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JUNE 2007
ISSUE #162

POPULAR Woodworking

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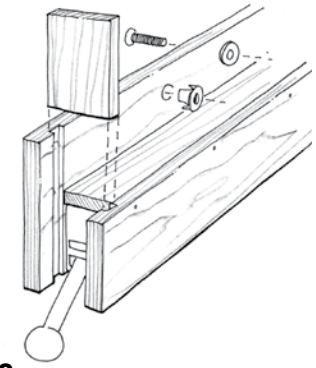
IN EVERY ISSUE



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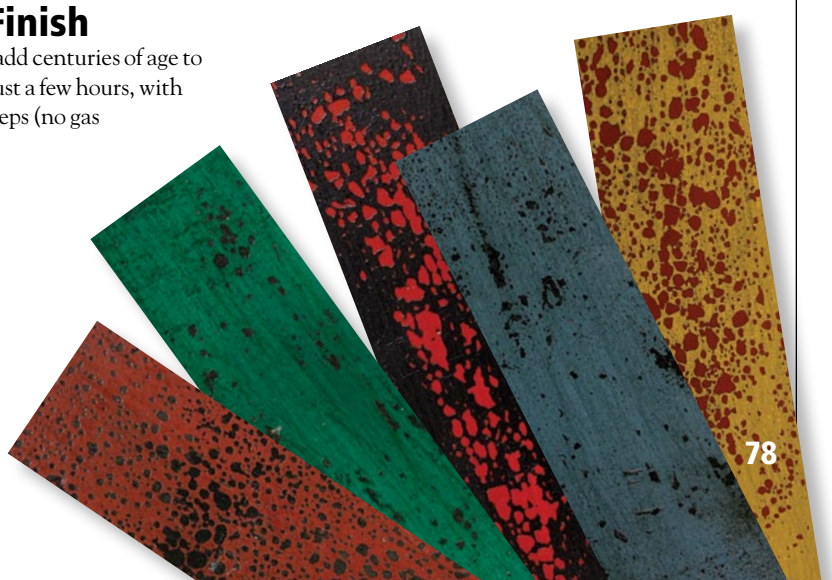
ON THE COVER

Classic designs such as this English-style workbench can help you easily hold almost any workpiece for any task, with a minimum of fuss. Plus, a proper bench will add speed and satisfaction to your shop time.

Cover photo by Al Parrish

DEPARTMENTS

PROJECTS, TOOLS AND TECHNIQUES



Online Tools

Enter to Win a PM2000 Table Saw from Powermatic

Enter to win a Powermatic PM2000 table saw, just for answering a few questions at popularwoodworking.com.

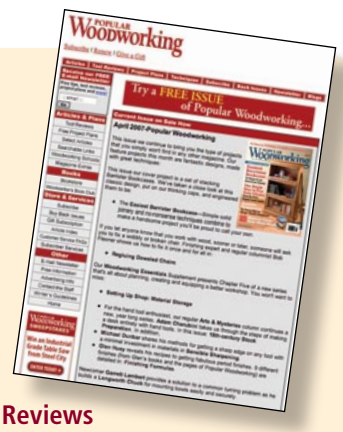
This cabinet saw garnered a 2006 *Popular Woodworking* "Best New Tool" award. We were particularly impressed by the machine's riving knife (a splitter that moves with the arbor). A riving knife allows you to work safely without getting in the way of your work when making through-cuts.

It also has an integrated caster system that allows you to move the saw at a moment's notice – another great feature for many home shops.

In addition, the PM2000 comes with a nice oversized table, a smooth-sliding T-square-style rip fence and more.

You can read all about the Powermatic PM2000 on our web site, then enter for a chance to win – but hurry – this contest ends May 31.

Inside Online



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Article Index

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Magazine Extras & Editor Blogs

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

Tool Reviews

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

Writer's Guidelines

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

Contact the Staff

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

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Editorial Offices 513-531-2690

Publisher & Group Editorial Director
Steve Shanesy

Editor **Christopher Schwarz**
ext. 1407 • chris.schwarz@fwpubs.com

Art Director **Linda Watts**
ext. 1396 • linda.watts@fwpubs.com

Senior Editor **Robert W. Lang**
ext. 1327 • robert.lang@fwpubs.com

Senior Editor **Glen D. Huey**
ext. 1293 • glen.huey@fwpubs.com

Managing Editor **Megan Fitzpatrick**
ext. 1348 • megan.fitzpatrick@fwpubs.com

Photographer **Al Parrish**

Contributing Editors
Adam Cherubini, Nick Engler, Bob Flexner, Don McConnell, Troy Sexton

F+W PUBLICATIONS INC.
Chairman & CEO **David H. Steward**
CFO **John Speridakos**
VP, Manufacturing **Barbara Schmitz**
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F+W PUBLICATIONS INC. MAGAZINE GROUP
President **Colin Ungaro**
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PRODUCTION
Production Manager **Vicki Whitford**
Production Coordinator **Katherine Seal**

ADVERTISING
Advertising Director **Don Schroder**
331 N. Arch St., Allentown, PA 18104
Tel. 610-821-4425; Fax 610-821-7884
d.schroder@verizon.net
Advertising Production Coordinator
Nancy Miller, Tel. 513-531-2690 ext. 1228
nancy.miller@fwpubs.com

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SAFETY NOTE

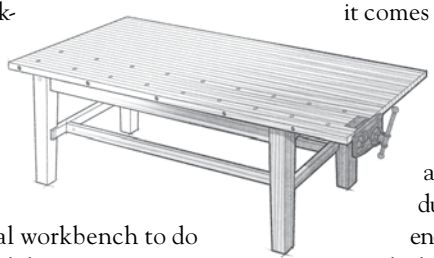
Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular Woodworking*, these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy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

Illustration by Matt Bantly

Avoid Unworkable Workbenches

In the summer of 2002 I got to visit Sam Maloof's new workshop and home in Southern California and was floored by three things: the tactile perfection of his work, the delicious pork tacos he fed us and the workbench that he and his employees work on.

Maloof's workbench looked so much like a dining room table that we could have eaten the tacos there comfortably. The bench was the height of a dining table, had four tapered legs and four well-proportioned aprons beneath the maple top. The only work-holding device was a patternmaker's vise.



Maloof's work, of course, speaks for itself. And what the work seems to say is that you don't need a traditional workbench to do awe-inspiring work. And that's true. In professional shops all over the world, makeshift workbenches are the rule.

So why do I sometimes get on a high horse about workbench design? (As I do in this issue in the "Woodworking Essentials" section.)

Well, no matter how much excellent woodworking is done on solid-core doors and plywood on sawhorses, my own experience with workbenches is valid and true.

As a boy I began woodworking on my grandfather's bench, a European model with a smooth face vise and dog holes. But when I started woodworking after college, I worked on a few scraps of construction lumber piled on my back porch. Since then, I've worked on every style of workbench imaginable – from an 18th-century French bench to a 21st-century power-tool workbench. I've built 10 workbenches, for myself or for others. And I've read every book in English that I could find about workbenches. Here's what I've found:

No matter what you build. No matter how you build it. No matter what tools you use. No matter your skill level. Working wood is easier with a bench that's designed to easily hold boards so you can work on their faces, their edges and their ends.

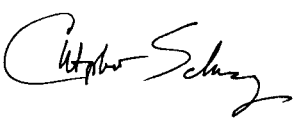
Few modern-day workbenches can accomplish this simple task. Why? Perhaps we've forgotten how good the old workbenches were. Perhaps we equate the old workbenches as necessary for hand-tool work. Or perhaps we don't even know we're struggling.

Woodworking is, after all, about problem-solving. And woodworkers are ingenious when it comes to figuring out how to do a complex task with limited tools. So we get by with a substandard bench, and we manage to produce nice furniture. In the end, good work comes from the hands, not the bench.

But let me suggest that almost every task you do could be easier. And we don't even need to invent anything. Fully evolved workbench designs were figured out 300 years ago – they're just waiting for you to rediscover them.

Mark Your Calendars: June 9-10

Michigan tool collector John Sindelar is holding a big bash June 9-10, and *Popular Woodworking* will be there. The two-day event will feature tool auctions, swap meets and demonstrations from interesting people: planemakers Jim Leamy and Konrad Sauer, finishing expert Dexter Adams from Chemcraft and other surprises. Sindelar's tool collection alone is worth the trip to Edwardsburg, Mich. Drop me a line for full details. I'm going! **PW**

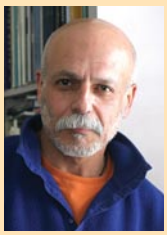


Christopher Schwarz
Editor

CONTRIBUTORS

MARIO RODRIGUEZ

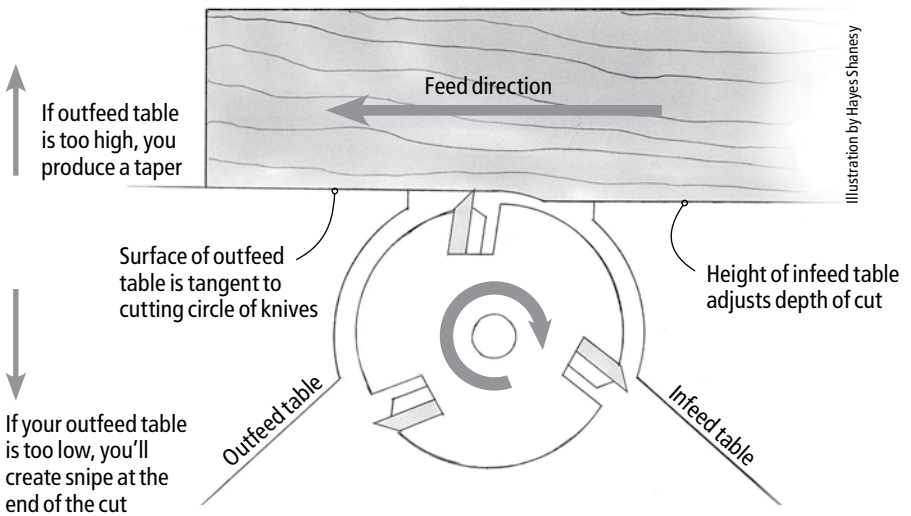
Mario has more than 30 years of experience in woodworking as a builder, teacher and writer. After almost 18 years in the Restoration Department at the Fashion Institute of Technology in New York City, he now teaches at the Philadelphia Furniture Workshop. Mario has two books under his belt, "Traditional Woodwork" and "Building Fireplace Mantels" (both from Taunton). He's also contributed numerous articles to many of the leading woodworking magazines. This is Mario's first story for *Popular Woodworking*; we're delighted to welcome him aboard. In this issue, he writes about methods for hot hide glue veneering, beginning on page 64.



MEGAN FITZPATRICK

Megan, the managing editor of *Popular Woodworking*, leads at least three lives. In addition to her duties at the magazine, she's working on her doctorate in English literature, concentrating on early modern drama. (Her favorite play is Francis Beaumont's "Knight of the Burning Pestle," which we've been told has a ribald pun in the title.) And when she's not correcting our coarse grammar around the office, Megan teaches literature and composition at the University of Cincinnati, practices cutting dovetails and listens to modern Americana music. Her interview with singer-songwriter-luthier Guy Clark begins on page 84.

Jointer's Alignment May Cause Tapering



My Leg Parts Taper – But Shouldn't

I am making a Mission-style computer desk, and I want to use a quadralineal leg construction technique that shows quartersawn grain on all four sides. My problem occurs when making the bevels on the four long edges of the workpieces. My saw is a right-tilt and I hate ripping to the right with the blade tilted. So I tried the 45° setting on my jointer fence. The problem I have is that the edge is coming out tapered. The bevel will be perfect at the front and still have a 1/16"-wide flat spot at the end of the board. I can't figure out what is causing this and would like to pull this off without buying anything. (I don't have a 45° router bit big enough for the job.) Any ideas?

Justin Norden
via e-mail

I understand your reluctance to make the rip cuts. If you can put the fence to the left side of the blade you can make this cut safely, but this is awkward because we don't do it very often.

The problem with your jointer is likely either that the tables are not aligned properly, or your technique is faulty. If the outfeed table is just a bit too high it will produce a tapered cut. The same thing can happen if you are applying pressure on the infeed table through most of the cut. Switch your hands so you are applying pressure on the outfeed table as soon as you have room to do this safely.

You can also get quartersawn figure on all four sides of the legs by laminating two pieces and applying 1/8"-thick veneer to the two non-quartersawn edges. I explain this technique in the "Lost Stickley Side Table" article in our November 2006 issue (# 158).

— Robert W. Lang, senior editor

Hard or Soft Maple: Which is Better Suited to Furniture Making?

I plan to build some 18th-century pieces from maple. I haven't used maple before, other than as inlay on pieces made from mahogany. What is the difference between "maple" and "hard maple?" Which is best suited for furniture?

Bill Jordan
Andalusia, Alabama

Maple is an excellent furniture wood. I love working with it. There are lots of kinds of maple, though the two you are most likely to find are sold as "soft maple" and "hard maple."

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Soft maple is almost always red maple (acer rubrum)*, though sometimes it will be silver maple. Hard maple is typically sugar maple* (acer saccharum) *or sometimes black maple* (acer nigrum)*.*

What's the difference? The hard maples are heavier, a bit harder and tend to be whiter in my experience. The soft maples weigh a bit less, are a bit easier to work (though not much) and tend to have more color streaking throughout (grays and browns mostly). In general, we've found color streaking becomes more prominent in Southern-grown maples of both types. In soft maples, unusual figure seems to be more common in our area, though the curly version of hard maple tends to be more dramatic.

Soft maple is generally less expensive than hard maple and is sometimes used as a secondary wood by some furniture makers. I have found that you can also use soft maple for exterior parts if you select it carefully.

— Christopher Schwarz, editor

Wanted: Details for Making Hand Tools

Where can I find details for making my own planes, saws and more? I spent some time on the Clark & Williams site (planemaker.com), but they give helpful hints – not details and dimensions.

Jim Rather
Medina, Texas

There are good resources out there for people who want to build their own tools.

If you are interested in making James Krenov-style wooden planes (or aren't sure what style you want to build), I recommend "Making & Mastering Wood Planes" (Sterling) by David Finck. While the book focuses on building the low-slung plane associated with Krenov, the book is an excellent all-around reference on plane mechanics and tuning.

If you want to make wooden planes that are more traditional, including moulding and joinery planes, then I recommend "Making Traditional Wooden Planes" (Astragal) by John M. Whelan. It also is an excellent reference on plane mechanics.

For making your own saws, I have two recommendations. Visit the Norse Woodsmith site (norsewoodsmith.com), which has a wealth of information about saw making (and tool making in general). There are lots of photos, illustrations and text to guide you.

For sharpening your saws, I recommend "Setting and Sharpening Hand and Power Saws" (Wooden Boat Books) by Harold H. "Dynamite" Payson. It is, in my experience, the best book on the topic.

— Christopher Schwarz, editor

How to Make Side-hung Drawers

I am a relatively new woodworker and focus on Mission-style furniture. I am in the process of making two end tables that each have one drawer.

Excluding my workbench that contains drawers hung on manufactured runners, I have never made a piece of furniture that has drawers. I would like to hang the drawers from the sides using wood rails that ride in a groove in the drawers' sides (as done in Stickley furniture) but would like some specific guidelines on how to do this. If it's possible to do this with a table saw rather than a router, that would be great.

I particularly like the Stickley-type furniture plans that have been published in *Popular Woodworking* but haven't found any that contain a drawer using this construction method. Are there any? If not, do you have any detailed guidelines that I could use? For example, given a specific drawer opening size, how do you size the drawer appropriately for the space? And where do you place the wood rails and the drawer grooves for a foolproof fit? I want to learn some general "rules" that I can apply to any future situation.

Brian Baker
Bethlehem, Pennsylvania

The Byrdcliffe cabinet I made for the April 2006 issue (#154) has side-hung drawers. I also discuss this in my first book, "Shop Drawings for Craftsman Furniture" (Fox Chapel). It's not that complicated. I usually make the drawer sides out of 1/2" or 5/8" material, and make the groove 1/8" to 3/16" deep. The width of the groove will vary between 3/4" and 1 1/4" depending on the height of the drawer, with a wider groove in a taller drawer. I center the groove top to bottom in the height of the drawer side. I make the drawer about 1/16" smaller on all sides than the opening; if the drawer front is more than about 6" wide, I'll leave a bigger gap at the top and bottom (I use a nickel as a spacer in winter and a dime in summer).

The main thing is to get the runner sized so that it slides nicely in the groove without being sloppy. If I can, I'll attach at least one end of the runner to the case with a screw in an oversized hole so that I can adjust it to keep the drawer front parallel to the front of the case. For a final fit, I'll rub chalk on the runner or in the groove and work the drawer in and out to reveal the high and low spots. I try to cut a nice clean groove with a machine – I prefer the router – then I can plane the runner with a block plane or a shoulder plane to fit. Paraffin rubbed on mating parts will help it slide.

The main reason not to use the table saw for the grooves is that the grooves need to stop an inch or so back from the front of the case. A stopped groove from the table saw will ramp up at the end and this excess material will need to be removed.

— Robert W. Lang, senior editor

Advice Needed for Correct Use of The Skew in Woodturning

Do you have any advice on the correct use of a skew in woodturning? I was taught incorrectly in school and later learned a little correct woodturning technique during a brief encounter with a far more knowledgeable turner than my woodshop teacher.

One trick was to turn, then join offset turnings to make offset feet on tapered legs, then round and cut them off cleanly – all glass-smooth with no sanding whatsoever. I learned more in five minutes from that turner than in an entire year in school, and would like to expand on that.

Christopher Wright
Verona, New Jersey

For truly glass-smooth cuts, the skew is the proper tool – and mastering that tool takes practice. Alan Lacer is a recognized expert and promoter of using the skew, and he's made some good videos demonstrating its use and technique (you can find his videos and more information about him at alanlacer.com).

Because you have already discovered the value of learning firsthand, I'd suggest you look into a turning club or guild in your area. Members are usually more than happy to help people learn and improve. Our local group in southern Ohio even has an established no-cost mentor program. You can find a list of clubs with links to more info at woodturner.org.

— Steve Shanesy, publisher

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Pining for Finishing Advice

I find finishing articles are often confusing so I skip them, but Glen Huey's "Finishing Formulas" was interesting and easy to follow (issue #161). One question – I am making a pine chest. What finish do you recommend?

Don Alexander
via e-mail

Pine, be it clear white or Southern yellow, is different from the wood I used for most of the projects described in the article. Other than the painted cupboard, those projects are hardwood; pine is a softwood. Pine readily exhibits blotching when staining, so you won't obtain the same results with the aniline dye finishing methods from the article.

In a previous career (homebuilding), it was common to apply a "wash coat" of thinned shellac (1# cut) before staining it with oil-based products. It's a tricky scenario at best. Too much or too thick and the shellac prohibits the stain from penetrating and actually staining the piece at all. It might be worth your time to experiment on scrap wood.

Today, I'd suggest using a gel stain. Gel stain is thicker than regular stain and doesn't penetrate as much as the aniline dye stains. Therefore, the gel-stained finish on pine is likely to show less blotchiness. But there's no guarantee – experiment on scrap to arrive at an acceptable finish.

— Glen D. Huey, senior editor

What Glue for Cutting Boards?

I wish to make cutting boards but am not sure what glue to use. My cutting boards will get wet so the glue must be waterproof but also not cause people to get sick. Is there some special glue made for this purpose?

James "Tommy" Tompkins
Graham, Washington

Years ago, I made a lot of cutting boards using epoxy. It's a good choice, but brittle; a drop to the floor can break the glue line. This was before the advent of Gorilla Glue or Titebond III. Today, I think I would use Titebond III.

— Robert W. Lang, senior editor

A Shine-free, Durable Topcoat

Your finishing article in the April 2007 issue was very timely; I am finishing a large cabinet and have some questions about it.

The cabinet is for our mud room and will see some abuse. The lower shelves will be for storing boots and shoes and so must hold up to water, mud, dirt and scratches. For this reason, and because I want as low-maintenance a finish as possible, I decided to go with polyurethane for the top coat.

After I had it stained, my better half informed me that she does not want any shine or sheen to the finish – not even that which you get from satin polyurethane. Is there a good compromise between the amount of shine and the durability of the top coats?

I am interested in the antique appearance from shellac that you discuss, but have some questions:

1) How does shellac hold up compared to polyurethane?

2) Would shellac be an adequate choice for the abuse this piece will be getting?

3) Would I have to use spray equipment to apply the shellac?

Eric Torola
Dassel, Minnesota

I wouldn't choose shellac for a tabletop or anything else that will likely get a lot of abuse (such as the shelves in your project). That's the ideal finishing situation for polyurethane or even something harder, such as catalyzed lacquer or varnish, some of which are available in a dull sheen.

And no, you don't have to apply shellac with a spray system. Most often, shellac is either brushed or wiped onto a project.

By the way, if you already purchased the polyurethane and the sheen is the only issue, simply rub the finish lightly with #0000 steel wool. That's a way to knock off the high sheen in a topcoat. It might just do the trick, and make both you and your wife happy.

— Glen D. Huey, senior editor

Wooden Handplane Restoration

I now have four books on wooden planes and can't find a thing about restoring the wood portion of these planes. Articles on the web suggest a variety of treatments, soaking in boiled linseed oil among them. Then on the tool dealers sites I see such things as "properly oiled and waxed." I have learned not to take information found online as gospel. But I trust the staff of *Popular Woodworking*.

If you were to purchase some old wooden handplanes and wanted to restore them for use, collecting or to sell, what would be the best treatment (after removing dirt and grime)? And what about this wax I'm hearing about?

Almost every unused wooden plane I have seen is very dry, shows small cracks and would likely benefit from some kind of oil treatment.

Terry Miller
Albion, New York

There is a lot of bunk out there about wooden handplanes. They don't need to be soaked in linseed oil, and they don't need special waxes. Just treat the wood like it's wood. Any cracks in the stock of the plane are probably due to the plane being stored improperly. There's not much you can do about it now — oiling sure won't close the cracks.

Clean the plane with a rag and a little mineral spirits. Maybe put a coat of paste wax on the tool to make it look nice. Then turn your attention to the sole, the mouth, the escapement and the wedge. Those things are far more important than applying voodoo to the stock. **PW**

— Christopher Schwarz, editor

QUESTION? COMPLAINT? WRITE TO US

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

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

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

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Popular Woodworking
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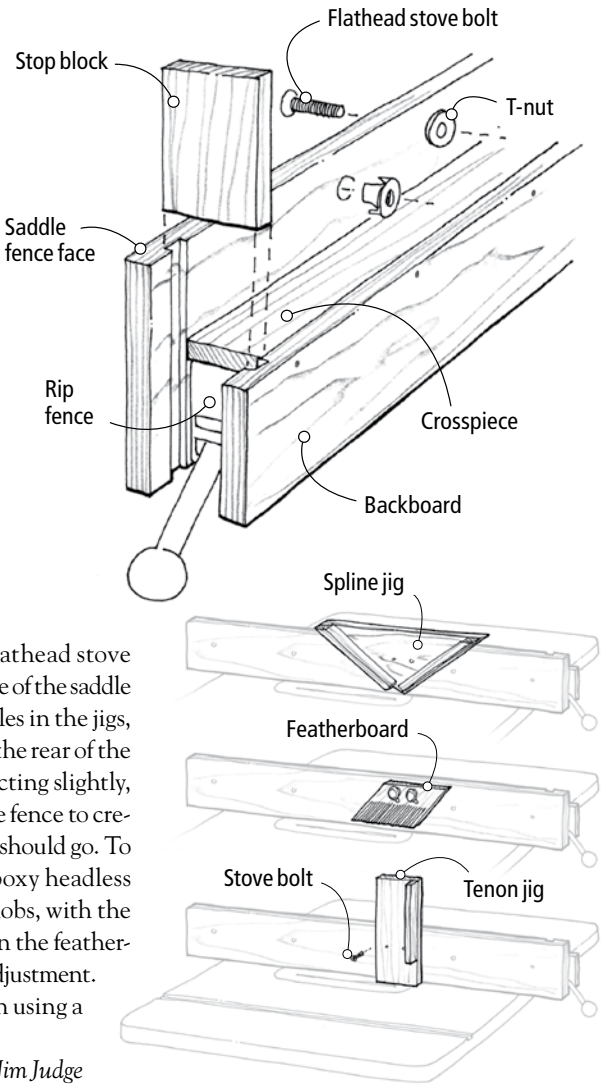
Cincinnati, OH 45236

Compiled by Paul Anthony
Illustrations by Matt Bantly

Multi-purpose Saddle Fence



THE WINNER:

I decided to make a saddle-type tenoning jig to ride on my table saw rip fence, and I got to thinking that I should make it multi-functional. I ended up devising this saddle fence that accommodates all sorts of jigs, including a tenoning jig, a featherboard, an auxiliary fence face for cutting rabbets with a dado head and even a spline jig that cuts slots in the corners of assembled boxes and frames.

The saddle fence slips completely over my rip fence and includes a removable stop-block that sits in dados at the operator's end. I leave the block in place when I want the fence stationary for mounting an auxiliary fence face or a featherboard. To use the tenoning jig or spline jig, I remove the stop-block, which allows the whole saddle and jig to slide in order to carry the workpiece over the blade.

I built my fence from quartersawn lumber, but you could use MDF or good-quality hardwood plywood instead. Make sure that the fence face, crosspiece and backboard are all square to each other, securely attached, and that the saddle sits snugly on your rip fence. Make the fence face tall enough to accurately support workpieces on end, and to accommodate T-nuts for attaching various jigs. (My fence is 5" tall.)

I attach most jigs with flathead stove bolts countersunk into the face of the saddle fence. To locate the T-nut holes in the jigs, you can thread bolts in from the rear of the fence with the bolt tips projecting slightly, then clamp the jig against the fence to create imprints where the holes should go. To attach my featherboard, I epoxy headless bolts into turned wooden knobs, with the bolts inserted through slots in the featherboard to allow up and down adjustment. I clamp the fence down when using a featherboard.

Jim Judge
Casper, Wyoming

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CASH AND PRIZES FOR YOUR TRICKS AND TIPS!

In each issue we publish useful woodworking tips from our readers. The 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 at right 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 (either by mail or e-mail) you must include your complete mailing address and a daytime phone number. If your trick is selected for publication, an editor will need to contact you. All entries become the property of *Popular Woodworking*. You can send your trick by e-mail to popwoodtricks@fwpubs.com, or mail it to Tricks of the Trade, *Popular Woodworking*, 4700 E. Galbraith Road, Cincinnati, OH 45236.

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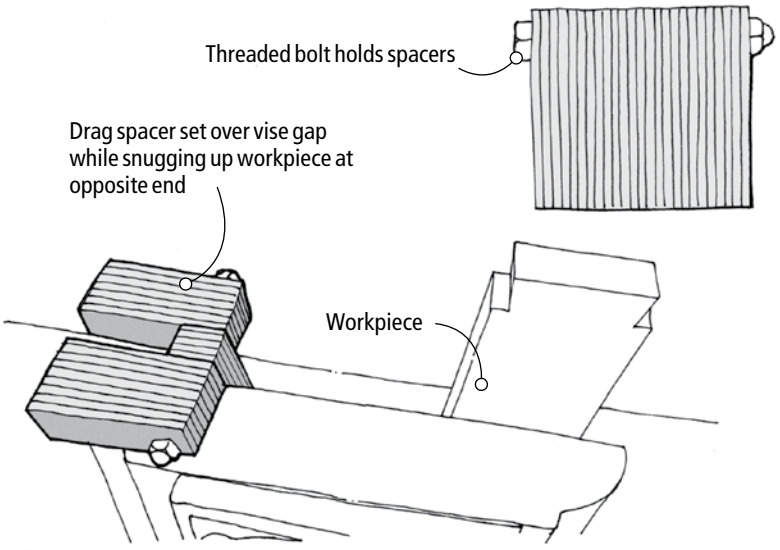
Adjustable Vise-spacer Set

I've seen tips regarding all sorts of shop-made spacers that prevent a vise from racking when an object is clamped at only one end of it. I've tried some of them, but found that I don't like having a bunch of little pieces laying around waiting to be lost or sucked up the dust collector.

Instead, my solution was to mill up some 1/8"-thick stock, and cut it into 25 pieces about 1" wide by 5" long. I drilled a 3/8"-diameter hole at one end of each, and threaded a 3 1/2"-long bolt through the stack to create an automatically adjustable, one-size-fits-all spacer set. Just drag it over the vise opening as you're snugging up your workpiece at the opposite end of the vise jaw. The appropriate number of spacers will fall into the gap by themselves.

Nick Anastas
Barrie, Ontario

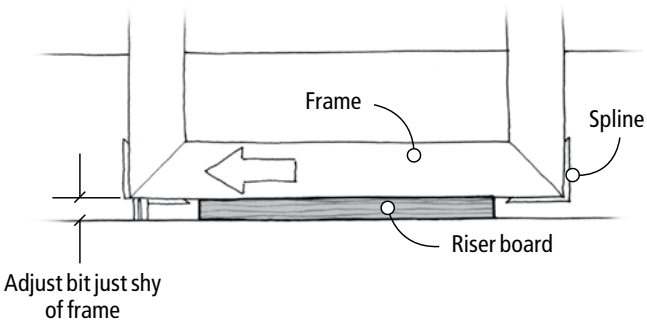


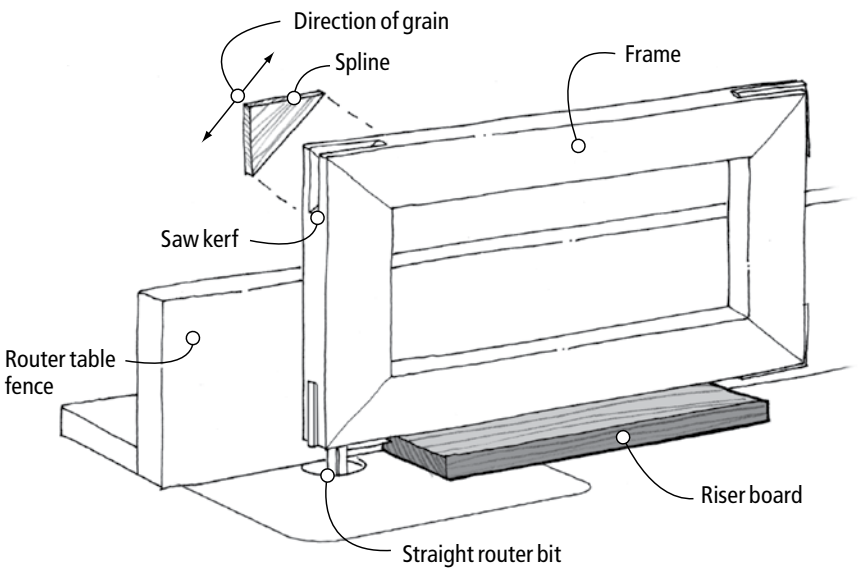
Trimming Spline Joints

As any savvy woodworker knows, miter joints should be reinforced for strength. One of my favorite methods is to glue the frame together, saw a kerf diagonally across the corner and insert a spline to create the joint. Sawing the kerf is a simple matter of using a jig to carry the frame corner-side-down over a table-saw blade. (See "Multi-Purpose Saddle Jig," page 18.) I cut my triangular splines slightly oversized in length and width, often making them of a contrasting wood to accent the frame. (For strength, it's critical that the grain of the spline runs perpendicular to the miter joint line.)

After installing the splines in their kerfs and letting the glue dry thoroughly, I trim the splines flush with the frame. I used to do this with a small handsaw, chisels and a block plane, but I've found that it's much quicker and easier to do on a router table outfitted with a straight bit. I rest the edge of the frame on a scrap riser board that's not quite as long as the distance between the projecting splines. Then I adjust the height of the router bit so it's just a bit shy of the frame. After adjusting the router table fence so the bit aligns with the spline, it's a simple matter of feeding the frame corner over the bit to trim the spline flush. A few passes with a sharp block plane afterward is all it takes to produce a neat joint.

Paul Anthony
PW contributor



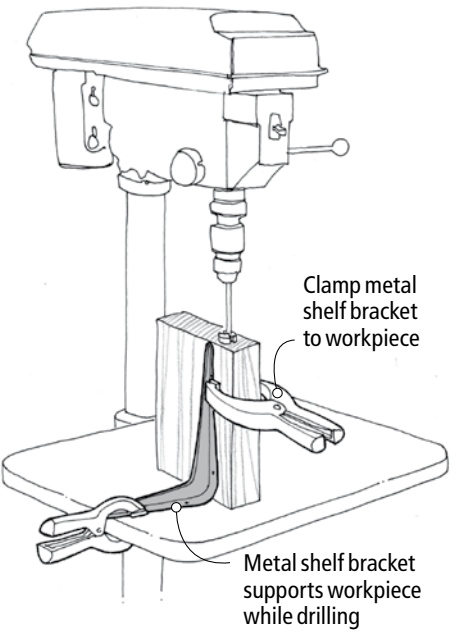


continued on page 22

Quick and Easy Drill Guide

Occasionally I need to drill a hole into the end of a rail or other workpiece using the drill press. I've found that a metal shelf bracket makes a handy support, keeping the workpiece square to the table and in line with the drill bit. I simply clamp the bracket to the drill press table, then clamp the workpiece to the bracket. I keep various sized brackets on hand to accommodate workpieces of different lengths.

Bob Kelland
St. John's, Newfoundland



Biscuits Please, But Hold the Glue

When using biscuits as an alignment aid for edge-joining solid-wood boards, I save quite a bit of time by not bothering to apply glue to the slots or biscuits. In this case, gluing the biscuits isn't necessary because properly jointed solid-wood edges don't need reinforcement, and using biscuits for this can actually cause problems. A board that has been sanded or planed before the glue has cured entirely can result in biscuit-shaped depressions later when the water from the glue evaporates, causing the wood to shrink in that area. **PW**

Bill Newcomer
Saranac Lake, New York

A Better Sanding Solution

Sanding accounts for a major portion of work in the shop. The dust produced can lead to bouts with chronic bronchitis, asthma or dermatitis. So you have reason to search for better sanding products.

Mirka Abrasives Inc. has invented "Abranet" – aluminum-oxide grit with resin-over-resin bonding, attached to polyamide fabric backing with a hook-and-loop design. It's best used with a vacuum setup for dust-free sanding. Simply put – it's a better sanding product that's available in discs, sheets or rolls with grits ranging from #P80 to #P800.

What makes this design a better sanding solution? It resembles a sanding screen, but a sanding screen is simply a fully coated product while Abranet has the abrasive aligned in rows. It's that row formation that makes Abranet unique. Because of the abrasive arrangement, dust is never more than .5mm from an opening in the disc, through which it's extracted from the surface.

This efficient extraction is beneficial in a number of ways. For one, the disc isn't as likely to cake or clog. That keeps the grit working longer per disc, in effect extending cutting time and reducing replacement. It will also prevent "pilling" – the buildup of small amounts of dust that cause sanding defects that show up in later finishing steps, such as swirls.

To use this product to its fullest capacity you need to have adequate dust collection on your sander. Mirka has a full range of products to help. That doesn't mean that you can't use your sander just as it is, but the best setup would be to replace the sanding pad on your tool with one designed specifically for Abranet – a pad that has 52 exhaust holes. Prices for these vary depending on your type of sander. Abranet will make any sander more efficient, but the more vacuum suction, the better the extraction.

Photos by Al Parrish

One accessory Mirka recommends is the "Pad Protector." This product is designed to prolong the life of your replacement pads and softens the cut of the abrasives. We tried Abranet with and without the pad but noticed no difference in the short run.

Mirka also offers the "Interface Pad." This is a ½"-thick pad designed for rounding corners or sharp edges. It prevents the Abranet disc from catching an edge and tearing – the one downfall we found with the product. If you catch an edge while sanding (as we did sanding a face frame), the pieces will rip and you'll have to replace them. The Interface Pad makes sanding the inside of cove moulding and other curved profiles easier.

Disc sizes run from 3" to 11" in diameter, with sizes to fit most orbital sanders. There are sheets available for many electric and hand-sanding tools. The sizes are 3" x 4" and 2¾" wide x 5", 8" and 16½" long. The rolls are 4½" wide x 10' or 25' in length.

Mirka claims Abranet lasts three to five times longer than ordinary paper-backed discs – and at three times the life, Abranet is a better monetary value. Plus, less shop cleanup and less time spent changing discs means a time savings, too. And less sanding dust in your lungs? An incalculable value.

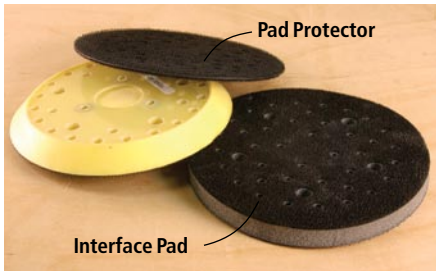
— Glen D. Huey

For more information, circle # 154 on Free Information Card.

SPECIFICATIONS

Abranet

Street price: $33 box of 50 – 5" (packs of 10 available at woodcraft.com, $16)
Pad protector: $17 two-pack – 5"
Interface pad: $14 – 5"
Performance: ●●●●○
Price range: $$$$
Mirka Abrasives Inc.: 800-843-3904 or mirka-usa.com



There is a replacement pad to fit most sanders. The thick Interface Pad softens the cut of the abrasive for rounding corners and the Pad Protector lessens the wear on the pad while sanding.

When you hold it up to the light, it's easy to see why Abranet has the best dust collection when a vacuum system is used. Better collection extends the life of the disc.

Ryobi Cordless Sander

Random-orbit sanders are a staple for woodworking. Having a sander that's cordless can be better in certain situations. The 18-volt Ryobi P410 is not the tool for everyday use, but it's perfect for any time you need to make a quick sanding swipe – or two – to bring your work back from disastrous nick, scratch or gouge.

Being able to sand without having to unwind and struggle with an electric cord or drag out the extension cord or air hose increases shop production. Having this sander on the job makes work easier.

At just under five pounds with a grip girth of 9¼" this sander is large. It will fill your hand unless you have huge paws.

Although it appears top heavy, the Ryobi P410 is well balanced and easy to use. At 10,000 orbits per minute the sander is slower than electric or air-powered tools; to compensate, the orbit diameter is less aggressive.

The 5" hook-and-loop pad accepts most eight-hole sanding discs.

— GH

For more information, circle # 155 on Free Information Card.

SPECIFICATIONS

18v Random-Orbit Sander
Street price: $40
Weight: 4 lbs. 11.7 oz.
Girth at grip: 9¼"
Replacement battery: $40 for two
Performance: ●●●○○
Price range: $$
Ryobi: 800-525-2579 or ryobitools.com

Zona: The Best $9 Backsaw

Sometimes the laws of time, space and economics get bent. And in the case of this Zona-brand saw, sometimes the laws get broken.

The Zona is a 24 tpi backsaw with a 6½"-long blade, 1¾" maximum depth of cut, and a straight handle with a shiny finish. The teeth are filed rip and cut on the pull stroke. Here is the kicker: The saw costs only $8.95 but it cuts like a much more expensive tool.

Designed for model makers, the saw cuts slowly, which is to be expected, but the surface finish left behind is so clean that it shone like it had been planed. And when used in white oak (a difficult ring-porous wood for fine saws) the saw excelled.

The Zona saw is great for detail work, such as trimming stringing, inlay and banding. I've also used it to cut dowels, define the limits of a hinge mortise and rip wedges before driving them into a joint. One last surprise: The saws are made in Bethel, Conn. So sometimes you do get more than what you pay for.

— Christopher Schwarz

For more information, circle # 156 on Free Information Card.

SPECIFICATIONS

Zona Razor Saw
Street price: $9
Overall length: 12"
Sawplate: .01" thick
Performance: ●●●●○
Price range: $
Zona Tool: 203-792-8622 or zonatool.com

MORE REVIEWS ON OUR BLOG

LIE-NIELSEN ROUTER

Lie-Nielsen Toolworks is now making a small hand router based (loosely) on the Stanley No. 271, but with some nice curves. Search on "Lie-Nielsen." *— CS*

HOVERPAD

I bet you've seen the Hoverpad. It's a hard-plastic, furturistic-looking, air-assisted, bladder-swelling mobile base that can move large tools around your shop effortlessly. How does it work? Do you need one in your shop? How is it priced versus available mobile bases? Search on "Hoverpad."

— GH

PC COMPACT SANDER

This lightweight belt sander (only five pounds) is a great tool for small sanding jobs, and the two flush sides allowed me to sand all the way into the corner of a 90° angle. Plus, the rubber grip fit comfortably and securely in my small hand.

My one complaint? No dust collection bag – just a hose port. If I have a large enough sanding job to need my vacuum, I'm likely to pull out my larger sander, too. Search on "371K." *— Megan Fitzpatrick*

TOOL RATINGS

Performance is rated on a one-to-five scale. You won't see a low rating ("one or two") because we don't publicize inferior tools. "Five" indicates the leader in the category. Five dollar signs indicates highest price in the category. Three indicates an average price. If you have tool questions, call me at 513-531-2690 ext. 1407, or e-mail me at chris.schwarz@fwpubs.com. Or visit our web site at popularwoodworking.com to sign up for our free e-mail newsletter.

— Christopher Schwarz, editor

Marcou S20A Smoothing Plane Great for Exotics

If you work with exotic woods – the nasty, stringy stuff that no plane can tame – then Philip Marcou would like to build you an equally exotic handplane. Marcou, a New Zealand cabinetmaker-turned-toolmaker, builds premium planes designed to easily achieve the high cutting angles that work with exotic woods.

For several months, I borrowed an S20A smoothing plane from Marcou to use, and I spent that time looking for exotic woods that the tool would not plane. Of the 15 or so woods I tried, the Marcou S20A handled them all with ease.

The plane works with the bevel facing up, like a block plane, so you can increase the cutting angle of the tool simply by increasing the sharpening angle on your iron. The iron is bedded at 20°, so by honing a 40° angle on the iron I was planing at 60°. There are lots of planes that can do this, of course, but the Marcou shines because of its mass (it weighs almost 9 pounds) and the fact that you can close up the mouth to an aperture that's perfect for smoothing. In fact, when the mouth is closed all the way, the aperture is spot-on for taking a .001"-thick shaving. That is some high-tolerance engineering, and it's one of the reasons the tool costs $1,995.

Like any tool that costs this much, everything about the Marcou is finished to a high degree. The depth-of-cut adjuster is as smooth as silk. The dovetails that join the sole and sidewalls are seamless. My only complaint with the tool was I found the rear tote a bit uncomfortable for my hand. Marcou said he's refining the tote shape and will, of course, fit a tote to a user's hand.

Owning a Marcou is like owning a Jaguar. You might not need one to get to work every day, but its beauty and performance make you lust wildly for it. — CS

For more information, circle # 157 on Free Information Card.

SPECIFICATIONS

Marcou S20A Smoothing Plane

Street price: $1,995
Dimensions: $11\frac{3}{16}$" l. x $2\frac{3}{4}$" w.
Iron: $2\frac{1}{4}$" Veritas A2 iron
Performance: ●●●●◐
Price range: $$$$$
Marcou Planes: marcouplanes.com or wkTools.com.
In the U.S. call Wiktor Kuc at 505-401-6040.

Steel City 13" Planer is a Solid Contender

The new Steel City Tool Works machines we've tested have been solid tools with few frills at a fair price. And the company's newest 13" portable planer, the 40200, fits in well with the company's other products.

The 40200 has features that woodworkers need, including a three-knife cutterhead, quick-change knives and two feed speeds, plus a $399 price tag that makes it a good value among other 13" planers. Of all the merits of the machine, the one we think is most important is the three-knife cutterhead. Our experiences with three-knife machines have shown they produce a nice surface finish for a longer time because the blade wear is spread out over three knives instead of two.

Not that changing knives on the 40200 is difficult. The two-sided disposable blades drop in on pins – it takes 15 minutes to change all three. Another key feature about the knives: You can adjust them left and right to cancel out any nicks that appear on your knives.

We've run a couple hundred board feet of hardwoods and softwoods through the planer to see how gutsy the motor is, how nice the surface finish is and to see how much snipe was created at the ends of boards. The motor was fine – you're never going to get induction-motor power out of a universal motor in any portable planer. The surface finish was excellent at both feed speeds (16 and 23 feet per minute). And the snipe was acceptable – a few thousandths of an inch of thickness. You can sand that out with ease.

There's no cutterhead lock, which some woodworkers like but we don't think is a do-or-die feature. Like on all portable planers, we wish the polyurethane infeed roller was grippier. It wouldn't grab the boards firmly when it got dirty. All in all, if you really want a three-knife cutterhead and two speeds with a good price, this is a tool for the top of your list. **PW**

— CS

For more information, circle # 158 on Free Information Card.

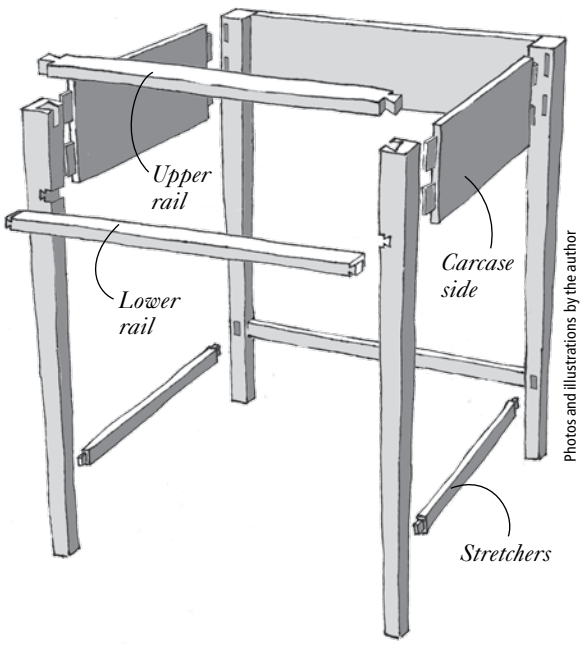
SPECIFICATIONS

Steel City 40200 13" Planer

Street price: $399
Replacement blades: $57
Warranty: 5 years
Weight: 66 pounds
Performance: ●●●●○
Price range: $$$
Steel City: 615-225-9001 or steelcitytoolworks.com

18th-century Carcase Joinery:
The Lower Case

How to build your first as if it's your hundredth.



Photos and illustrations by the author

This drawing suggests a more or less typical approach to mid 18th-century furniture building. The joinery reflects my sensibilities and technical capabilities. Learning period "best practices" is difficult. I recommend Jeffrey P. Greene's "American Furniture of the 18th Century" (Taunton). Even if you're not an 18th-century furniture fan, the appendix shows useful hand-tool only, solid-wood construction methods.

Period accounts indicate 18th-century American cabinetmakers typically produced a wide variety of products. They were neither quite as specialized as some would have it, nor did they produce particularly great quantities of any one product.

Philadelphia cabinetmaker John Head made an estimated 20 high chests in his 35-year career. The Wistar high chest, currently residing in the Philadelphia Museum of Art, was made early in his career. And though it is indisputably a masterpiece, it could not possibly reflect years of "lessons learned" building this particular product.

This is part three of my series on building a standing desk for my shop using the tools and techniques of 18th-century cabinetmakers. In this article, I'll begin constructing the basic structure or carcase of the desk. I'll focus on the joinery, as well as the tools and techniques used by early craftsmen.

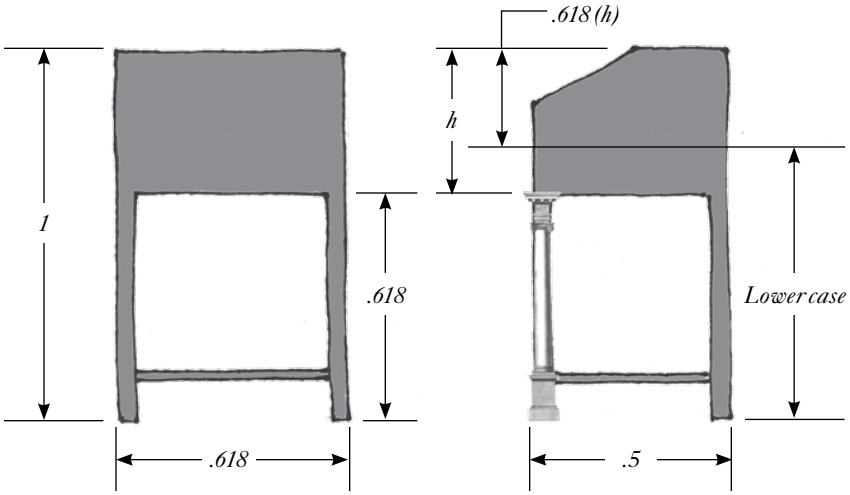
Legs – Start Rough, Refine as Required

I began the lower case by preparing the legs. The legs were sawn out of a thick piece of pine, then quickly rough-planed square. It is my understanding that tapering legs with machines requires special jigs. I used a hatchet. In a matter of minutes, all the legs' tapers were rough chopped and rough planed. But there was still much more to be done.

To get nice-fitting joints, the two mating faces (where the mortises go) need to be square. But I also wanted the aprons flush with the outside faces of the legs. So those outside faces needed to be squared up as well.

Additionally, I found it advantageous to make the left and right legs similar. Technically, I could have planed to my gauged line, but I found it easier to simply match-plane the legs. Having the right and left legs the same allowed me to make the left and right aprons the same. Because of the drawer, the front and back pieces are necessarily different so I saw no need to match front and back legs.

With the legs squared up, I was ready to cut the mortises. The mortise gauge was set to produce a tenon in the middle of the thin apron boards. That setting was then transferred to the leg stock. When joining a particularly wide board like this one, it's typical to see multiple



Though it would appear in a slightly different form, this would be all the design information an 18th-century cabinetmaker could expect. The imposition of the Ionic column determines both the minimum size for the leg taper (not shown) as well as the position for the stretcher. For more information on the design of period furniture refer to my story in the February 2007 issue (#160). Eighteenth-century furniture illustrations, when they existed at all, did not include construction details.

by Adam Cherubini

In addition to woodworking, Adam enjoys drawing and painting. He studied art at the Fleischer Art Memorial in Philadelphia. Visit his blog at artsandmysteries.com.

tenons as opposed to one long tenon. I believe this was done to save time mortising.

When the Tenons are Too Wide to Saw, Cut Rabbets

Craftsmen in the 18th century used backsaws with blades as long as 20" to saw tenons, but the average tenoned carcase side was probably too wide to be sawn. I marked out the tenons as usual then cut them with a moving fillister plane (which cuts a rabbet). The fillister does a good job making tenons on a wide board but a lousy job making tenons on a short one. (See photo on the next page.)

Lower Stretchers

With the upper mortise-and-tenon joints fitted, I turned my attention to the lower stretchers. I positioned the stretchers using the column orders (see my blog at artsandmysteries.com for more information on column orders). The height of the stretcher off the floor is the height of the base of the column. Because the legs are tapered, I simply held the stretchers against the legs and scribed the taper on the stretchers. These tenons were marked and sawn with a backsaw.

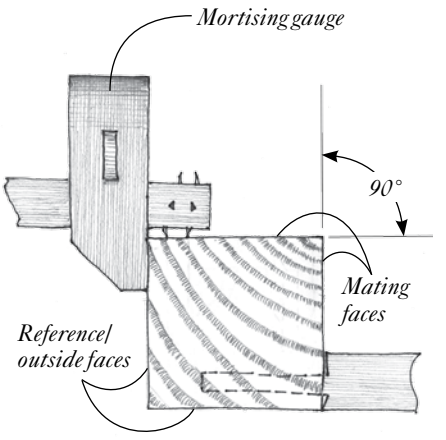
Building the Front – Sliding Dovetails

After completing the carcase sides and lower stretchers that join the sides and back, build the front. The front legs are held together with sliding-dovetail joints on the ends of two rails that define the drawer opening. The lower rail slides in from the front. The upper rail slides down from the top. Both rails are as wide as the legs are thick. You'll see why later.

I began by sawing the dovetail shape on each end of both rails. Then I simply laid them on the project and traced around with the knife end of my striking knife. I did not taper the dovetail in any way. Using my backsaw, I simply sawed out the knifed lines and chopped out the waste with my chisel. One trick you see in period sliding dovetails is that although the rail stock is as wide as the leg, the dovetail rarely spans that full length. The dovetails are often cut off such that they only extend 1" or so into the thick leg stock.

Adding a Drawer to the Lower Case

The only thing that separates this piece from a table is the integration of a drawer. The basic full-height leg construction with an upper apron, mortised and tenoned into place, easily dates to the Middle Ages. In 17th-century pieces, drawers were hung on side rails almost like modern ball-bearing drawer slides. The rails were typically either let into notches in the legs or nailed in place. This is an easy and effective approach to integrating a drawer. The only downside is that it requires a side-hung drawer. Side-hung drawers require thick sides in which a groove is let for the runner. Hardwood sides are less prone to wear than softwood sides. Consequently, drawers made this way were often fairly heavy. I chose to use the 18th-century method, requiring runners, guides and kickers.



I tend not to four-square stock (make each face square to its adjacent faces), but in this case, the ends where the apron attached really needed to be squared.

I like to brag about how roughly and quickly I work because I think it marks a significant departure from my perception of "Norm-al" woodworkers. The truth is, this is only the first step. I start rough, then refine where needed. In this picture, I'm producing the leg taper with a hatchet.

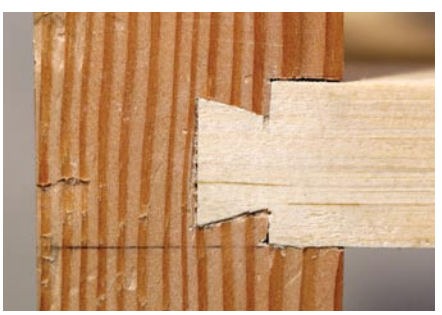
In this picture you can see the two squared up rear legs. They are square but not exactly the same size. The long try plane shown remedied this problem in seconds.

The drawer runners are tenoned into the back of the upper and lower rails. I find it advantageous to have the rails as wide as the legs so I don't have to notch the runners around the legs. Different craftsmen attached them differently in the back. Some simply nailed or doweled into their end grain through the back piece. Others chopped a hole in the back to permit a short tenon. I chose to chop the holes as shown in the illustration below.

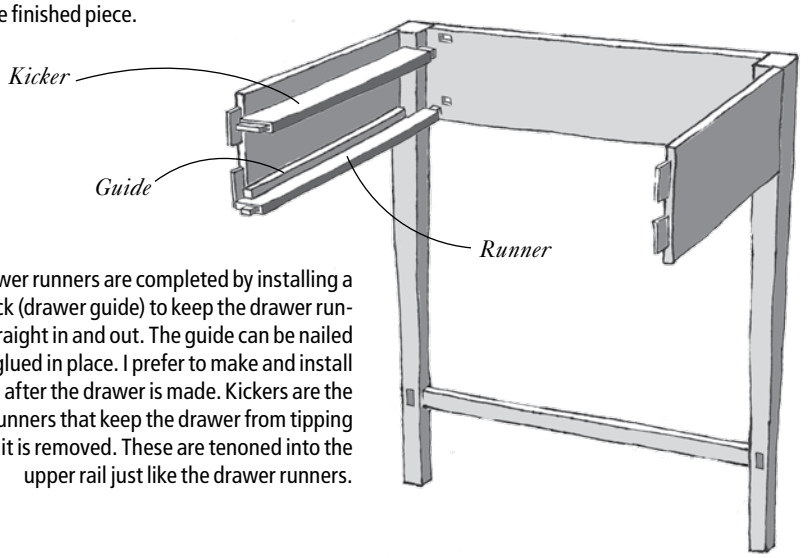
It's tough to saw tenons on a wide board. I'm using a fillister plane instead. The disadvantage of this method is that the shoulder of the tenon is defined by the end of the board (where the plane's fence rubs). That means the length of the board must be just so. So this isn't a better way to cut tenons, but it's a reasonable alternative for wide carcase sides. See my blog for a demo.

I mark the tenons directly from the mortises. It's important to have nice crisp ends on your mortises. When the ends are rounded over even a little bit, it's tough to know how wide to make each tenon.

The upper rail holds the tops of the two front legs together. I think the trick to getting any dovetail tight is sawing accurately. Beyond that, what you want is for that wedge shape to pull against the shoulders. If the top is too tight, the wedge shape can't do its job. So I shaved away a bit of the top of the tail to get a tight fit. This joint won't be visible in the finished piece.



I think it's helpful to bury the shoulder inside the leg. This makes the creation of the rail much easier and allows the inside surface of the leg to vary that much more.



The drawer runners are completed by installing a little stick (drawer guide) to keep the drawer running straight in and out. The guide can be nailed or glued in place. I prefer to make and install them after the drawer is made. Kickers are the upper runners that keep the drawer from tipping down as it is removed. These are tenoned into the upper rail just like the drawer runners.

Locking It Up

I've left this piece unglued to give me a little more freedom to make changes as I build the upper case. The lower sliding dovetail is so tight, I doubt I could get any hide glue in it. The upper dovetails could probably use a bit of glue. Hide glue prefers a slightly gappy joint. When a joint is very tight, hide glue tends to extrude out. The mortise-and-tenon joints are too tight for hide glue and not tight enough for yellow glue to develop much strength. These joints will get drawbore pegged. The upper pegs will be tight, but the lower pegs will be driven into elongated holes in the tenons to account for shrinkage of the sides relative to the legs. When this lower case is complete, it will only need a few drops of glue in it.

Conclusion

Though we don't know exactly how period craftsmen were able to efficiently build such a variety of objects, we do have some evidence. Despite the attempts of antique dealers to distinguish one piece from another by shop, or region or style, similarities in basic construction are overwhelmingly evident. Period craftsmen built similar things similarly.

In this instance, the joinery presented is virtually identical to that of a baroque (Queen Ann) lowboy. The legs on my desk are tapered where the baroque piece's legs would be cabriole. The lower stretcher would be omitted in the baroque piece. Otherwise, the joints, the tools used and the techniques are all identical. By using a common suite of joints and applying them to different objects, we can develop the skill needed to build our first as if it's our hundredth. **PW**

A Shapely Shaker Shelf

The mouldings dress up the shelf while building the drawer increases your skills.

In the 1989 edition of the Willis Henry Shaker auction of ephemera, woodenware and furniture, this Canterbury, N.H., shelf immediately caught my eye. I've incorporated a few size and construction variations from the antique in my version, but this design is true to the spirit of the original.

You'll find a use for those scraps from earlier projects if you decide to paint this piece. Mixed woods are often found in antique furniture. Don't be afraid to try it (if you don't have enough scraps, head to the home center).

Building the drawer for this shelf is a new technique for the "I Can Do That" column. Don't freak on me! It appears more complex than it is and your list of "got-to-do" projects will grow once this skill is in your arsenal.

Curvy Bottoms Add Appeal

Each side of the shelf has three curves or arc cuts. Each arc evolves from the previous arc, starting with the smallest radius at the lower, rear corner of each side.

Crosscut the sides to length and draw the pattern on the pieces. Cut the profile with the jigsaw then clean up any rough edges with a rasp and sandpaper.

Next, square one end of the stock and crosscut the five rails that fit between the sides. Position and clamp a stop block at the miter saw to cut each piece to the same length. Then pull out the pocket-screw jig. You have holes to drill.

Each rail requires two pocket-screw holes per end. Also, the top face rail needs three extra holes, spaced evenly and along the grain, to attach the top. The drawer rail will need one hole that is centered, also along the grain, to hold the drawer rail flush with the lower face rail. Also, drill a hole in the center of the each side. These will be used to attach the top.

Step to Successful Assembly

The steps to assemble the case need to be completed in a specific order to allow you access to the pocket-screw holes. First, attach the top face rail and lower face rail flush with the front edge of the sides. Next, install the top nailing rail ¾" in from the back edge of the sides.

Cut the top to length and position the partially assembled case on the underside of the top. Make sure the case is centered on the top and flush at the back edge. Add the screws and the top is attached. To finish construction of the case, install the drawer rail and the lower nailing rail.

Place the project on its top with the front facing you and fit the mouldings against the project. Make the first set of moulding cuts at the miter saw, leaving the side moulding extra long. Match those cuts to form the left-front corner. Hold the front moulding tight to the case and move to the next corner of the project to find the cut line.

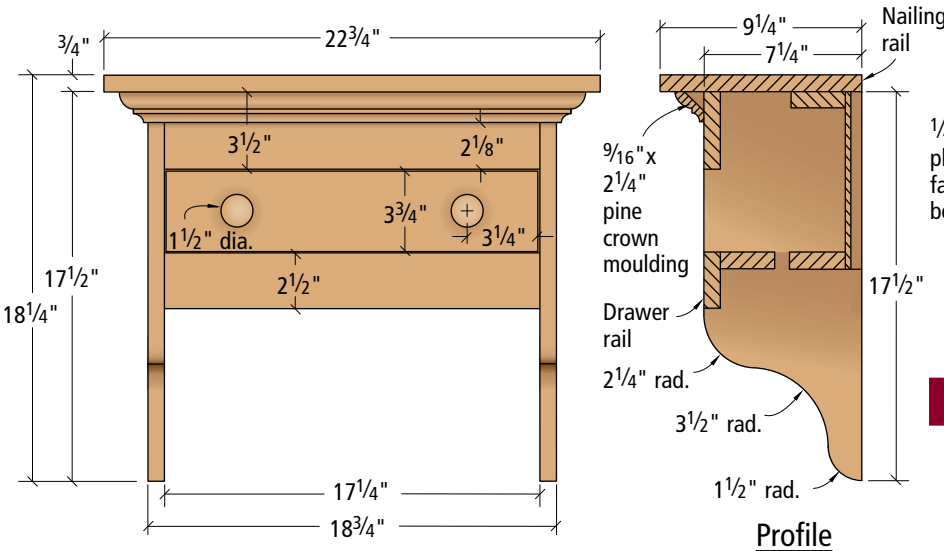
Mark the cut line for the second cut on the front moulding as well as the angle of cut.

The best way to cut crown moulding at the miter saw is to position the moulding upside down to how it's installed on your project. As you mark the cut line, also note the direction of the 45° cut.

Marking the cut line for the second cut on moulding requires an exact layout. A ruler or straightedge held tight to the sides will reveal the location for the cut.

by Glen D. Huey

Questions or comments? You can reach Glen at 513-531-2690 ext. 1293 or glen.huey@fwpubs.com.



Illustrations by Mary Jane Favorite

SHAPELY SHAKER SHELF

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L
❑	1	Top	3/4	9 1/4	22 3/4
❑	2	Sides	3/4	7 1/4	17 1/2
❑	1	Top face rail	3/4	3 1/2	17 1/4
❑	1	Lower face rail	3/4	2 1/2	17 1/4
❑	1	Drawer rail	3/4	2 1/2	17 1/4
❑	2	Nailing rails	3/4	2 1/2	17 1/4
❑	2	Drawer sides	3/4	3 1/2	5 7/8
❑	2	Drawer front/back	3/4	3 1/2	15 3/4
❑	1	Drawer face	1/4	3 3/4	17 1/4
❑	1	Drawer bottom	1/4	5 7/8	17 1/4
❑	1	Case back	1/4	8	17 1/4
❑	1	Crown moulding	9/16	2 1/4	48
❑	2	Wooden knobs	1 1/2" diameter		

Head back to the miter saw to complete the cuts for the second corner.

Position the side mouldings and mark a line at the back edge of the shelf. The 90° cut is made with the piece flat at the miter saw. Add glue to the miters and attach the mouldings with 3*d* nails. (For additional information on fitting mouldings, download the free manual at ICanDoThatExtras.com).

Building an Inset Drawer

You already have the skills to build a drawer. You just need to know how to cut with a jigsaw, drill pocket-screw holes and hammer nails.

To properly fit an inset drawer, the front should be about 1/8" smaller than the opening – 1/16" on either edge. Measure the opening from side to side and subtract 1/8". Then subtract the thickness of the two sides (1 1/2") to arrive at the cut length of the front and back of the drawer box. Drill two pocket-screw holes at each end of the these pieces.

Next, cut the drawer sides to size and attach the front to the sides with pocket screws. Careful alignment of the joint makes attaching the drawer face stronger. Complete the drawer box by installing the back piece.

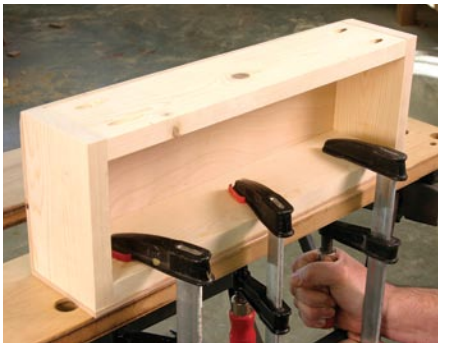
The drawer bottom is 1/4" plywood. Measure the footprint of the box then cut the bottom with the jigsaw. Smooth rough cuts with a plane and attach the bottom with 3*d* nails.

Measure for the drawer face, including the thickness of the plywood bottom. Cut the plywood a little oversized, then add glue to the front rail of the drawer box, position the box onto the drawer face and add clamps as shown below.

Once the glue is dry trim the face with your plane, making the box and face flush on all sides. Finally, install store-bought wooden knobs.

To complete the shelf, knock off any sharp edges with #100-grit sandpaper, apply two coats of your favorite paint color, then cut and install the plywood back with 3*d* finish nails. Your Shaker-inspired shelf is ready to hang. **PW**

Building the drawer with pocket screws is a simple task. But, it is necessary to achieve a flush fit between the front and sides. The level joint makes the best connection when attaching the drawer face with glue.



The aesthetics of the drawer, which shows no screws during normal use, is achieved by turning the pocket screws toward the outside of the drawer box and covering the front with the drawer face. Cut the face oversized and trim flush with your plane.

ABOUT THIS COLUMN

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

To download the free manual, visit ICanDoThatExtras.com.

Southern Sugar Chest

This 19th-century piece was designed to safeguard a then-precious commodity.

Not so long ago, obtaining sugar wasn't easy. It's difficult to believe that the commodity we have in almost everything today was scarce and highly valued in the early part of the 19th century.

During those days well-to-do patrons required somewhere to store this sweet under lock and key. Why did sugar have to be locked away? It was so valuable that the hired help could be tempted to pinch a bit here and there.

So local cabinetmakers rose to the occasion and the result was a specialized piece of furniture – the sugar chest. This type of chest was built throughout the South – most notably in central Kentucky and middle Tennessee.

by Glen D. Huey

Comments or questions? Contact Glen at 513-531-2690 ext. 1293 or glen.huey@fwpubs.com.

Photo by Al Parrish

Photo by Al Parrish

The open lid provides a great look at the divider. Sugar on one side and coffee on the other? The drawer held sugar nippers, used to pinch off a supply for the day's baking, along with other accoutrement.

An increased availability of sugar, along with a decline in price, reduced the need to safeguard the commodity. The demise of the distinctive design was imminent. By the late 1840s these chests were no longer regularly built.

Although the sugar chest's prominence was short-lived, the lessons encountered in constructing this form will go a long way toward increasing your skills – and besides, it's a great little chest for storing blankets and whatnot.

Start at the Top

When building a piece on legs, you usually begin with the base. But with this project, it's best to build the box portion first because it's the more challenging portion. Once that's finished, you can build the base to fit.

Mill and cut to size the panels for the front, back and sides of the box. The four pieces are assembled with dovetails. Schedule some practice time before beginning on the actual piece, because these visible joints are the main focus of the chest.

Any dovetail is a work of art, and while this project can be built with a dovetail jig, hand-cutting the joint will boost your skills.

Orienting the pins and tails invites discussion among woodworkers. To determine which goes where, look at how the piece will be used and then make the call.

Under normal use, the front and back of the sugar chest will receive the majority of the pressure when loaded. Therefore, cut the pins on the front and back with the tails on the side pieces.

As the pressure increases on the front and back, so will the holding power of the dovetail joint. That's the functional design of the joint.

Pin Down the Process

When one decides to hand-cut the joint, another discussion that raises the ire of most woodworkers is whether to cut the pins first or the tails first.

I'm a "pins first" subscriber. For every reason that I give to start with the pins, a "tails first" woodworker can state a nearly identical reason to begin with the tails. Except for one!

When you move to the second step in dovetailing, that of transferring the layout from one panel to the adjoining panel, it becomes obvious why "pins first" is the correct call.

If the joint is designed in a historical manner, meaning that the pins are narrow and the tails are wider, you'll find that getting into the tail socket to transfer the layout is much easier than trying to mark through the narrow gap between the pins.

So give in and create the pins on the front and back. Make sure to start and end the layout with a wide pin area. Leaving a wide area makes it easier to cut the rabbet for the bottom panel and, with the transition moulding in place, the dovetails will look balanced. Also, the wider pin area at the top edge helps to balance the look as the moulding around the top hides part of the pin.

Don't fret too much about the exact shape of the pins. While they influence the look of the joint they will not affect the fit because they become the template used to mark the tails portion of the panels.

Once you define the pin area with a saw cut you need to remove the waste between them.

The wider tail area makes it much easier to transfer the layout of the pins onto the tail board. Also, to straighten any bowed panels attach a straightedge. It holds the panel in place as you transfer the layout.

Take the majority of the waste material from the wide side of the layout to reduce the potential for damaging the sharp corners of the pins. Finish the pins from the opposite side paying attention to those corners.

Because of the width of the box panels you'll have to cut some of the tails by hand. The extra cut at the center of the pin waste collapses as you chisel the material allowing the waste to easily be removed.

Rout the rabbet by using one of the panels as a straight-edge guide for the other – plus a pattern-cutting bit.

Begin the process by working on the face side of the panels where the wide portion of the waste is up. Sharp chisels make this quick work. Angle the cut of your chisel by a couple degrees to undercut the joint and make sure that no material is left to interfere with the fit of the dovetail.

Remove the waste to just past halfway through the thickness of the panel. Then, flip the board and complete the pins by removing the waste from the opposing face. Work carefully on this side; the area is narrow so it's easy to knock off a corner of the pins when removing waste.

Next transfer the layout of the pins to the sides and cut the tails at the band saw. These cuts are 90° to the table. You'll need to finish the cuts with your handsaw unless you have a large, deep-throated band saw.

One important step when cutting the tails is to make an additional cut down the middle of the waste area. This extra cut allows the waste to move away from the panel by collapsing as the chisel does its job.

A rule of thumb when hand-cutting dovetails is that the more pins and tails you have for the joint, the closer to the lines you need to cut. Remove the waste and test your fit. Make any necessary adjustments.

It's best to cut and fit each corner of the box then move to the next corner, making adjustments as you go. If you cut the entire box, only to find a problem with the fit, it's much harder to correct. Any problems found during the work on the first corner can be adjusted in subsequent corners.

Four Pieces Become One

Before you can glue up the box, you need to cut the rabbet for the bottom and the dado for the divider: two operations; two tools.

The rabbet is a router operation. Cut the rabbet at the bottom edge of each panel. If you started with a wide pin area as suggested, you have to make stop cuts along the front and back panels; on the sides you rout completely across.

You can use a rabbeting bit, but a top-mount pattern bit works wonders. And, the smaller radius will leave less to clean by hand at the stop cuts. I use one panel as a guide to rout the other.

Put the back panel on top of the front panel and position its edge to cut a $\frac{5}{8}$"-wide rabbet that is $\frac{3}{8}$" deep. Use the pattern bit to rout the rabbet. Remember to stop $\frac{1}{4}$" from both ends. This is a fragile area so be careful – but if you happen to knock off the piece, don't panic. The transition moulding between the base and box covers the area.

Reverse the panels and cut the back as you did the front, then move to the side panels. The set-up is the same but the cut doesn't stop short of the ends.

Sugar chests were usually divided into compartments of two or three sections – I chose two for this chest. These compartments would divide different types of sugar or possibly coffee beans from the sugar.

The divider fits into the front and back panels in dados cut at the table saw with a stacked dado cutter. Set the stack to cut a $\frac{1}{2}$"-wide dado, raise the blade to $\frac{3}{8}$" and set the table saw's fence at $10\frac{3}{4}$".

Make sure to match the panels for this process. You'll find it best to orient your front and back panels just as the box fits together, then open the pair as a book to mark the dado location on the inside of both panels. It's easy to get things turned around.

With the milling operations finished, assemble the outside of the box. If you have tight-fitting dovetails you need only apply glue to the pins. As the parts of the joint slide together, the glue will transfer to the tails.

Properly fit, the dovetails bring the box to square when assembled. Add clamps and confirm that the

Nails added to the front and back of the bottom panel hold the panel in place, as well as allow for seasonal expansion and contraction.

Joining the side moulding to the top with biscuits will keep things tight at the front while forcing any movement of the top panel toward the back of the chest.

box is square by measuring from corner to corner. Equal measurements mean the box is square.

Fit the Bottom, Make the Top

Once the glue is dry you can cut and fit the bottom and divider into the chest. The bottom is attached with both screws and nails.

Drive two #8 x 1½" screws through the bottom and into the side panels. Space the screws so each is 2" away from the centerline of the bottom. Placing the screws this way reduces the overall movement at the front and rear of the completed chest.

Now drive a couple period reproduction nails through the bottom into the front and back.

Why use two types of fasteners? Because the screws hold tight and restrict wood movement while nails will bend with seasonal expansion and contraction. Note that you need to pay attention to the fit of your bottom in its rabbet. You might need to leave a sliver of space at the front and back if you're building during the months when the wood has shrunk.

Next, mill and cut the divider to size then slide it into the box to check the fit. Leave the panel loose enough to be removed without problems. We'll need it out of the way in order to install the half-mortise lock that secures the lid.

The lid for the chest is created with the addition of moulding around three sides of the top panel. Choose your favorite profile for the moulding then cut the moulding to wrap the panel. The front piece of moulding attaches with glue alone – it's a long-grain-to-long-grain connection. Add strength to the side mouldings by gluing a biscuit at the front end while nailing the balance of the side pieces. The glued biscuit holds the side mouldings tight at the front while any expansion or contraction of the top will be absorbed by the nails bending at the rear of the lid.

Building the Base

The base construction starts with turning the legs. Shape the stock according to the plan, add the details then sand to #180 grit.

Each front leg gets a dovetail socket to house the top divider and a twin mortise for the bottom divider. The rest of the mortises are ¼" in width and 1¼" deep.

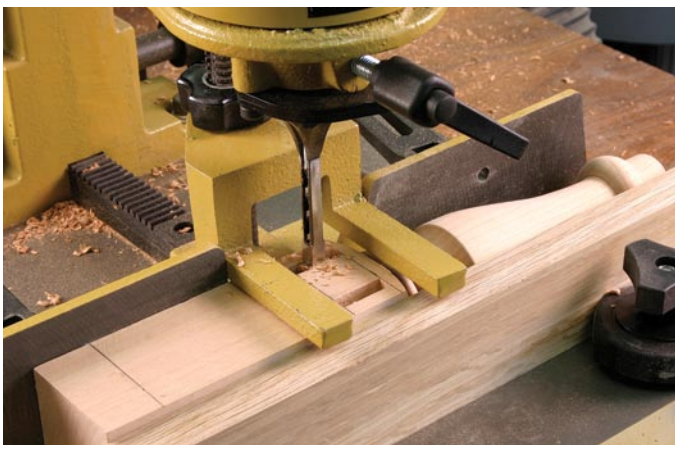
All mortises are cut on a dedicated machine. The mortises for the sides and back are 4¼" long with ½" shoulders. The twin mortises for the front bottom rail are cut with the mortiser set the same as for the sides for the first mortise. The second mortise is cut by reversing the leg in the mortiser. Each mortise is ⅞" in length.

Start the single dovetail socket for the top front rail with a handsaw to define the socket edges. Once the area is defined remove the waste to form the socket. First use a Forstner bit in a drill press to hog out as much waste as possible, leaving only chisel work to complete the first half of the joint.

Now that the work on the legs is finished, the matching work on the rails remains. Creating the tenons is straightforward. The setup for the side rail tenons is the same setup used for the twin tenons. The only difference is the position of the rails at the saw. The side rails will lay flat to the saw's table while the bottom front rail is cut as shown on page 38.

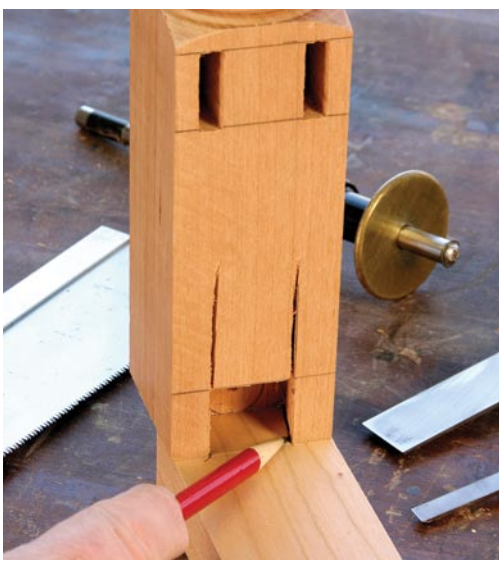
The second step of the two-step tenon is to cut with the piece vertically set. If you examine the front rail you'll see that the piece is symmetrical. Therefore, after you cut one side of the tenon, simply reverse the position of the rail to make next cut. First, remove the outer waste material then start the cuts on the inside. Each time you make a pass at the saw you'll remove waste in the center until the tenons are all that's left.

Then place the dovetail socket on the top rail and transfer the shape to the rail. Make the cuts at the band saw. Because this is a



The lower front rail connection is a twin mortise and tenon. The mortiser setup is identical to that for the sides. Simply reverse the leg to cut the second slot of the mortise.

Define the dovetail socket with your handsaw, then "hog out" much of the waste material with a Forstner bit at the drill press. Finish with your chisels.



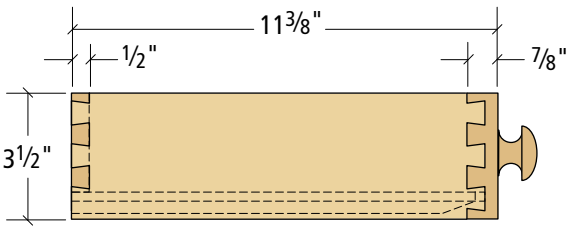
For the upper front rail, transfer the dovetail socket onto the rail, then it's quick work at the band saw to complete the tail.

The tenons on the sides and back rails are cut in a two-step method, the first of which is with the material flat on the tabletop. The same setup is used for the twin tenons on the lower front rail, but you cut the material on its edge.

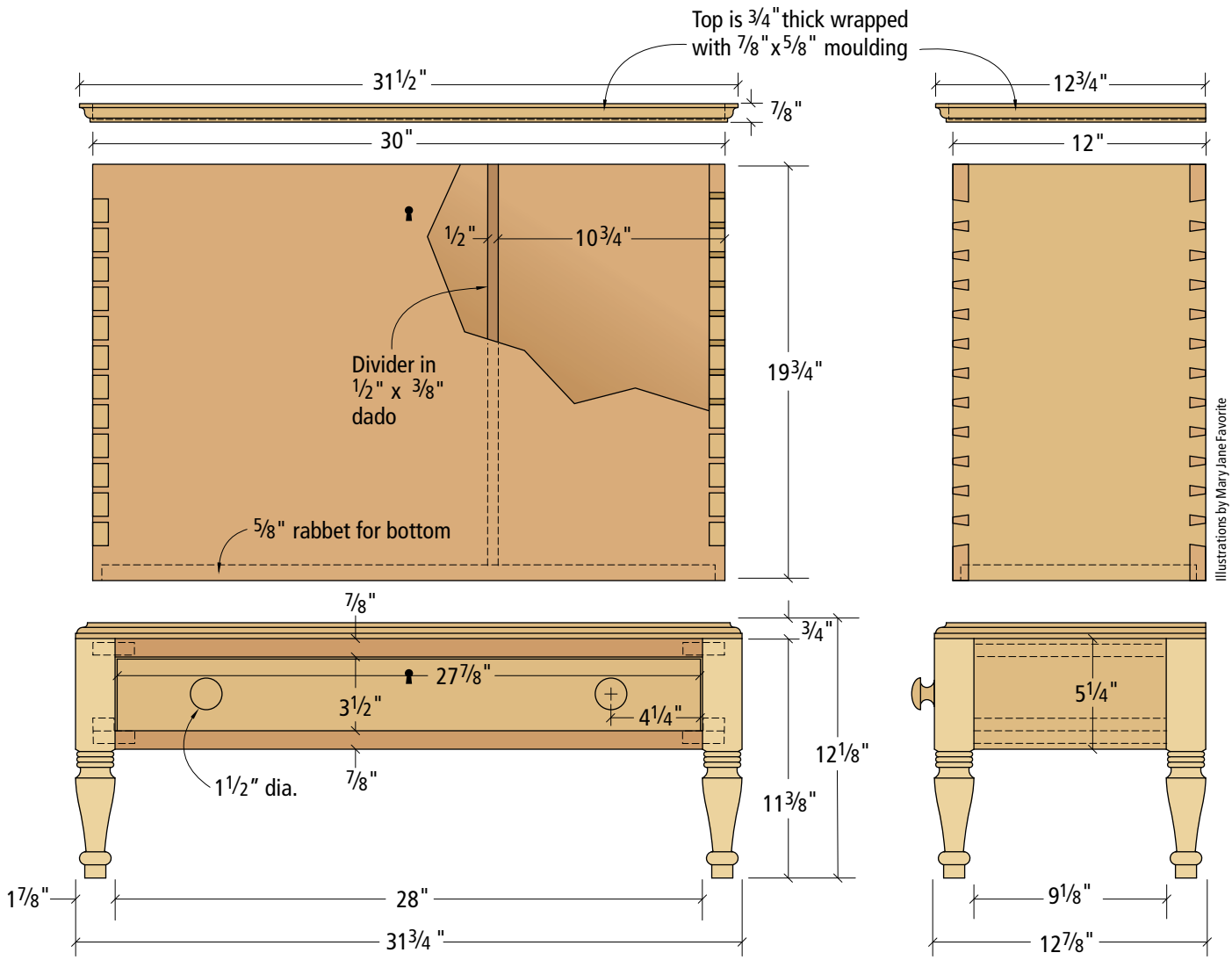
single dovetail there is no hand work to complete after the band sawing. The resulting tail fits into the socket.

Now cut the mortises for the drawer runners and drawer kickers into the front rails. The mortises need to be offset to work with the 7/8"-thick rails. Cut the mortises for the runners 1/4" from the top edge of the rail; those for the kickers are 1/4" from the lower edge of the top rail.

Add glue to the mortises and tenons for the front and back assemblies. Don't glue the sides



Drawer profile



Elevation

Profile

Illustrations by Mary Jane Favorite

in at this time. Slide the base together and clamp it. Make sure the base is square by checking the cross measurements before the glue sets. This ensures that the front and back assemblies will be square as well.

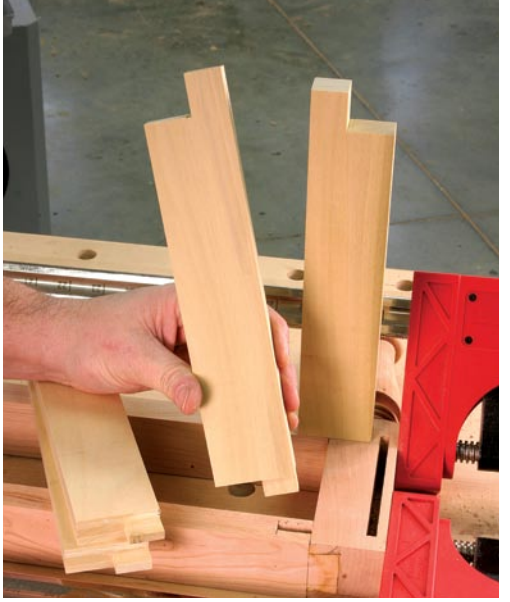
The runners and kickers are secured at the front with the mortise and tenon; at the rear they are nailed to the rear leg posts. They are identical in design. Create a 1/4" x 1" x 1/2"-long tenon on each piece, then cut the portion of the tenon away that fits to the leg posts. Cut the notch at the rear of the pieces at the table saw with a two-step cut.

Glue the runners and kickers into the rails, add glue to the mortise and tenons of the sides and reassemble the base again, checking for square. After the glue is dry, nail the runner and kickers to the rear leg posts with a single nail. First square the pieces to the front of the chest and drive the nails to secure the two pieces.

Attaching the box to the base is next. The connection for the back of the chest is wooden clips. Cut 1/4" slots for the clips in the back rail of the base. The inverted "L-shaped" clips sit on the bottom panel and are attached with screws while the tongue of the clip is held in the slot.

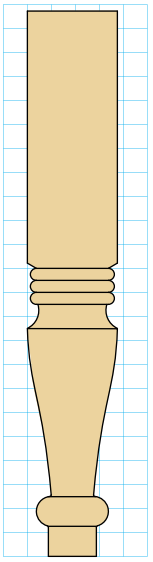
Invert the upper section of the chest then place the base in position. Keep it centered from side to side and flush to the back edge of the box. Drive three #8 x 1 5/8" screws through the front top

Once the insides of the twin tenon are nibbled away you can test fit the joint. Make it snug but not tight.



The drawer runner and kickers are all made the same. In order to work properly offset the mortises for these parts toward the interior of the drawer box.

The runners and kickers can be set square off the front of the base and nailed to the rear leg posts. Drill a pilot hole through the pieces but not into the leg. Drive the nail at the pilot hole to gain a strong hold into the leg.



1 square = 1/2"

Leg pattern

SOUTHERN SUGAR CHEST

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	Front and back	3/4	19 3/4	30	Cherry	
❑	2	Sides	3/4	19 3/4	12	Cherry	
❑	1	Bottom	5/8	11 1/4	29 1/4	Poplar	
❑	1	Divider	1/2	19 1/8	11 1/4	Poplar	
❑	1	Top	3/4	12 1/8	30 1/4	Cherry	
❑	4	Legs	1 7/8	1 7/8	11 3/8	Cherry	
❑	1	Top front rail	7/8	1 7/8	29 1/2	Cherry	3/4" dovetail both ends
❑	1	Bottom front rail	7/8	1 7/8	30 1/2	Cherry	1 1/4" twin tenon both ends
❑	2	Base sides	3/4	5 1/4	11 5/8	Cherry	1 1/4" tenon both ends
❑	1	Base back	3/4	5 1/4	30 1/2	Cherry	1 1/4" tenon both ends
❑	4	Runners/kickers	3/4	2	10 5/8	Poplar	1/2" tenon one end
❑	2	Drawer guides	5/8	1 1/8	9	Poplar	
❑	2	Transition moulding	3/4	3/4	34	Cherry	
❑	2	Top moulding	5/8	7/8	33	Cherry	
❑	1	Drawer front	7/8	3 1/2	27 7/8	Cherry	
❑	2	Drawer sides	1/2	3 1/2	11	Poplar	
❑	1	Drawer back	1/2	2 3/4	27 7/8	Poplar	
❑	1	Drawer bottom	5/8	11	27 3/8	Poplar	Oversize – cut to fit
❑	3	Wooden clips	3/4	7/8	2 1/4	Poplar	

rail and into the box front panel to make the connection. Use a tapered countersink bit before installing the screws. It's a tight fit to hit the panel exactly.

The Drawer Mimics the Chest

Building the drawer is a repeat of the dovetails we've created earlier in the project. The drawer back joins the sides with the same through dovetails as are on the box. The front attaches with half-blind dovetails, which are created in the same way as the dovetails for the front top rail. Complete the dovetails to build the drawer box.

Before assembling the drawer, cut the groove for the drawer bottom. The bottom slides in under the drawer back and into the groove on the sides and front. Cut the 1/4"-wide groove at the table saw. For a single drawer I would not take the time to set up a dado blade. Instead, make two passes at the saw cutting 1/8" each pass. The depth of cut is 1/4". Sand the inside of the drawer parts and assemble the drawer.

Mill the drawer bottom to thickness and cut the panel to fit the drawer box. To cut the bevel to fit the groove you'll need a pass over the table saw (see the caption under the photo above for accurate settings). That cut, rising through the panel, results in a bevel that fits tight to the sides of the groove, and touches the bottom of the groove at the same time. Cut the ends of the panel first then cut the edge that will be toward the front of the drawer.

Set the saw blade to 12° and leave a 3/16" space between the blade and the fence. The resulting cut will fit perfectly in the 1/4" x 1/4" groove for the drawer bottom. Raise the blade to make a clean cut.

Before installing the drawer bottom you need to create two slots for the nails that hold the bottom to the back of the drawer box. Slide the bottom into the box then mark where the bottom and the inside of the drawer back meet. Remove the panel from the box and cut a slot with the table saw blade set to the line. Then drive a reproduction nail through the slot and into the drawer back. A bit of glue in the groove in the drawer front holds the bottom tight to the front when the bottom moves. The nails will allow it to slide. Add a drawer stop inside the case to keep the drawer flush to the front.

Now install the two half-mortise locks – one in the box of the chest and the second in the drawer. Hold off on the lock receptacle until later. Also install the hinges for the top and prepare the wooden knobs for staining. (For expert tips on lock installation visit popularwoodworking.com/blog and search on "half-mortise.") Remove all the hardware before finishing.

A Favorite Finish

Finish sand the project to #180 grit and you're ready to stain. Use a water-based aniline dye (Moser's Dark Wine Cherry) making sure to coat the piece completely. Add stain until it runs off of the chest. Once dry, sand any raised grain with #400-grit sandpaper. Apply two coats of shellac, either sprayed at a 1 1/2# cut or brushed at a 3# cut, then sand smooth when dry.

To add age and diminish the effect of blotching in the cherry, add a coat of heavy-bodied glaze (I use a glaze from Mohawk, mohawk-finishing.com). The glaze is sprayed or brushed onto the chest, allowed to flash-off (begin to dry), then wiped completely from the chest. Residual glaze will remain on the piece in the tight corners and within the shellac finish. Give the glaze time to dry (about 48 hours) then add two additional coats of shellac. To complete the topcoat add one coat of dull rubbed effect lacquer (I get mine from Sherwin Williams, sherwin-williams.com).

Then reinstall the hardware and it's ready to move into the house. Here's a trick for installing the lock's receptacle. Once the lock is installed add the receptacle to the lock, add a few dollops of glue from a hot glue gun then lower the lid. The lid will contact the receptacle and the glue will hold it in position until you can make the final connection. You may find that you need to recess that receptacle to get the box to close properly. Be careful with the screws – this is not the time to puncture the top with a screw that is too long.

Everyone who sees this sugar chest falls for it, big time. It will look great in any number of places in your home. I've already got a waiting list of takers. I'm sure you'll have the same results. It's a sweet little piece. **PW**

SUPPLIES

Horton Brasses Inc.
800-754-9127 or
horton-brasses.com

1 • chest lock, #cl-5

1 • drawer lock, #lk-2

1 • pair of hinges, antique finish #pb-409

2 • wooden knobs, #wk-20

1/4 lb. • clout or shingle nail, #n-7

1/4 lb. • fine furniture nail, #n-20

Call for pricing.

Two slots cut in the drawer bottom just to the inside of the drawer back is where the nails are set to hold the solid drawer bottom. The slots allow for seasonal adjustments.

WOODWORKING ESSENTIALS

BY CHRISTOPHER SCHWARZ

CHAPTER 6

Setting Up Shop: Rules for Workbenches

When it comes to building or buying a bench, most woodworkers get wrapped up in what form it should take. Should it be a continental bench popularized by Frank Klausz? A Shaker bench like the one at the Hancock community? How about a British version like Ian Kirby's?

Copying a well-known form is a natural tack to take. After all, when woodworkers buy or build their first workbench, they are in the early stages of learning the craft. They don't know what sort of bench or vises they need, or why one bench looks different than another. So they pick a form that looks good to them – occasionally mixing and matching bits and pieces from different forms – and get busy.

That, I believe, is the seed of the problem with workbenches today. Many commercial workbenches are missing key functions that make workholding easier. And many classic bench forms get built with modifications that make them frustrating in use.

What's worse, the user might not even know that he or she is struggling. Woodworking is a solitary pursuit, and it's rare to use someone else's bench.

This workbench form is uncommon today, but it is still a sound bench because it allows you to perform all of the critical workbench operations with relative ease. Benches are a triumph of function over form.

This rig serves as the assembly bench in the *Popular Woodworking* shop, but if you put a vise on it somewhere, it probably could serve as a workbench in a production shop. It is simple and allows great flexibility for clamping. But some basic operations with this setup would be tricky.

During the last 10 years, I've built a number of classic bench forms, and I've worked on craftsman-made and commercial benches of different stripes. I've been stunned by how awful some workbenches can be at some tasks, and I've also seen brilliantly realized designs.

And now, after all this work, I've concluded that it doesn't matter what sort of bench you have as long as it performs a set of core functions with ease. I've boiled down these core functions into 10 rules for building (or buying) a workbench. As long as your bench obeys these rules (or most of them), you will be able to hold almost any workpiece for any task with a minimum of fuss. This will add speed and enjoyment to your time in the shop and reduce the amount of time you fuss with setups.

Do You Even Need a Bench?

Before we get to the rules, it's fair to say that a lot of the best commercial woodworking today is done on benches that disregard many of these rules. In production shops, it's rare to find a traditional bench used in a traditional manner. More often, a commercial woodworker will have something akin to a clamping table, or even a door on sawhorses. And they can turn out high-quality work that will blow you away.

In 2006 I was teaching a class in hand work at a school where Thomas Stangeland, a maestro at Greene & Greene-inspired work, was also teaching a class. Though we both strive for the same result in craftsmanship, the processes we use couldn't be more different. He builds furniture for a living, and he enjoys it. I build furniture because I enjoy it, and I sell an occasional piece.

One evening we each gave a presentation to the students about our work and I showed an image of the enormous French workbench I'd built the year before and discussed its unusual history.

Thomas then got up and said he wished he had a picture of his workbench: a door on a couple horses. He said that a commercial shop had no time to waste on building a traditional bench. And with his power-tool approach, all he needs is a flat surface.

It's hard to argue with the end result. His furniture is beautiful.

But what's important here is that while you can build with the door-off-the-floor approach, there are many commercial woodworkers who still see the utility of a traditional workbench. Chairmaker and furniture maker Brian Boggs uses more newfangled routers and shop-made devices with aluminum extrusions than I have ever seen. And he still has two enormous traditional workbenches that see constant use. Before Kelly Mehler opened a woodworking school, I visited his commercial shop and got a chance to inspect his vintage bench, which saw daily use.

The point is that a good bench won't make you a better woodworker, and a not-quite-a-bench won't doom you to failure. But a good bench will make many operations easier. It's simply a tool: the biggest clamp in the shop.

This French-style workbench weighs more than 325 pounds. The top is 4" thick. The legs are 5" square. All this mass absorbs vibration and makes every cutting operation smoother.


230 WM. P. WALTER'S SONS, PHILADELPHIA

SINGLE VISE BENCH

Fig. 1240

This Bench is designed specially for schools where benches with one quick acting vise only are required. Bench is 4 feet long, 20 inch. wide, with a 1¾ inch glued hard maple top 1¾ inch. thick with 7-inch well for tools.

The Bench is fitted with Back Board, Tool Rack and one Merill Bench Stop, has a Massey Lightning Grip Vise. It is regularly fitted with one drawer 18 inch. long, 18 inch. wide, 4 inch. deep, with lock. If wanted without drawer, deduct $1.00 from price.

Weight packed for shipment 120 pounds.....Price, $14 00

Note—The tools shown in cut do not go with the Bench, but only show the use of the rack.

WM. P. WALTER'S SONS, 1525 MARKET STREET, PHILA.

Spindly workbenches are nothing new. This anemic example from the early 20th century is too small and lacks mass. Sadly, there are modern ones that are even worse.

Rule No. 1: Always Add Mass

Always overbuild your workbench by adding mass. There is a saying in boatbuilding: If it looks fair, it is fair. For workbenches, here's a maxim: If it looks stout, then make it doubly so. Everything about a workbench takes punishment that is akin to a kitchen chair in a house full of 8-year-old boys.

Early Roman workbenches were built like a Windsor chair. Stout legs were tenoned into a massive top and wedged in place. Traditional French workbenches had massive tops (6" thick), with legs that were big enough to be called tree trunks. Later workbenches relied more on engineering than mass. The classic continental-style workbench uses a trestle design and dovetails in the aprons and vises to create a bench for the ages. The 19th-century English workbench uses an early torsion-box design to create a stable place to work. And good-quality modern workbenches use threaded rods and bolts to tighten up a design that lacks mass.

Many inexpensive commercial benches are ridiculously rickety. They sway and rack under hand pressure. You can push them across your shop by performing simple operations: routing, sawing, planing. If the bench looks delicate or its components are sized like a modern dining table, I would take a closer look before committing.

A big thick top and stout legs add mass that will help your work. Heavy cabinet saws with lots of cast iron tend to run smoother. The same goes with benches. Once your bench hits about 300 pounds, it won't move unless you want it to move.

Rule No. 2: Use Stout Joints

Overbuild your workbench by using the best joints. These are times to whip out the through-tenon and dovetail.

If you followed rule No. 1, then rule No. 2 should be no problem. Your joints will be sized to fit the massive scale of your components. If you cannot rely on mass, then you should beef things up with superior joinery. While dovetails and through-tenons are overkill for a towel rack, they are good for a bench.

That's because you are applying racking force to the workbench with typical operations and your vises will do their best to tear apart your bench. All wooden vises need to be overbuilt or they will self-destruct when you cinch them down hard. I've even seen a vise rip a benchtop from its base.

Make your tenons thick and your mortises deep. If you know how to draw-bore a mortise-and-tenon joint, this is one good application. Have you ever been in a timber-framed barn? Did you look at the joints? They're massive and pegged. Imitate that.

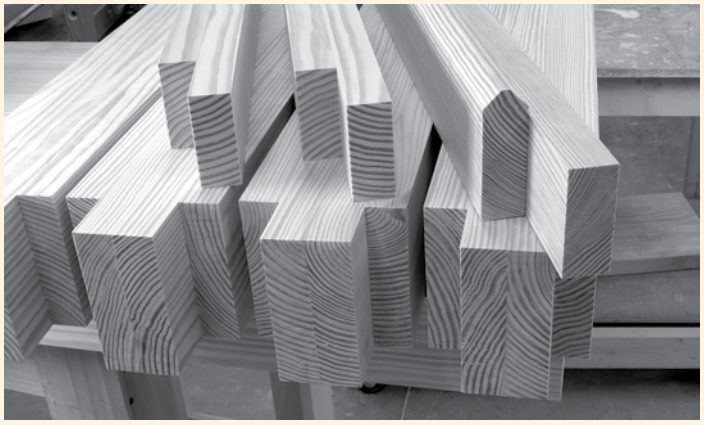
I think benches are a good place to practice your skills at cutting these classic joints, but some woodworkers still resist. If that's you, you should investigate hardware to strengthen your bench. Threaded rods, bed bolts, Veritas bench bolts or even stove bolts can turn a spindly assembly into something rigid that can be snugged up if it loosens. The hardware won't give you mass, but it will strengthen a rickety assembly.

Rule No. 3: Pick Your Wood Based on Its Stiffness, Not Its Species

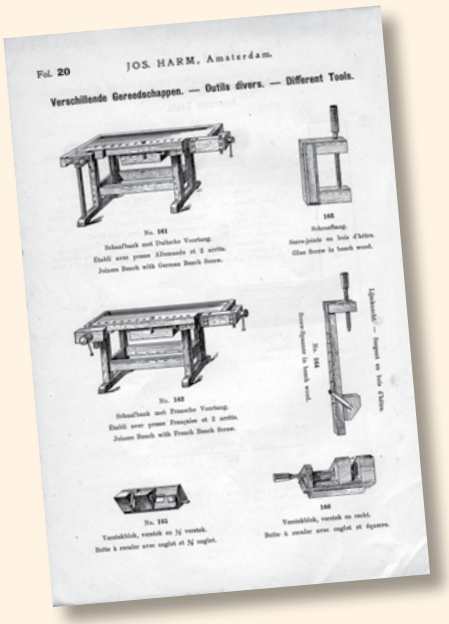
Use a stiff, inexpensive and common wood to build your bench. Showcase benches made from exotic materials are nice. No argument there. But focus on the functions before the flash. I'd rather have a construction-lumber bench that followed all these rules than a beautiful European beech bench that skipped even one of these concepts.

There's a lot of confusion on picking a wood for a bench. Most European benches were built using fine-grained steamed European beech. And many woodworkers go to lengths to purchase precious beech for their workbenches. After all, who wants to argue with hundreds of years of tradition?

I do. European cabinetmakers didn't choose beech because of some magic quality of *Fagus sylvatica*. They chose it because it was dense, stiff, plentiful and inexpensive. In the United States, beech is dense, stiff, hard to find and (sometimes) a bit spendy. You can, of course, use it to build a bench, but you will pay a pretty penny for the privilege. And it will have no demonstrable advantage over a bench built from a cheaper species.



Think big when cutting the joints for your workbench. The small tenons are 1¼" thick and 2½" long. The larger tenons are 2½" thick and 2" long.


Fol. 20 JOS. HARM, Amsterdam.

Verschillende Gereedschappen. — Outils divers. — Different Tools.

These classic European workbenches were made from fine-grained steamed European beech. Shouldn't you do the same? Not necessarily. Choose a wood that is like beech is in Europe: stiff, inexpensive and plentiful.

Other woodworkers, tacking toward the sensible, use hard or soft maple for their benches, rationalizing that it is like the beech of the New World. And indeed, the maples have all the qualities of a good species for a workbench.

Maple is stiff, resists denting and can span long distances without much of a support structure below it. But so can other species. In fact, if you went by the numbers from the wood technologists alone, you'd build your bench from shagbark hickory, despite its difficult nature. Once you look at the characteristics that make a good species for a workbench, you'll see that white oak, Southern yellow pine, fir or just about any species (excepting basswood and the soft white pines) will perform fine.

Rule No. 4: Use a Tested Design

After you sketch out your workbench design but before you cut any wood, compare your design with historical designs of benches. If your bench appears to be a radical design or looks unlike anything built before, chances are your design is flawed.

I've seen workbenches with pneumatic face vises. Why? I've seen a workbench that had two twin-screw vises: One vise for the right end of the workbench that was matched to work with two long rows of dogs along the length of the benchtop; and a second twin-screw vise on the face of the bench that was matched to two more rows of dogs across the width of the bench.

Now I'm certain that there are a few woodworkers who would really need this arrangement – perhaps someone who has to work on a circular tabletop on one end of the bench and a Windsor chair seat at the other. But for most people who build cabinets and furniture, this setup is redundant and neglects some critical bench functions.

Rule No. 5: The Overall Dimensions of Your Bench Are Critical

Your bench design cannot be too heavy or too long. But its top can easily be too wide or too tall. I think your benchtop should be as long as possible. Find the wall where your workbench will go (hint: Pick the wall that has a window). Measure that space. Subtract four feet from that measurement and that's a good length for the top. Note: The benchtop must be at least 5' long unless you build only small-scale items. Furniture-sized parts typically range up to 48" long and you want to support these fully with a little room to spare.

I've made tops that are 8' long. My next bench will be a 10-footer, the maximum that will fit in my shop. It is difficult to make or imagine a workbench that is too long. The same goes for thickness. It is the thickness that allows the top to be that long. If you make the top really thick (4" or more), then it will offer unerring support and allow you to build your bench without any support system beneath. The top can perch on the legs and will not sag under its own weight.

The width is a different matter. You can have a bench that is too wide for a one-person shop. I've worked on benches that are 36" wide and they have downsides. For starters, if you park them against the wall you'll have to stretch to reach the tools hanging on the wall. If you assemble projects on your bench, you will find yourself dancing around it a lot more than you should.

But there's more. Cabinetwork is sized in standard chunks. These sizes come from the human body; they aren't arbitrary. A kitchen's base cabinet is generally 24" deep and 34½" high. This is important for a couple reasons. First: It means you don't really need a bench that's much more than 24" deep to build cabinets. With that 24" depth, you actually get some advantages, including the fact that you can clamp the cabinet to your bench from as many as three sides of your bench. That's dang handy. A deep bench allows you to clamp your cabinets to the bench on only two sides (with a couple exceptions). Here's the other thing to keep in mind: Kitchen cabinets are themselves a highly studied work surface. There's a good reason that kitchen cabinets are 24" deep. And it's the same reason you don't want your workbench much deeper either.

Now I'm not going to argue with you if you build really big stuff or have a bench that you share with another woodworker facing you; you might need more depth. But if you are like the rest


Since 1848 HAMMACHER, SCHLEMMER & CO., INC. New York

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Here's proof that odd workbench designs are nothing new. This Hammacher, Schlemmer & Co. bench from an old catalog is a study in tool storage. I've seen one of these in person and I can say this: I would not want to have to build anything using it.

of us, a 24"-deep bench is a powerful and right-sized tool.

On the issue of workbench height: Many bench builders worry about it and there are a wide variety of rules and advice. The bottom line is the bench must fit you and your work. And in the end, there are no hard-and-fast rules. I wish there were. Some people like low benches; some like them high.

So consider the following as a good place to start. After taking in my crackpot theories, your next stop should be a friend's house or a woodworking supply store to use their benches and get a feel for what is right (it could be as simple as having a bad back that requires you to have a high bench, or a love for wooden handplanes that dictates a low bench).

Here is my experience with bench height: I started with a bench that was 36" high, which seemed right for someone who is 6' 3⅝" tall. And for machine woodworking I was right. The high bench brought the work close to my eyes. I loved it. And then my passion for handwork reared its ugly head.

If you get into hand tools, a high bench becomes less attractive. I started with a jack plane and a few smoothing planes. They worked OK with a high bench, but I became fatigued quickly.

After reading the screed on bench heights, I lowered the height of my 36" bench. It seemed radical, but one day I got the nerve up and sawed 2" off the legs. Those two inches changed my attitude toward planing.

The 34"-bench height allowed me to use my long leg muscles to propel the plane forward instead of my arms.

Now, before you build your next bench at 34" high, stop for a minute. That might not be right for you. Do you use wooden stock planes? If so, you need to consider that the wooden body planes can hold your arms about 3" to 4" higher off the workbench than a metal plane can. As a result, a wooden plane user's workbench should be lower.

This is as good reason as ever to get to know someone who has a good shop you can visit and discuss your ideas with. It is better not to make this decision on paper alone.

But there are other factors you must consider when settling on the bench's height. How tall are you? If you are over 6' tall, you should scale your bench a bit higher. Start high and cut it down if it's too high. And prop it up on some blocks of wood if it's too low. Experiment. It's not a highboy; it's a workbench.

Here is how high my workbench is compared to my hand, which is hanging loosely by my side. I use hand and power tools in my work, and I've found this height is ideal.

Here are other things to consider: Do you work with machinery? If so, a bench that's 34" from the floor – or a bit lower – can be good. The top of a table saw is typically 34" from the floor, so a workbench could be (at most) a great outfeed table or (at least) not in the way of your crosscutting and ripping.

Of course, everyone wants a ballpark idea for where to start. So here it is: Stand up straight and drop your arms against your sides in a relaxed manner. Measure from the floor to the place where your pinky joins your hand. That has been the sweet spot for me.

This early 20th-century airplane factory had the right idea when it came to workbench length. With a long bench, you can work on one end and assemble at the other – no need for an assembly bench. Thus, a big bench actually saves floorspace.

Rule No. 6: Benches Must Hold the Work in Three Ways

All benches should be able to grip the wood so you can easily work on the faces, the ends and the edges. Many commercial benches fail on this point.

Submit your bench to what I call the Kitchen Cabinet Door Test. Imagine a typical kitchen door that is ¾" thick, 15" wide and 23" long. How would you affix that door flat on your bench to level its joints and then sand (or plane) it flat? How would you clamp the door so you could work on the ends to trim the top rail and tops of the stiles so the door will fit its opening? And how will you secure that door on edge so you can rout its hinge mortise and plane off the saw-blade marks without the door flopping around? Does your bench pass this test? OK, now ask the same questions

Most benches are easy to set up to work on the faces of boards or assemblies. In this example, a door is clamped between dogs. You can even work simpler and plane against a planing stop.

with a door that is ¾" x 15" x 38". And then try a board that is ¾" x 12" x 6'.

How you accomplish each of these three functions is up to you and your taste and budget. To work on the faces of boards, you can use a planing stop, a grippy sanding pad, a tail vise with dogs, clamps or hold-downs.

To work on the ends of boards, you can choose a shoulder vise (especially for dovetailing), a metal quick-release vise, a leg vise or a twin-screw vise. And you can use all of these in conjunction with a clamp across your bench. The vise holds one corner of the work; the clamp holds the other corner.

Working the long edges of boards is tricky with most benches. In fact, most benches make it difficult to work the edges of long boards, doors or face frames. There are a couple ways to solve this. Older benches had the front edge of the benchtop flush with the front of the legs and stretchers so you could clamp your frames and long boards to the legs. And the older benches also would have a sliding deadman (sometimes called a board jack). It would slide back and forth and had an adjustable peg to support the work from below. Another old form of bench, an English design, had a wide front apron that came down from the top that was bored with holes for a peg to support long work.

■ Rule No. 7: Make Your Bench Friendly to Clamps

Your bench is a three-dimensional clamping surface. Anything that interferes with clamping work to your benchtop (aprons, a drawer bank, doors, supports etc.) can make some operations a challenge.

We had a phase at *Popular Woodworking* where we tried to design a cupholder into every project. It started innocently with a deck chair. Who doesn't want a cool beverage at hand? Then there was the dartboard. What goes better with darts than beer? I think we came to our senses when designing a series of cupholders into a Gustav Stickley Morris chair reproduction. Do you really need a Big Gulp-sized hole in your Morris chair? I didn't think so.

The point of this story is to illustrate a trend in workbench design that I

Working on the ends of boards – especially wide boards – can be a challenge for face vises. Adding a clamp to the setup stabilizes the work for sawing or whatever.

Here's another historical bench that shows some difficulties. The drawers will interfere with clamping things down to the bench. With no dogs or tail vise, this bench could be frustrating to work on.

This primitive bench still allows you to work on long edges of boards. The crochet (or hook) grips the board. Holdfasts and a scrap support from below. Simple and brilliant.

personally find troubling. It's a knee-jerk reaction to a common American complaint: We don't think we have enough space in our shops to store our tools and accessories. And how do we solve this problem with our workbenches? By designing them like kitchen cabinets with a countertop work surface.

This design approach gives us lots of drawers below the benchtop, which is great for storing the things you reach for every day. It also can make your bench a pain in the hiney to use for many common operations, such as clamping things to your bench.

Filling up the space below the benchtop also prohibits you from using any type of holdfast or holddown that I'm aware of.

If you build drawers below the top, how will you clamp objects to the benchtop to work with them? Typically, the banks of drawers below the benchtop prohibit a typical F-style clamp from sneaking in there and lending a hand with the setup. So you can't use a typical clamp to affix a router template to the bench. There are ways around these problems (a tail vise comes to mind) but the tail vise can be a challenge to install, set and use.

You can try to cheat (as I have) and install the drawer bank so there is a substantial space underneath the benchtop for holdfasts and clamps. Or you can give your bench a large overhang to allow clamping (as some Shaker-style workbenches did) but then you have to start engineering a way to hold long boards and assemblies on edge.

■ Rule No. 8: There are Good Rules for Placing the Vises on Your Bench

Place your vises so they work with your tools. Vises confuse many work-

bench builders. They're bewildering if you've never spent much time working at a bench to develop a taste for the peccadilloes of all the idiosyncratic forms. There are a lot of weird configurations in the world, from a table with no vises to the bench with a vise on every corner.

Classic workbenches have some sort of vise at the front left corner of the bench. This is called the face vise. Why is it at the left? When we work with hand tools, especially planes, right-handers work from right to left. So having the vise at the left end of the bench is handy because you will always be planing into the vise that is gripping your work, and the work can be braced against the screws of the vise. So if you are a lefty, placing your vise on the front right corner makes sense.

So with that left corner occupied by a vise, where are you going to put the a second vise that is designed to grip boards so you can work on their faces? (The classic vise for this is a tail vise.) Well the right side of the bench is free (for right-handers) and there is no disadvantage to placing it there, so that's where it generally goes.

Messing with this arrangement can be trouble. I've seen face vises on the right corner of the bench of people who are right-handed. They said they liked it better for crosscutting with a handsaw. But when and if you start handplaning, that vise will be in the way because it won't be ideal for gripping long stock. It will be holding the tail end of the board and the plane will be trying to pull it out of the vise.

■ Rule No. 9: No Fancy Finishes

When finishing a workbench, less is more. A shiny film finish allows your work to scoot all over the bench. And a film finish will crack when struck by a hammer or dead-blow mallet. Choose a finish that is easy to apply, offers some protection and doesn't build up a thick film. I like an oil/varnish blend (sold as Danish Oil), or just boiled linseed oil.

■ Rule No. 10: Get a Window Seat

Try to place your bench against a wall and under a window, especially if you use hand tools. The wall braces the workbench as you are planing cross-grain and sawing. The light from the window points out the flaws in the work that your hand tools are trying to remove. (When I work with hand tools, I turn the overhead lights off. I can see much better with fewer light sources.)

For machine work, I find that placing the bench by a window helps with some operations, though not all. When power sanding, for example, the raking window light points out scratches better than overhead fluorescents.

In general, when working with power tools, I tend to pull my workbench away from the wall so I can work on all sides of it. When working with routers, you sometimes have to work with odd clamping setups so that you can rout around a template. So having access to all four sides of the bench is handy. Power tool setups thrive on overhead light – and lots of it. So being by the window is nice, but not as necessary.

An oil-varnish blend (any brand) is an ideal finish for a workbench. It resists stains, doesn't build up a film and is easy to apply. Two coats are all I ever use.

You do need to be able to pull your bench away from the wall on occasion. When I am assembling cabinets, I'll clamp them to the benchtop so I'm able to get around the bench. The same goes when I'm routing. Note how I'm harnessing the window light.

With your workbench against the wall, you have the wall and the mass of your bench holding things steady as you saw your workpieces. You also can keep your tools at arm's length. And, the windows cast a useful light on your workbench.

How to Fix Your Current Bench

You don't have to build or buy a new workbench if you're frustrated with the one you have. There are ways to improve your bench so it will be more useful. Here are some strategies.

■ Problem No. 1: My bench is too lightweight. I chase it around the shop when working.

Add weight by building a tray below the bench and fill it with sand. Or rebuild your bench base with massive components and joints. You also can build drawers near the floor (so they don't impede clamping things to the top). That adds weight and storage.

- **Problem No. 2: My bench sways and vibrates when I work, making my saw cuts and attempts at planing into a ragged mess.**

Your problem is most likely in the base of the bench. Commercial benches can be too spindly for woodworking. Rebuild the base from massive components and better joints. If you can't do that, stiffen the bench by running all-thread rod through the legs and cinching the base tight with nuts.

- **Problem No. 3: I want a new bench, but I'm low on funds.**

Build your bench using Southern yellow pine or fir, both of which are stiff, plentiful and cheap (you can build a bench of your dreams for less than $300, easy). You will have to pick your lumber with care and let it reach equilibrium with your shop. But in the end, you'll have a great bench.

- **Problem No. 4: I think I want a fancy twin-screw vise, Emmert pattern-maker's vise or tail vise on my bench. Plus something for working metal.**

Before you drop serious coin on vises and put them on every corner, start with a simple face vise. Then buy a tail vise. Then decide after a year of working on the bench if you need the fancier vises. The answer might be yes. You also might forget that you ever wanted those vises.

- **Problem No. 5: My bench is too short in length, too wide, narrow, high or low.**

If your bench is too short in length you should probably build a new top. Keep the base if you can. If it's too wide, rip it down (removing a tool tray will help). You might need to cut the base a bit narrower as well. This is doable: Cut the stretchers on the sides shorter and then cut tenons on their ends. Cut new mortises on the legs and assemble it. If your bench is too narrow, scab on new material at the back, which will add mass as well. If your bench is too high, cut down the legs or the sled foot. If it's too low, build a sled foot to raise it.

- **Problem No. 6: My bench makes it difficult to work on the long edges of boards.**

First, detach the benchtop from its base and reattach it so the legs are flush with the front edge of the benchtop. If your bench has a sled foot or a trestle design, there is an easier fix. Scab on extra pieces to the legs to bring them flush with the front of the benchtop. Now build a sliding deadman or a bench slave and you'll be in business.

- **Problem No. 7: My bench looks like a kitchen counter with drawers below. Clamping to the bench is a problem.**

You might be stuck here. Some commercial designs allow you to remove the drawer bank (they sell them separately) and you can install it someplace else handy, such as under a table saw's wing. If your bench is a door on top of base cabinets, consider making a new base and use that cabinet as a cabinet.

- **Problem No. 8: My commercial bench came with a face vise and tail vise. Both rack horribly. How do I improve them?**

By throwing them in the fireplace and installing a real face vise on the front and tail vise on the end.

- **Problem No. 9: My workbench has a lacquer finish that looks nasty and lets the work slide everywhere.**

Flatten the top of your workbench and then refinish the top with an oil/varnish blend.

- **Problem No. 10: I like my bench in the middle of the room so I can work on all sides.**

Perhaps you do. Try putting it under a window and against the wall and work that way for a few months. Don't have a window? Directional compact florescent fixtures can help. Or you can save your pennies and have a window installed. I did. It was the best $1,000 I've ever spent on my shop.

Most workbench books begin with a grand statement about how the workbench is the most useful tool in the shop. I'm not so sure I agree with that statement as it stands. I think it's correct to say that a well-designed, solidly built and properly outfitted bench is the most useful tool in the workshop. Anything less is only making you struggle. **PW**

Adapted from a forthcoming book by Christopher Schwarz titled: "Workbenches: Design, Construction & Use." Contact Chris at chris.schwarz@fwpubs.com for details on its release.

Real World Router Test

A woodworking pro takes on 9 router kits to find his favorite.

I'm a full-time professional woodworker, so I need my tools to be reliable. And I absolutely hate to waste time. I make money when I'm doing something to a piece of wood, not when I'm adjusting a tool. When the editors asked me to test two-base router kits I agreed to bring them into my shop and put them to work, but on my terms.

by Troy Sexton

Troy designs and builds custom furniture for Sexton Classic American Furniture in Sunbury, Ohio, and is a contributing editor to Popular Woodworking.

Spindle locks sound convenient, but they all had problems. The Ridgid (left) was easy to operate, but in the way when changing bases. The DeWalt was difficult to press in.

The large cast wrench of the Milwaukee (right) made for easy bit tightening. The thin stamped wrench of the Makita (left) tended to slip off the nut.

Most of the magazine tool reviews I read seem kind of silly. I don't need a chart comparing motor amperage draw and I don't care to see a router rigged up with weights and pulleys. I want to know what it's like to hold the tool and cut wood with it.

When the nine routers arrived in my shop, I put them to work, comparing them side by side. I looked at what was important to me, and I tried to push them to their limits. Any of these routers will do typical router work. I was looking for the one I would want to keep, and those I'd avoid.

I compared the most common tasks first. What was it like to change a bit? Was it easy to reach the switch? Did the motor vibrate too much and was the plunge mechanism easy to use? Then I looked at the finer points, the little things that make a router easier or better to use.

Bit Tightening

Tightening the bit in the collet is to me one of the most important design considerations. Every professional woodworker I know has had a router bit move while it's in use – a dangerous and maddening situation. I want to be sure that the collet is tight on the bit, and I want bit changing to be painless.

There are two systems in use. The first employs two wrenches, and the second uses one wrench and a button that locks the tool's spindle. I prefer the two wrenches because I can easily get the bit as tight as I want it. The spindle-lock systems are convenient because you need only one wrench, but I think it's difficult to get a lot of torque on the nut due to the way your hands are positioned while depressing the spindle lock. The spindle locks also show wear and tear quickly; the hole can become egg-shaped and the button can break or stick. All the routers in the test with spindle locks showed some wear after testing.

Among all the routers, the Milwaukee is the best of the group when it comes to bit changing, with two large nuts and two cast wrenches that are the same size and length. This lets me tighten or loosen the collet by squeezing the two wrenches in one hand. The wrenches and nuts are also sized to make aligning them incredibly easy. Next easiest were the Bosch and the Craftsman. They both have nice wrenches that are easy to align and don't slip, but they were harder to torque down because one wrench was smaller to fit on the motor shaft rather than on a second nut.

The Hitachi is similar to the Bosch but its wrenches are stamped metal rather than cast. The Makita also comes with stamped wrenches. It has one thin nut and one thick nut, which makes it hard to get the wrenches

The switch on the DeWalt is in an easy-to-locate, and easy-to-operate position.

For some switches, such as on this Makita, it's necessary to remove one hand from the router to reach the switch.

on the nuts and tighten them without slipping.

The Freud had the easiest-to-reach spindle lock location, but the nut can only be tightened using the spindle lock. The Porter-Cable, DeWalt and Ridgid all have either a second nut or flat areas on the motor shaft so the collet can be tightened with two wrenches if that's your choice or if the lock wears out.

Switch Operation

I think of routing as a two-handed operation, and I want to be able to reach the switch while both my hands are on the router. The DeWalt had the most convenient switch; I barely had to move my thumb to flip the toggle switch. The Milwaukee, Bosch and Craftsman were almost as good; I only had to stretch my hand a little to reach the switch.

The Freud switch is in a good location, but the switch was difficult to move. The Hitachi and Makita have the switch on top of the motor housing, which requires you to take one hand off the router to operate it. The Porter-Cable and Ridgid also require taking one hand off the router to reach the switch, and these were also stiff.

Vibration

Excessive vibration can be a sign of poor motor quality, and can lead to lack of control, user fatigue and poor cut quality. I placed each router on my bench and watched for movement like in the electric football game I had when I was a kid. I held each one and felt for vibration, and also compared the vibration I felt while routing.

The Milwaukee was the clear winner and was a pleasure to work with. The Ridgid and Freud were close, followed in order by the Makita, Hitachi, DeWalt, Porter-Cable and Bosch. The Craftsman had the most vibration.

Changing Bases

When changing the router motor from one base to the other, I want the process to be quick, simple, obvious and solid. The Milwaukee was my favorite; there was no confusion about which way to place the motor, and it clamped down in both bases without hassle.

The Hitachi, Bosch, Craftsman, DeWalt and Porter-Cable were almost as easy. In these there was a bit of aligning and some twists here and there before locking the motor in place, but I encountered no major problems.

With the Freud and the Ridgid, things were more complicated. With these, the spindle lock must be depressed to remove the motor from the base. If these are mounted in a table, there are two steps to release the motor.

The Makita is the only one of the group without a clamp to hold the motor to the base. It locks in its plunge base by loosening or tightening a Phillips-head screw.

Plunge Action and Locks

The plunge mechanism needs to work smoothly and without noticeable play. I want the plunge spring to be strong enough to raise the motor completely. The Porter-Cable, DeWalt and Milwaukee were the best on these points.

The Bosch and Craftsman were smooth in action, but the springs seemed a little weak. The Makita and Hitachi weren't quite as smooth as the others, but had strong springs. The Ridgid and Freud were noticeably sloppy in their plunge action.

The plunge lock holds the plunge depth, and it's often engaged while the router is running so it's important that it be simple and safe. There are two different types of locks used by routers in the test.

The Milwaukee, Makita, Bosch, Craftsman and Hitachi release the lock when you press down on the lever. The DeWalt, Porter-Cable, Ridgid and Freud engage the lock when you push down on the lever.

With the lever-down-to-release routers, the motion stops when you release the lever, but you need to pull the lever completely up to lock the plunge action. If the lock isn't completely engaged, it is possible for the router to drop as it is pushed into the work.

I prefer this method, because when the lever is released during a plunge cut, the action stops. But other woodworkers prefer the second system because there is no intermediate, partially locked position. If you already own a

One feature can get in the way of another. To change bases on the Ridgid and Freud routers, the spindle lock must be depressed.

Location and direction of the plunge-release lever is also important. Some, such as the Milwaukee, release when pushed down. Others lock when the lever is pushed down.

TWO-BASE Router Kits

Bosch

877-267-2499
boschtools.com

The Bosch wasn't the winner, but there weren't many complaints. It's a solid tool that performed well. Bit tightening and depth adjustments were good, and the fixed base can be adjusted from above in a router table.

It has a solid, well-balanced feel in hand-held use, and the plunge action was smooth, but the spring is weaker than some of the routers tested. There is an adjustable nut on the stop rod for precise depth adjustments in plunge mode. The dust collection was among the best; the fitting was easy to attach, and it could exit on either side of the router.

Likes

- Smooth plunge action
- Excellent micro-adjustments
- Easy bit and base changes
- Good balance and control
- Good dust collection

Gripes

- Wood knobs on fixed base
- Soft spring on plunge base

Craftsman

800-549-4505
craftsman.com

While this appears to be a clone of the Bosch, there are minor differences that don't offset the slight difference in price. They are nearly identical, and fit each other's bases.

The Craftsman had the most motor vibration of any in the test, and it seemed that some corners were cut in the quality and inclusion of accessories. The Bosch included a template guide fitting for the base plate, as well as a bit-centering cone. The Craftsman base plate was made of a flexible plastic that allowed sawdust to pack between the base plate and the router base.

Likes

- Plunge action and adjustments
- Good bit tightening and wrenches

Gripes

- Above average motor vibration and noise
- Lack of vacuum attachment and template guide

DeWalt

800-433-9258
dewalt.com

The DeWalt had good ergonomics and a low center of gravity. The short motor housing helped with control when mounted in the fixed base, and didn't take much space when mounted in a table. The plunge action was smooth and the threaded nut on the end of the plunge rod depth stop made fine-tuning settings a breeze. The handles were nicely shaped and rubber coated, and the switch was in a great location and operated easily. The through-the-post vacuum dust collection worked well and kept the hose out of the way. There is no provision for adjusting the bit height from above the table.

Likes

- Switch location and operation
- Good balance and control
- Plunge base micro-adjustment
- Good ergonomics

Gripes

- Awkward spindle-lock system
- Noticeable motor vibration
- No above-table height adjustment

Freud

800-334-4107
freudtools.com

The above-the-table adjustment feature operated smoothly, and the motor ran with little vibration. The lever to release the plunge was in an odd position and difficult to get tight. Once released, the plunge action was sloppy. The depth-stop adjustment on the turret was decent, but required extra tools to make adjustments.

This router also required depressing the spindle lock to change bases. There is no second nut or flat on the spindle, so two wrenches cannot be used instead of the lock.

Likes

- Above-table height adjustment
- Little motor vibration

Gripes

- Sloppy plunge action
- Spindle lock interferes with base changes
- Difficult to operate switch

Hitachi

800-829-4752
hitachi.com/hpt

If style is important to you when choosing power tools, then this router has some appeal. If substance is more important than style, you might want to take a closer look. Of the features I looked at, the large base plate was the only item rated above average.

Motor vibration, ergonomics, plunge operation and base changing were decent, but nothing to write home about. Changing bits was difficult, and the height adjustment in the fixed base had a lot of play. It also had the same switch placement issues as the Makita.

Likes

- Template guides included
- Extra-large clip on motor clamp

Gripes

- Coarse fit and adjustments of fixed base
- Hard to find/reach switch

Makita

800-462-5482
makita.com

The Makita worked well as a plunge router, with smooth action, a well-placed release lever and some nice adjustment features. There aren't any frills to the fixed base; the height adjusts by a threaded motor housing and there is no above-the-table depth adjustment.

Motor changes between bases are easy, but to lock the motor in the plunge base you need a Phillips-head screwdriver. This was the only router in the test to require a separate tool for this task. It is hard to align the wrenches on the nuts when changing bits.

Likes

- Plunge base action and lever
- Plunge base micro-adjustments

Gripes

- Extra tool required to lock motor to plunge base
- Switch location can be hard to reach

Milwaukee

800-729-3878
milwaukeetool.com

This router ran the smoothest and had the easiest bit-changing. The switch and other controls were easy to locate and operated well in either hand-held mode, or inverted in a router table. Changing the motor from base to base was simple and obvious, and the innovative micro-adjustments worked great in all configurations.

The few things I didn't like were all related to the round base plate. I prefer one with at least one straight edge for locating the tool on a straightedge fence. The base plate attaches to the router with Torx drive screws, and the screws to attach a fence (not included with the kit) and the vacuum attachment are mounted on the bottom of the base plate. These are minor inconveniences however, not deal breakers.

Overall, the quality feel, ease of use and smooth operation and performance put this router ahead of all the others.

Likes

- Overall design, easy to operate
- Least motor vibration
- Easiest bit changes
- Switch location and above-table height adjustment

Gripes

- Use of Torx screws
- Round base plate
- Accessory screws below base plate

Ridgid

866-539-1710
ridgid.com

The Ridgid is smooth and powerful in operation and it's the only router in the test with a light that shines on the bit. It also has a cord light to indicate when the tool is plugged in. Visibility is good as the base has a lot of open area. The plunge-depth adjustment is threaded instead of a turret.

The biggest problem with this router is the placement and operation of the spindle lock. To change bases, the lock must be depressed. This complicates the change and requires two steps for removal.

Likes

- Light illuminates bit
- Vibration-free operation
- Above-table height adjustment

Gripes

- Spindle lock interferes with base changes
- Switch placement

Porter-Cable

888-848-5175
porter-cable.com

The Porter-Cable has some features that are ahead of others in the test, but it also has some quirks. In addition to an above-the-table height adjustment, it was the only router in the test that provided a way to lock or unlock the motor to the base from the top.

It has a solid feel to it with nicely shaped rubber-coated handles and the motor had plenty of power with little vibration felt. The plunge mechanism is smooth in operation, with a powerful spring. The spindle lock is in an awkward location, and it was difficult to hold in. The micro-adjustments on the plunge turret use a Torx-head screw, and the adjustments on the fixed base had some backlash.

Likes

- Handle shape and ergonomics
- Solid feel with little vibration
- Above-table height adjustment and lock
- Smooth plunge action

Gripes

- Spindle lock hard to use
- Backlash in height adjustment
- Torx screws for fine plunge setting

The Milwaukee's fine adjustment on its fixed base was the favorite of the routers tested.

Routers without a fine-thread adjustment on the fixed base have coarse threads on the motor housing. Depth of cut is set by twisting the base in the motor housing.

Above-the-table adjustments aren't always as easy as they seem – the hole to reach the screw can fill with debris, and you'll likely need to bend down anyway to see the edge of the bit.

plunge router, and are looking for a second, choosing one that releases in the same way will help you avoid confusion.

Most of the plunge levers were in an easy-to-access position. The lever on the Freud was awkwardly placed, and required the use of a finger as well as a thumb to operate the lever.

Depth Adjustments

I'm a perfectionist, so I need a simple and reliable way to change the depth-of-cut to make that final, half-a-hair adjustment. I get frustrated if there is enough play in the mechanism due to coarse threads or enough sloppiness to make the bit move more than I expect when I reverse direction.

Several of the routers offered above-the-table depth adjustment, but the Porter-Cable is the only one with an above-the-table motor latch.

Rating the fine adjustments is difficult because not all the routers tested use the same mechanism in each of the three possible configurations (plunge base, fixed base, and fixed base in a router table).

There are two basic systems used with the fixed bases. The first, found on the Bosch, Craftsman, Freud, Milwaukee, Porter-Cable and Ridgid, employs a threaded rod that's adjusted with the thumb and forefinger.

The other system, used by DeWalt, Hitachi and Makita has large coarse threads that spiral around the motor housing. Twisting the motor in the base raises and lowers the motor. Both systems worked well with the fixed bases in this test.

The Milwaukee latch system was the most user-friendly; the base didn't move when I locked it down. The Bosch, Craftsman and Ridgid moved slightly when locking the base.

On the Freud router, the adjustment knob is longer than it needs to be, and keeps the top of the router off the table if you flip it upside down to change or adjust the bit. The Porter-Cable adjustment had some play in it, about a half-turn, before engaging when changing directions. The Hitachi sits loosely on its threaded motor housing, and it can drop when the motor latch is released.

Mounted in a router table, the threaded rod adjustments work a little better than the threaded motor housing. The Bosch, Craftsman, Milwaukee, Ridgid, Freud and Porter-Cable can be adjusted from above the table with an accessory tool. The Porter-Cable also includes a motor latch that can be engaged from above the table.

Above-the-table adjustment sounds like a good idea, but the access to the adjustment can easily fill with dust and you still need to bend down to see the bit and, except for the Porter-Cable, lock and release the motor base's grip on the motor.

When set up as plunge routers, final cutting depth is set with a depth-stop rod, and a turret for making stepped cuts. The Bosch, Craftsman and DeWalt have a

A fine-threaded nut at the end of the plunge rod makes fine-tuning depth settings simple and precise.

threaded knob at the bottom of the stop rod, a great way to tweak the final depth setting.

The Milwaukee has a unique thumbscrew and stop rod that works almost as well. The other routers all make fine adjustments by adjusting a screw or screws on the turret. The Makita and Porter-Cable have three fixed stops, and three adjustable screws on the turret.

The Hitachi is similar, but with only one adjustable screw on the turret. The Ridgid turret has no fixed stops, but the single base turret is threaded for making final depth adjustments.

Vacuum Attachments

All of the routers tested included an attachment to hook up a vacuum for dust collection except the Craftsman, Hitachi and Makita. The DeWalt and Porter-Cable channel the dust and chips up one of the plunge columns to a hose connection at the top of the motor.

This keeps the hose out of the way better than the rest, which require a clear plastic attachment with the hose connection close to the base of the router. The Bosch and Freud attachments could be mounted in either direction, but the Ridgid and Milwaukee only mount in one location.

Performance will vary depending on the type of cut you're making and the depth of the cut. There wasn't a significant difference between any of the routers we tested in performance, but I liked the through-the-column style because it kept the hose from interfering.

And the Winner Is …

The Milwaukee 5616-24 was the clear winner of the routers I tested. It was smooth and powerful with a combination of design features that separated it from the others. Every feature I looked at had a quality feel to it, and the designers obviously did their homework to create an integrated system that was user-friendly.

The Bosch, DeWalt and Porter-Cable were close behind and would be good, useful choices if they have a feature you prefer, or if you find one at a bargain price. During the test period, prices varied as different brands went on and off sale, so shop around to get the best bang for your buck. **PW**

Some routers require a separate attachment for dust collection. The Bosch, shown here, can mount in two different directions.

The Porter-Cable, as well as the DeWalt have the dust collection attachment at the top of the column, a more convenient location.

TWO-BASE Router Kits

BRAND & MODEL #	PRICE*	SPEED RANGE (RPM)	PLUNGE LOCK	PLUNGE BASE ADJUSTMENT	FIXED BASE ADJUSTMENT	SPINDLE LOCK
Bosch 1617EVSPK	$208	8,000-25,000	Up=lock	Threaded stop	Adj. knob**	No
Craftsman 1617-12	$199	8,000-25,000	Up=lock	Threaded stop	Adj. knob**	No
DeWalt DW618PK	$199	8,000-24,000	Down=lock	Threaded stop	Motor thread	Yes-opt.
Freud FT1702VCE	$200	10,000-23,000	Down=lock	Turret screws	Adj. knob**	Yes
Hitachi KM12VC	$160	8,000-24,000	Up=lock	Turret screws	Motor thread	No
Makita RF1101KIT2	$224	8,000-24,000	Up=lock	Threaded stop	Motor thread	No
Milwaukee 5616-24	$249	10,000-22,000	Up=lock	Adj. stop rod	Adj. knob**	No
Porter Cable 893PK	$259	10,000-23,000	Down=lock	Turret screws	Adj. knob**	Yes-opt.
Ridgid R2930	$199	10,000-23,000	Down=lock	Threaded turret	Adj. knob**	Yes-opt.

**Prices correct at time of publication. Router kits are often sale priced. Prices ranged between $175 and $260.*
*** These routers also are adjustable from above when used in a router table.*

Photos by the author

Old School Veneering

Traditional methods with a veneer hammer and hot hide glue.

Veneering has been practiced for thousands of years. It's a way to take some of the world's most spectacular but unstable woods, cut them to paper-thinness and glue them to a stable foundation. By veneering, you can repeat natural patterns, create intricate borders and inlays, arrange grain direction and create surface designs that would be impossible to make with solid wood.

Using veneer adds a new dimension to furniture making and offers wonderful opportunities to the woodworker. However, from a technical perspective, there is the problem of attaching this skin securely to a wood substrate. You don't want a veneered surface to peel, crack or buckle.

From an aesthetic perspective, it allows the maker to design the "look" of his or her creation, almost like a painter working on a canvas. Veneer can change the perception of a piece. A delicate inlay can emphasize a feature: a cuff around a leg visually anchors a

by Mario Rodriguez

Mario has almost 30 years of experience as a craftsman, educator and writer. He teaches at the Philadelphia Furniture Workshop.

piece; bookmatched doors provide symmetry. Veneer can elevate your furniture from simple to sophisticated.

But, some woodworkers shy from using veneer. First, the term "veneer" implies to some people poor quality and shoddy, dishonest craftsmanship. Then, the process itself is so mysterious. Veneer is thin, fragile and prone to breaking apart. The tools and techniques used in veneering seem difficult and strange.

If a woodworker were interested, where would he or she start? What tools would be needed? How large and difficult a project should be attempted? As a teacher, I'm always searching for ways to make woodworking more accessible. A project such as this gentleman's dressing mirror is a perfect introduction to traditional veneering.

I've taught this project class at the college level, and the Philadelphia Furniture Workshop is planning to put it on the schedule soon. (Complete plans for the dressing mirror are available through the school for $40 at philadelphiafurnitureworkshop.com).

Traditional Hot Glue and Hammer Veneering

There are several ways to apply veneer to a piece. And if you're serious about veneering, it's a good idea to become familiar with all of them. I think the best method to learn first is traditional hammer veneering.

Of all the methods, gluing veneer with hot hide glue and pressing it with a hammer can be the most challenging – and the most satisfying. To achieve success takes a generous amount of patience, a delicate but firm touch and a critical eye. Tackling this method on a small but manageable scale will build confidence and develop your skills.

For this project, I used mahogany crotch veneer. This is a rich and shimmering veneer filled with light that often features a feather-like grain pattern down the center. Because the cabinet is small, the feather should also be small, and scaled to the cabinet. Many veneer suppliers have photos on their web sites to help you make your selection.

I ordered several sequential leaves to ensure color and grain pattern uniformity – or in case I made a mistake. And having virtually identical leaves will make your inevitable patches almost invisible.

For this project, I ordered three 18" x 30" crotches from Ben Barrett of Berkshire Veneers (413-644-9696 or berkshireveneer.com), who searched his inventory and sent me some beautiful crotch leaves that were perfect for the project. These pieces provided all the veneer I needed.

Flattening the Veneer

When the veneer arrives it will probably be buckled and brittle. Veneer in this state is difficult to work, so you'll need to flatten and soften it. This is easily accomplished with a solution of water, glycerin, alcohol and glue (fish or hide). For this project I used about 1 quart of the solution I typically mix; 3 parts water, ¾ part glycerin, 1 part alcohol, and ¼ part glue.

After soaking the veneer on both sides with the solution (dispensed from a spray bottle), I pressed the veneer leaves between sheets of plywood, using absorbent paper (either brown kraft paper or plain newsprint) between the leaves, and then weighted everything down for 24 hours. You only need enough weight to keep the veneer flat, so scrap wood or anything else you have around your shop will do.

Veneer leaves should always be sequential for the best match in terms of figure and color. Most figured veneers will need to be flattened before use.

If the veneer isn't flat the next day, repeat the process. Or if the veneer is flat but still damp, change the absorbent paper and wait another 24 hours. When the veneer is completely dry, flat and pliable, it will cut easily and glue up nicely with minimal checking or buckling.

Cut the crotches for the project

To get the veneer to lie flat, spray it with a solution of glycerin, alcohol, glue and water then press it between sheets of paper and plywood.

Several strokes with the veneer saw held against a straightedge will create a clean edge on the veneer leaf.

parts (allow generous margins all around), reserving the most striking veneer for the sides, top and drawer front. Then lay out the sides and top so that the grain is continuous, running up one side, over the top then down the other side, without interruption. The underside of the cabinet is not veneered. Save the second leaf for the drawer front. Everything else can be cut from the leftovers.

Rest your veneer on a flat scrap of plywood and put a wooden straightedge on the line. Rest your veneer saw against the straightedge and gently pull it toward you. (See "Tuning Up a Veneer Saw" on page 69 to get better saw performance.) It will take several passes to make the cut.

When preparing the narrow strips for the cabinet edge, the mirror frame and the feet, I first apply veneer tape to the strips to protect them. This paper tape (activated by moisture and available from veneer suppliers) acts as reinforcement, helping to keep the veneer strips flat and in one piece.

Lightly wet the veneer strip on both sides, apply the tape to the top side, and press gently with a rubber roller. Then weight the strips down with a piece of scrap until they dry. Highly figured wood usually has small cracks or other defects and I also use veneer tape to repair these.

Preparing the Glue

Hide glue has been used in veneering for thousands of years, and was used on most of the antique veneered furniture you find today. The glue is made from animal hides, blood and bones that have been dried and pulverized. It comes in pearl or flake form and is activated with heat and water. I obtain hide glue from Tools for Working Wood (800-426-4613 or toolsforworkingwood.com). They also carry the glue pot and other tools mentioned in this article.

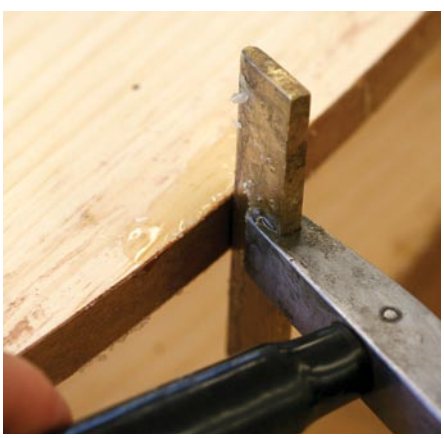
Hot hide glue does have some advantages over other adhesives. When it cools, it sticks. That eliminates the need for a press. It can be reactivated with heat – or by the addition of more glue. It is water-soluble and cleans up with warm water.

For a project of this size, I place about ½ cup (dry) of hide flakes in a small jar then cover over the glue with warm water and let it sit for about 20 minutes before placing the jar into the glue pot sleeve.

After 15 minutes, stir the glue until it runs freely from the brush. Then take a small amount between your middle and fore fingers and rub. The glue should develop tack in a couple of minutes.

If left uncovered, the glue will

Hide glue is generously applied to the back of the edge veneer with a brush.



Using a veneer hammer, press firmly down on the edge. Look for a tight joint and light glue squeeze-out. Let the veneer overlap at the corners.

Let the glue cool and stiffen, then use a veneer saw to trim off the excess. You should leave 1/32" to 1/16" margin.

thicken as the water evaporates. To maintain the consistency of your glue, cover the jar with its lid or a damp towel. If you add more water to thin the glue, remember to allow the glue to warm to its proper temperature (140°F) before brushing it onto your work.

Gluing Down the Veneer

When you apply veneer at any corner, one layer of veneer is trimmed flush with the substrate surface, then the next layer of veneer is applied perpendicular to the first. The second layer covers the first, but its edge remains visible – and vulnerable.

You must consider the order in which you veneer. And it's always a choice between hiding the veneer seam and protecting it. For example, you usually veneer the edges on a drawer front first, then veneer the front itself. When the drawer is closed, the veneer edge is not visible.

Apply warm glue to the box edge, then to the edge veneer. After centering the strip on the edge, apply glue on top of the tape (this lubricates the pressing). Then with firm but careful pressure, press down along the edge with the veneer hammer (more like a veneer squeegee), looking for light glue squeeze-out along both sides of the edging.

Work your way around the box, overlapping the edging at the corners. Then, with a sharp marking knife, cut through both layers, across the corners, to make the miters. After cutting through both layers, carefully remove the cut-off pieces with the tip of the knife and apply veneer tape to draw the miter joint closed. If the glue cools before you can trim the miters, rewarm the joint with an iron or by applying more glue, then trim and tape.

When the glue cools and bonds, trim off the excess veneer with the saw and flush the edge with a file. Any small gaps between the veneer and the box's edges are warmed with an iron and pressed down. Finally, scrape the edge, working in toward the center for a clean surface and a tight joint so that veneer applied perpendicular to the edge will produce an invisible seam.

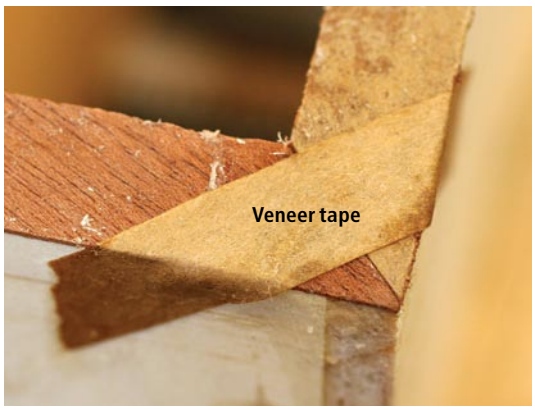
Gluing the Sides and Top

Apply glue to the substrate. Then lay the veneer face down on the surface and into the glue while brushing glue onto the back of the veneer. Next, flip the veneer over and place it face side up, then use the veneer hammer to press the veneer down firmly. Work from the center out toward the edges, applying more glue to lubricate the hammering if necessary.

If a bubble appears, brush glue onto the bubble and the surrounding area, and press from the bubble toward the nearest edge.

When the sides are down and secure, saw off the excess, then

Lay a ruler across the points of the miter, then cut through both layers with several passes of a sharp marking knife.



Place a strip of tape across the miter, then resist for several hours the temptation to remove the tape. If needed, rewarm the joint to close the miter, then tape.

Holding a mill file flat to the surface produces a clean edge without any "rolled" edges.

After applying glue to the veneer face, press down firmly with the veneer hammer. Work from the center out toward the edges, squeezing out any excess glue.

file the edge flush. Apply hot glue to any gaps and press them down until the glue cools. Repeat the process for the top.

Veneering the Curved Drawer Front

Set the curved drawer front securely in the vise to allow clearance and good access to the corners. Then repeat the process for applying glue and laying down the veneer. While the glue is warm, press down with the veneer hammer until the corners and edges are down nicely and all the bubbles are pressed out.

Be careful not to slide the hammer off the drawer front and fracture the veneer as you apply pressure to the corners.

Next, cut off the major excess and replace the drawer front in the vise so you can press down any small gaps.

Be careful – even though I was, I still slid off the edge and cracked the veneer. But after inspecting the damage, I determined it would be an easy repair once the glue was dry. The next day, I used a warm household iron to heat and press down several small gaps along the corner before repairing the edge of the drawer front.

Trimming and Cleaning Up

After setting the box aside to cool and settle down, carefully inspect the edges for clean, tight and attractive joints. I use four tools to trim, clean and flush veneer seams:

- Veneer saw – to trim edges.
- Grobet detail file – a tapered half-round file with coarse teeth on one end and fine teeth an the other to remove excess glue and expose small gaps.
- Flat card scraper – to flush the veneer to the substrate.
- 8" second-cut mill file – to perfectly flush and joint edges.

How to Flawlessly Patch Veneer

Veneer is fragile; mistakes and accidents will happen. Most of the damage will occur at the edges and corners, where patches can be cut and easily let in.

First, select a piece of veneer that closely matches the damaged area in color and grain (wetting both the patch and damaged area will give you a good idea of the final appearance). Then take a curved carving gouge and punch out a patch that covers the damaged area. With the same gouge punch out the damaged area and clean it out with a bench chisel. Check the patch for fit, color and grain. Then glue the patch in place and secure it with masking tape.

After the patch dries, carefully file off any excess, then file the patch flush and sand. After sanding, your project will be ready for finishing.

When the surface is sanded, any significant traces of glue are removed, which leaves an open-pore surface that is receptive to stain and finish. Unlike when using yellow glue, any hide glue residue remaining on the surface will have no adverse effect. **PW**

A warm iron is used to soften the glue and press down any problem areas.

A carving gouge is used to punch out a damaged area. The same gouge is then used to cut a matching patch.

TUNING UP A VENEER SAW

Once at a woodworking show, I witnessed Frank Pollaro making up veneered chess boards. He must have produced more than 30 pieces and each was perfect. The seams were tight and clean; there was no tear-out or split veneer. What impressed me most was that he was getting these results straight from his veneer saw, with no fussing or cleaning up on a shooting board later. After that, I was determined to improve the performance of mine.

Here are the steps I take to "soup up" a veneer saw. It's not necessary to do this to learn veneering, but it helps.

Straighten the tang. Most veneer saws have an uncomfortable hang (the angle of the handle to the blade). I found that by lowering the handle and placing it more in line with the saw blade, I got better control and improved results with less pressure.

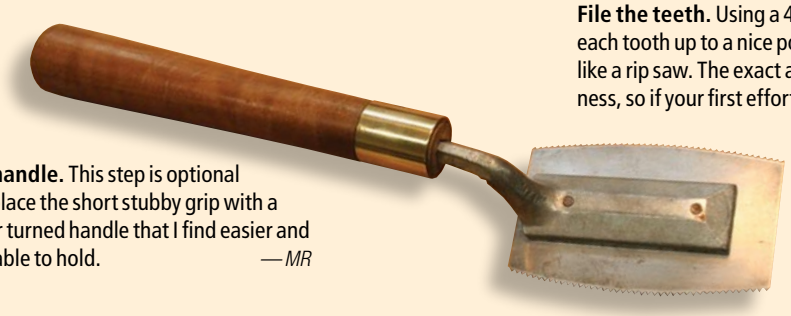
After taking apart the saw, I placed the spine in a vise and with vise grips, gently straightened the tang. Be careful. The metal typically used for this part is soft and susceptible to breaking.

Flatten the spine. Any bumps or unevenness of the spine against the blade may result in a curved blade that won't easily cut to a straight line. To establish a flat spine, flatten the back of the spine where it attaches to the blade on a coarse sharpening stone.

Flatten the back of the blade. On the same stone, flatten the back of the saw blade. You may want to advance to finer grit stones for a more polished blade. I find a smoother blade is easier to keep clean and rust-free.

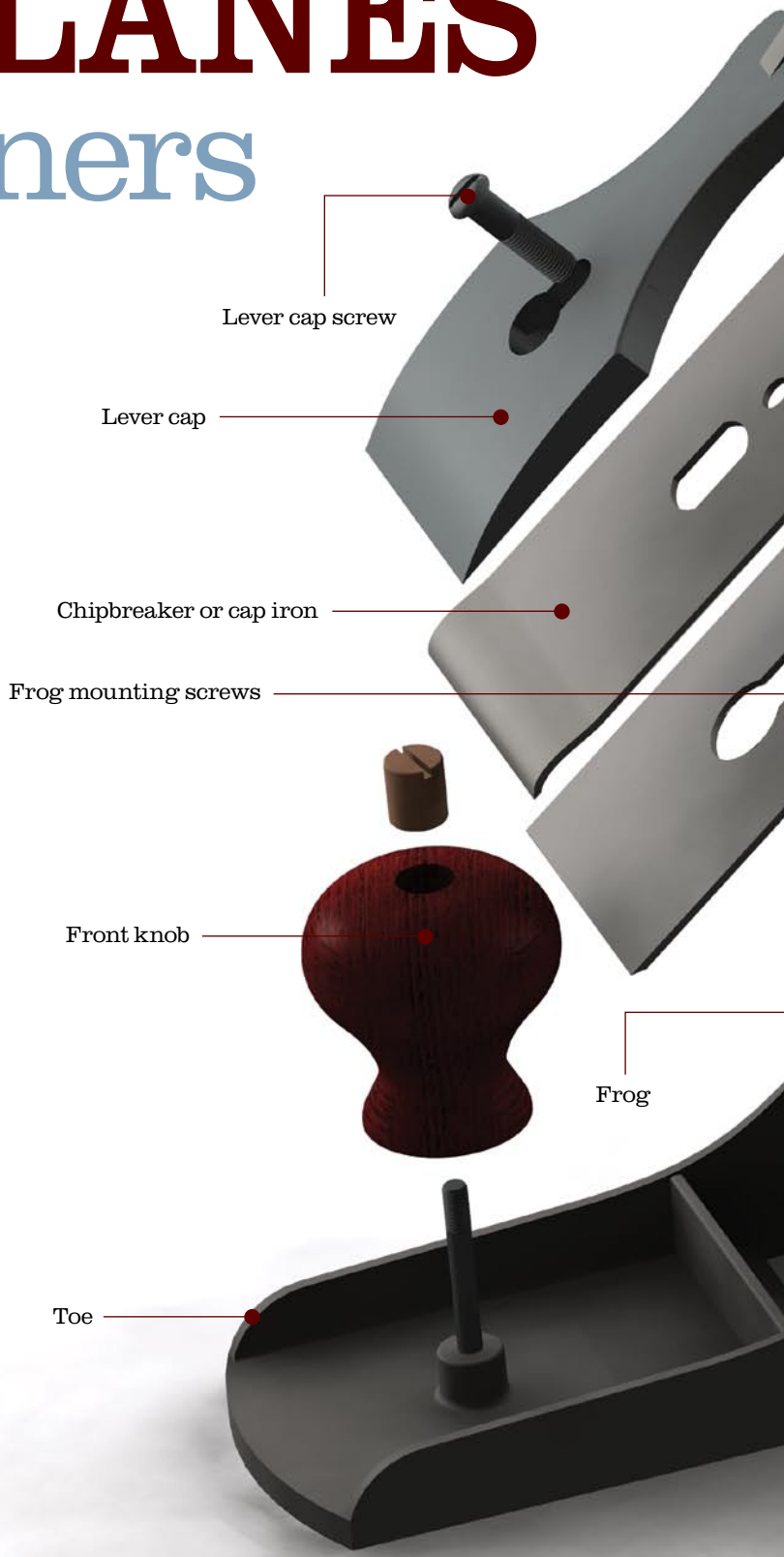
Bevel the cutting edge. I use a 6" mill file to bevel the cutting edge on one side. Holding the file at an angle and working across the teeth, gently file until a bevel extends from the points to the gullets of the teeth. This (step) produces slender teeth that glide through veneer.

File the teeth. Using a 4" double extra-slim tapered saw file, I gently bring each tooth up to a nice point. I keep the file at 90° to the teeth and file it just like a rip saw. The exact angle of the teeth isn't as important as their sharpness, so if your first effort isn't perfect, don't worry.



Replace the handle. This step is optional but I like to replace the short stubby grip with a slender, longer turned handle that I find easier and more comfortable to hold. *— MR*

HANDPLANES
for Beginners



Handplanes are the king of woodworking tools in that they are the most versatile tool in a shop. They do so many varied jobs, that the more you know how to use planes, the more planes you own. The converse is true. If you own just one, there is a good chance you do not know how to use it.

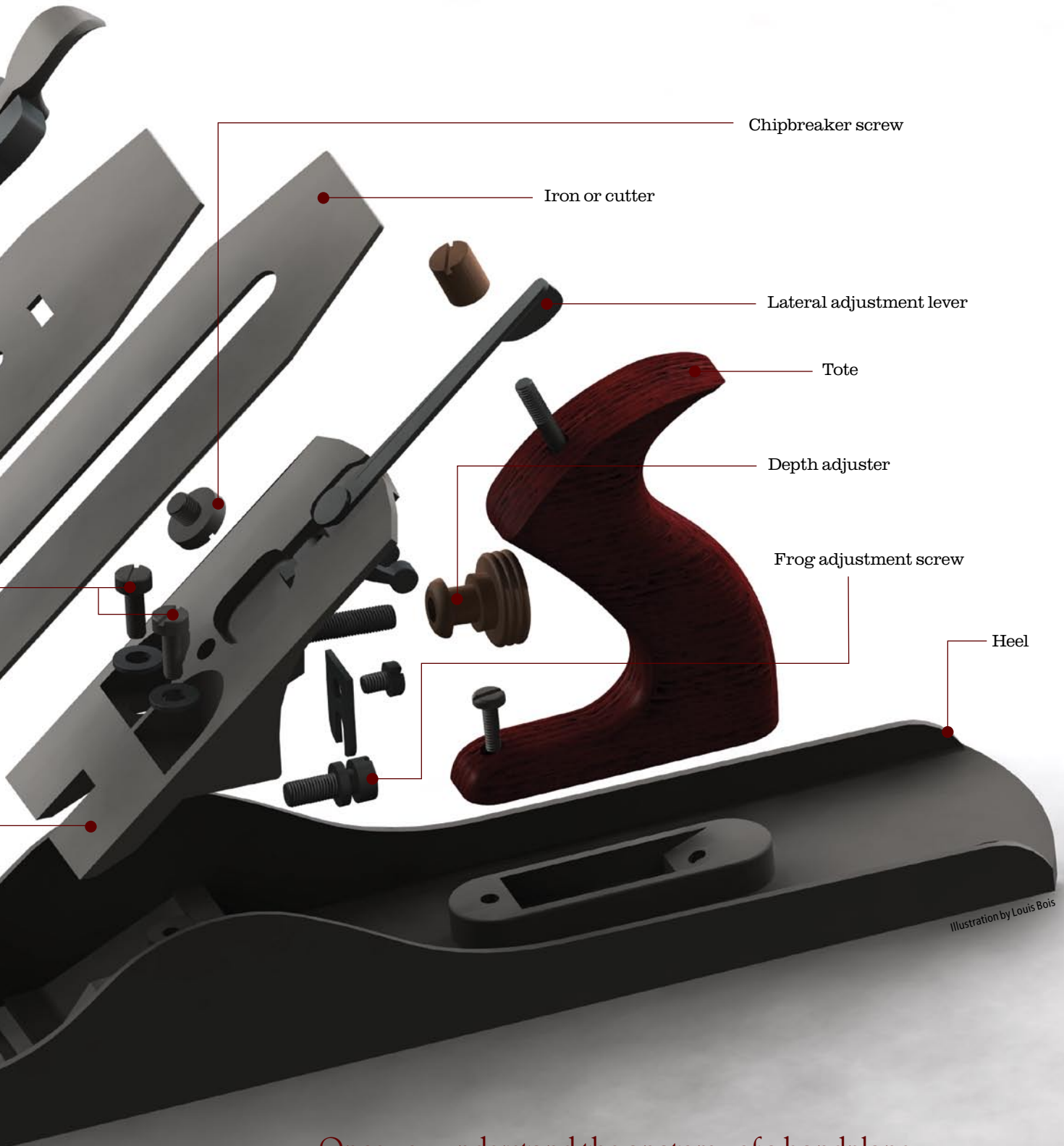
If you do not know how to use a plane, you are not alone. In fact, when history judges those of us who teach and write about woodworking, it will be harsh. We bear responsibility for the loss of knowledge of handplanes. For thousands of years these tools have been the mainstay of every woodworking shop, and in a matter of decades we permitted this knowledge to almost disappear. These days, the handplane is used more frequently as a logo on woodworkers' business cards than in their shops.

I experience this lack of knowledge directly in every class I teach. Our tool list specifies a handplane, "either smooth or jack, such as a Stanley No. 4 or No. 5." Students putting their tools together frequently call and ask for clarification. One recently repeated what I have heard many times: "I'm a professional woodworker and I don't know what a 'smooth' or a 'jack' is."

Students frequently ask us to show them how to adjust the plane they brought. When they go to work, we frequently observe them struggling with their planes. It is not uncommon for us to find the blade upside down, or even the chipbreaker mistaken for the blade. The purpose of this article is to describe the basics of handplanes starting at the most nitty-gritty level. Until you understand these basics, handplanes will remain a mystery.

A History Lesson

The basic handplane we recognize is referred to as a "bench plane." The quest to develop cast iron bench planes began in the 1800s. Prior to that, most planes were made of wood. Cast iron planes were deemed more desirable, because they could be easily mass produced, and would hold up longer. Although a lot of people had tried making cast iron planes, Leonard Bailey of Boston, Mass., made a technological breakthrough by inventing the removable frog. This device allowed for more easy and accurate adjustment. In 1869, Bailey sold



Once you understand the anatomy of a handplane, you'll be well on your way to using it with success.

by Michael Dunbar

A chairmaker since 1971, Michael is the founder of The Windsor Institute in Hampton, N.H., where he teaches hundreds of students each year to build Windsor Chairs. For more information, visit thewindsorinstitute.com.

his patents for cast iron planes to the Stanley Rule and Level Co., which for a long time continued to call its planes "Bailey Patent." The term is still used and understood today.

For many decades, Stanley produced high-quality iron planes in prodigious quantities. By 1897, the company had sold more than 3 million planes. Until the 1930s, the company introduced numerous improvements to Bailey's original design. Quality began to decline after World War II, and this decline accelerated after 1960. For that reason, the best of Stanley's products are referred to as "pre-war planes." These are the examples preferred by the most experienced handplane users.

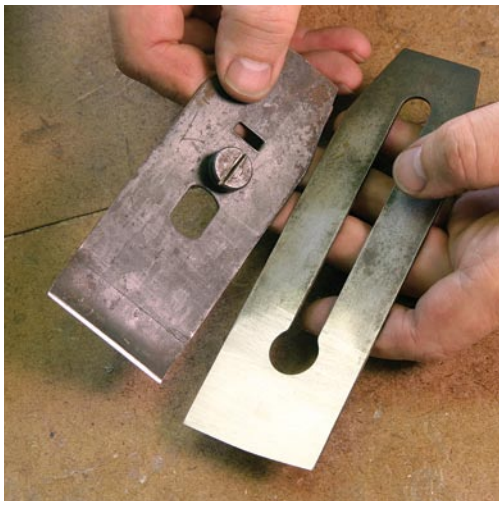
Stanley numbered its line of bench planes No. 1 through No. 8. The number designates the plane's size and purpose. No. 1 through No. 4 are smooth planes. However, the No. 1 and No. 2 are so small as to be impractical, and so we will ignore them. No. 5 and No. 6 are jack planes, while No. 7 and No. 8 are both jointers.

The words smooth, jack and jointer describes a plane's most common purpose. A smooth plane is typically used for finish work. The word jack is a bit archaic, but once designated things that were used for heavy work. Thus, a jack plane is designed for heavy stock removal. Like its powered namesake, the jointer straightens the edges of boards, frequently in preparation for gluing.

There are three other less common bench planes in the series, designated No. 4½, No. 5¼, and No. 5½. The No. 4½ is a wider smooth plane. The No. 5¼ is a smaller jack than the No. 5, while the No. 5½ is larger.

Stanley also produced a Cadillac series of planes that it sold under the name Bed Rock. These are high-quality tools and rank among the best handplanes ever produced in the world. The Bed Rock planes used the same numbering system as Stanley's Bailey Patent planes, except that the plane's number was preceded by the number 60. Thus, a No. 604 is a Bed Rock smooth plane, while a No. 605 is a jack.

After Bailey's patents expired, other companies produced copies of Stanley planes. Some of these companies include Sargent, Keen Cutter, Millers Falls and Record. Some even used numbering systems that mimicked Stanley's.



The iron (right) and the chipbreaker, sometimes called the cap iron or back iron. The chipbreaker was designed to prevent the wood from tearing out ahead of the iron's cutting edge.

Some of the many bench planes produced by Stanley. The three planes shown directly above are Bed Rock planes – the top of the line. The rest of the planes are grouped by function. From left to right: smooth planes, jack planes and jointers.

Stanley made bench planes in many sizes from the diminutive No. 1 to the massive No. 8 jointer plane.

Plane Anatomy 101

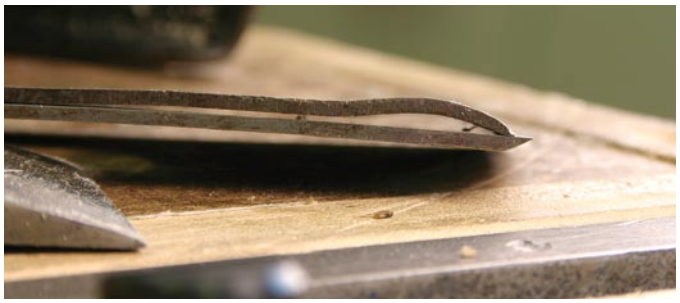
A bench plane is essentially a mechanism for securing a chisel-like blade so it can take a controlled cut. The tool also permits the cutter to be adjusted to a desired setting. Since at least the time of the ancient Egyptians, all handplanes have had certain elements or parts. The main part is the body, which on a wooden plane is also called its stock. The bottom surface of the body that runs on the wood is the sole. The front end of the body is the toe, and the rear the heel. The sole has an opening in it through which the cutting edge projects. This opening is called the mouth. The handle that is used to push a plane is the tote, and sometimes there is a knob. The blade is also called the iron or the cutter.

In a wooden plane, the mouth is the bottom of a larger opening called the throat. The cutter is secured on the back surface of the throat, called the bed, by a wedge. The cutter had to be adjusted by a light hammer. Bailey's genius was to create a whole new way of holding and adjusting the cutter. His method relied on a removable 45° bedding platform called a frog.

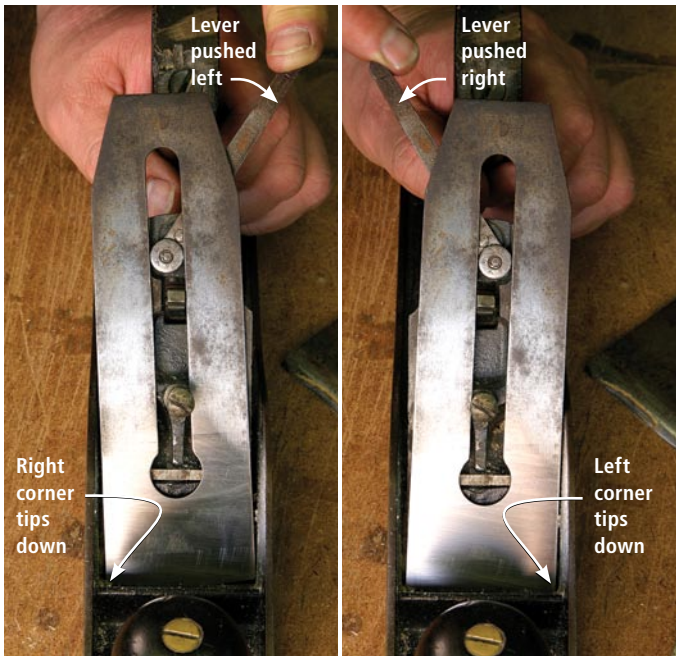
A Bailey-type plane's cutter is secured to the frog, which is then secured to the body. The frog also includes two important adjustments, and because it is secured to the body, it is itself adjustable. As a result, a Bailey-type plane is very easy to set up and very accurate. However, it is easier to understand the adjustments if you understand how a plane works.

How it Works

The plane blade's cutting edge projects below the sole. When the plane is pushed forward, this sharp edge engages the wood and severs a shaving. Imagine a chisel being pushed over wood. While its sharp edge would engage the wood, the shaving would quickly become long enough to ride up the chisel's inclined body. Then, instead of cutting, the chisel would begin to act as a lever, lifting the wood. The split would extend ahead of the cutting edge, so instead of being cut, the chip would tear away from the board. The result would be no



The assembled chipbreaker and iron. When the plane's iron cuts a shaving, it immediately is deflected up and kinked by the chipbreaker. The shaving is ejected out of the plane.



The lateral adjustment lever keeps the cutting edge parallel with the sole. When you move it all the way left (from the operator's perspective), the right corner of the iron tips into the work. When you move the lever left, the opposite effect occurs.

control, and the resulting surface would be quite rough.

That is where the sole of the plane comes in. The flat sole ahead of the cutting edge holds the wood down and prevents it from being torn loose by a levering action. Because it cannot lift the chip ahead of it, the cutter shears a continuous shaving. That shaving then passes up through the mouth and is ejected from the plane.

Advent of the Chipbreaker

For millennia, the sole of the plane was the only prevention against tearing. In the 18th century, plane makers developed the chipbreaker. The chipbreaker looks like a second blade that is secured to the cutter by a stubby screw with a wide, flat head. Adding a chipbreaker gave rise to the terms a "double," or a "capped iron." The chipbreaker itself has a bow in its end. When the breaker and the cutter are assembled and the screw is tightened, the cutter is stiffened. This stiffening helps the cutter to resist chattering due to the force of cutting, and results in a cleaner surface.

The addition of the chipbreaker resulted in a change in the plane irons. They now had a slot along much of their length. The slot had a round end to allow the screw head to pass through.

The chipbreaker's name describes its most important function: As the chip rises up through the mouth it immediately encounters the convex curve at the end of the chipbreaker. Instead of rising up in a line along the surface of the cutter, which helps create a levering action, the chip is bent forward, causing it to kink. Now broken at each kink, the chip is much less likely to be lifted by levering. These kinks occur at very short, regular intervals measuring many per inch. As a result, a broken chip tends to roll up into a tube as it leaves the mouth.

The Frog

In wooden planes a double iron, like the earlier single iron, was still secured by a wooden wedge. However, Bailey attached the cutter and chipbreaker assembly to the frog's 45° bed with a device called a lever cap. The lever cap has a locking lever at the upper end. There is a cam on the hinged, lower end of the lever. Thus, the cap can be tightened and loosened very quickly by lifting or lowering the lever. A roundhead machine screw secures the cutter/chipbreaker assembly and lever cap tightly to the frog. Stanley and other makers found the cap's visible front surface a nice place to display the company's name.

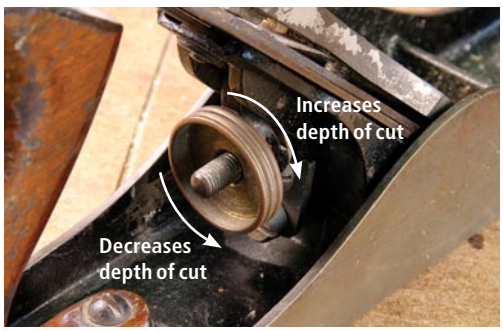
The frog itself has two important adjustments – the lateral and longitudinal. When using a plane one wants the cutting edge to be parallel to the sole. If it is not, it will cut more deeply on one side than on the other and leave an unsightly track on the wood's surface. It is important for a plane to also be able to control the chip's thickness. On a wooden plane both blade adjustments were accomplished by tapping the tool with a light hammer. On a Bailey plane they are controlled by adjustments in the frog.

Lateral Adjustment

Lateral adjustment, that which allows the cutting edge to be set parallel to the sole, is accomplished by a lever under the cutter. This lever extends between the cutter and the tote, to provide easy access. The lever is secured to the frog with a rivet that allows it to pivot. On the end of the lever is a wheel that fits into the slot in the cutter. On later planes the wheel was eliminated and the end of the lever became merely a bent lip. By moving the lateral adjustment lever side to side, the cutter/chipbreaker assembly will pivot under the lever cap. If you push the lever to the right, it extends the left side of the cutting edge, and vice versa.

Longitudinal Adjustment

Behind the frog is a brass wheel (on later planes this can be made of other, less expensive materials). This wheel regulates the cutter's longitudinal adjustments. The wheel is mounted on a stud with



The brass wheel behind the frog regulates the depth of cut. Rotate the wheel clockwise to increase the cut and counterclockwise to decrease it.

a left-hand thread. The yoke on the lower end of a small lever fits into a groove in the wheel. The rectangular upper end fits into a short horizontal slot in the chipbreaker. As the wheel is moved clockwise, the lever pivots and moves the cutter/chipbreaker assembly down, increasing the amount of the cutting edge projecting through the mouth. The projection is decreased by turning the wheel counterclockwise.

Open Wide – or Not

The final adjustment on a Bailey-type plane is the frog itself. The width of the mouth ahead of the cutting edge affects how well the plane cuts. If the mouth is too wide it will be less effective at reducing tearing. If the mouth is very narrow, it better controls tearing. However, the plane will choke if the blade is set to take a shaving thicker than the mouth opening.

The mouth's opening is controlled by moving the frog forward or backward, a motion that moves the cutting edge closer to the mouth's front edge, or away from it. The frog is adjusted by removing the lever cap and cutter/chipbreaker assembly. This exposes the two screws that secure the frog to the body. On early Stanley planes, the frog was adjusted by hand after the screws had been loosened. One moved the frog to the new position and held it in the new position while retightening the screws. The process was pretty much done by feel.

In about 1914, Stanley developed a very handy device to make setting the frog more accurate. A screw with a slot in front of the head was added to the rear of the frog platform. A steel tab with a yoke in the bottom was added to the back of the frog. The yoke slid over the screw's slot. Now, the frog retained its position when the platform screws were loosened. Rather than moving the frog by hand, one used a screwdriver to turn the slotted screw in the back of the platform. It could now be accurately moved as little as a fraction of a turn.

Here's the frog assembly removed from the body of the plane. The two screws hold the frog tightly in position. The holes for the screws are slotted so the frog can slide forward and back to open and close the mouth.

With most Stanley planes you adjust the frog by removing the blade assembly, loosening the screws that hold the frog and then turning a screw behind the frog that will push the frog forward or back.

With Bed Rock planes you can adjust the frog without disassembling the tool. Loosen the two outer screws to release the frog, then turn the center screw to adjust the frog's position. Tighten the two outer screws, adjust the iron and go to work.

The best mechanism is on the Bed Rock series. It is not even necessary to remove the chipbreaker to make this adjustment. The frog is secured by two screws accessible from the back of the frog, one on either side of the frog adjustment screw. When these screws are loosened the frog can be adjusted with the whole plane intact.

Rigidity is Key

Slicing a shaving by pushing a plane blade over a wood surface creates a lot of shock and stress on the cutter. The tool will only work well if all its mechanisms are rigid. The lever cap and cutter/chipbreaker assembly all contribute to this. However, if the frog moves, none of the other assemblies matter. Remove the frog from a Bailey-type plane and you will see that the mechanism sits securely on a platform created by three bosses with narrow machined surfaces. The frog's rear edge sits on one high boss that is the width of the body. The frog's front edge rests on two low bosses separated by a raised rib. The rib prevents the frog from moving side to side. When the frog screws are tightened, the whole mechanism is secure.

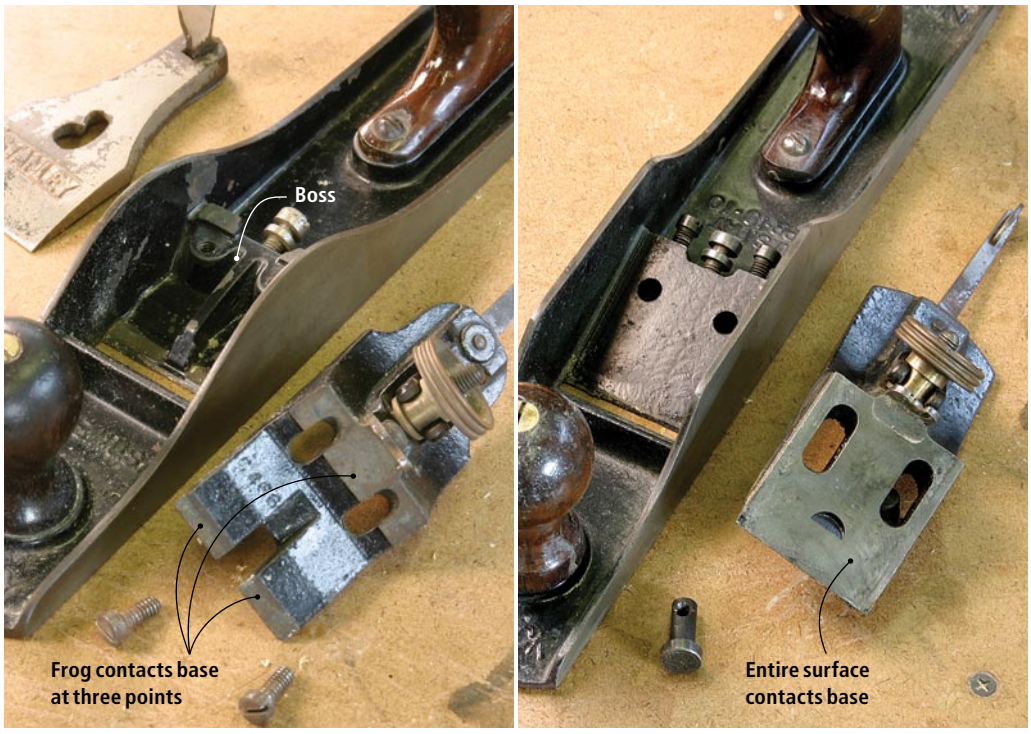
Remove the frog from a Bed Rock and you can see why these are the top-of-the line model. The frog rests on a machined bed. So instead of being in contact with a three-boss platform, the machined bottom of a Bed Rock frog mates perfectly with its platform, and is everywhere in contact. Rocking (movement due to shock and stress) is virtually eliminated.

The other two components on a Bailey-type plane not already mentioned are the rosewood tote and the front knob. Both are secured into the body with brass screws. The knob changed shape in 1922. On earlier planes it's squat; it's taller after this date.

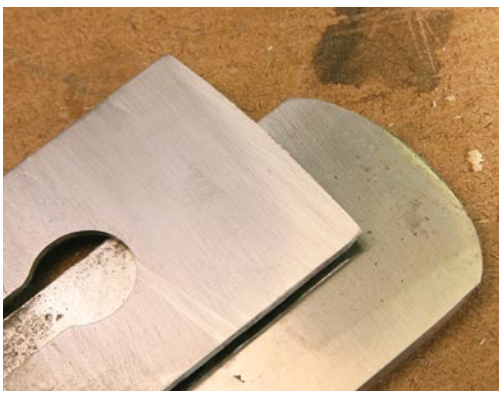
The bodies of Stanley planes are protected by a shiny black surface called japanning. It is not paint, but rather asphalt based.

Function Determines Form

A plane's purpose determines the shape of the cutting edge. A plane blade fresh from the manufacturer



With a standard Bailey-style bench plane (above left), the frog contacts the body in a few key places. With a Bed Rock plane (above right), the sole and body of the plane are both machined flat for maximum contact.



The iron of a jack plane (on top) has a gentle curve, while the iron of a scrub plane (below) has a curved cutting edge that has a pronounced arc.

is ground straight across. This is the appropriate shape for use on a wooden surface that is more narrow than the blade is wide. In other words, this is the edge you want on your jointer plane.

However, the same shape will not work on a surface that is wider than the cutter. This means that your smooth plane and a jack plane that is used on the wide face of a board cannot be ground straight. Imagine the result. The blade would leave behind a square-edged trough the shape of the cutter. This would not be at all acceptable on a visible surface. Instead, the cutting edges on a smooth plane and a jack have to be crested (as shown above). This way, they each remove a chip that is slightly thicker in the center, but that tapers out to nothing on the edges.

How much a cutting edge should be crested also depends on the plane's purpose. A jack plane is used for heavy stock removal. For example, if you are starting with a rough-sawn board, a jack will quickly remove all the saw marks and expose fresh wood. A jack plane blade needs to be aggressive and so its cresting is pronounced.

A smooth plane is used to bring a surface close to its final stage, nearly ready for applying the finish. A surface that is hand-planed will have a gentle texture that, depending on your sensibilities, you can leave or easily sand away. The appropriate amount of cresting on a smooth plane blade is almost imperceptible.

Scrub Planes v. Jack Planes

The crested blade on a jack plane causes many people to confuse this tool with a scrub plane. They are quite different. A scrub plane is a continental European plane designed to flatten boards. At a time in history when all the lumber that came into a woodworking shop was rough sawn and air dried, each board first had to be made flat and have the sawn surface removed. The scrub plane was the tool that started this process. Its blade has a cutting edge that is close to a semicircle. The plane is pushed quickly and forcefully across the surface of the board at a slight angle. If the board is warped or wracked, it catches the high spots and very quickly knocks them down. After the scrub plane has flattened the board, the woodworker is ready to advance to the jack plane.

In English and American shops this preparatory work was done with a jack plane. Although the cresting of a jack's cutter is extreme relative to a smooth plane, it does not even approach that of the scrub.

Preparing for Use

Whether you have a new plane or an older one, you will want to do some steps to get it ready for use. A bit of judgment is needed to determine just how much tuning you want to do. For me, it is a function of the plane's purpose. My jack plane is mostly used for prepping rough-sawn lumber while my best No. 604 Bed Rock smooth plane is reserved for figured wood and working around knots. Obviously, far more work has been invested in the smooth plane than in my jack. Still, my jack has not been ignored; it's just not been pampered as much.

We have discussed the importance of the sole. Your plane will work better if the sole is flattened. You will be surprised at how irregular many plane soles are, even when the tool is brand new.

The most important place for a sole to be flat is in front of the mouth, as that is the area that holds the chip down. This is unfortunately the area that receives the most wear, and a plane that has been used a lot will frequently need work in this area.

Some people take planes to a machine shop to have their soles ground flat. I think this is extreme. Remember – a hand-plane is a woodworking tool and does not require precision to four decimal places. You can get the maximum performance out of your plane without it ever leaving your shop.

I flatten on a $\frac{1}{2}$"-thick aluminum plate with a long strip of

Don't flatten a plane's sole like you would plane wood. Instead, use equal pressure on the front knob and rear tote and move your body back and forth as you move the tool as shown above. You don't have to flatten the entire sole. The area in front of the mouth, the toe and the heel are the critical areas.

adhesive-backed aluminum oxide paper adhered to it. If the sole appears to be in good shape, I use #330 grit. If it obviously needs a lot of work I use a coarser and more aggressive paper, such as #120. I do not disassemble the plane, other than to remove the cutter and lever cap.

The trick is to create an even downward pressure on the sandpaper. The worst thing you can do is to use the same stroke you would use while planing. This motion will actually damage the sole. I find it best to push down on both the tote and knob with equal force. Holding that position, I slide the plane along the strip of sandpaper. To keep the pressure even, I move my body along with the plane so my shoulders stay positioned over the tool.

After several passes, you should be able to detect low spots in the sole. The newly exposed metal is lighter in color, so low spots appear as dark areas. If you have trouble detecting them, invest in a can of Dykem spray layout fluid, either red or blue. Now, the low spots will appear in bright color.

It is not necessary for the entire sole to be flat, with no low spot remaining. It is a matter of where a low spot is located, or even more precisely, where a low spot is not located. You want the area in front of the mouth flat, as well as the areas at the heel and toe. If a low spot is behind the mouth, it presents no problem.

Next, sharpen the cutter. The plane's purpose determines the shape of the cutting edge. It also determines how sharp you want that edge. I will spend a lot more time on a smooth plane's blade than a jack's.

As a shaving passes up through the mouth it will find anything that it can catch on. It's like it has a mind of its own. The chipbreaker's edge is particularly inviting. If the shaving jams itself between the chipbreaker and the blade, work comes to a quick halt. You want to joint and hone the chipbreaker's edge so that it makes a tight fit. I do this, too, on my aluminum plate. Slide the chipbreaker side to side on the paper with even downward pressure. Hold the rear slightly lower than the aluminum to create a sharp edge. Raising the rear will round the edge, and that is definitely not good.

When I am done, I like to put a drop of oil on all moving parts and screws.

Assembly Time

Now, assemble the plane. Avoid damaging the cutting edge when mounting the chipbreaker on the blade. Hold them at a right angle to one another while you slide the screw head through the round end of the slot. Twist the two into alignment and slide the chipbreaker's edge into place behind the cutting edge. How close to go again depends on the plane. On a best smooth plane the distance may be as little as 1/16". On a jack, 3/16" or even 1/4" may be needed to let a heavy shaving pass. Tighten the screw so the chipbreaker stiffens the blade and its front edge pulls tightly into place.

Place the cutter/chipbreaker over the lever cap screw. Be sure the lateral adjustment fits into the cutter slot and that the end of the longitudinal lever fits into its slot in the chipbreaker. Place the cap over the lever cap screw, check that all parts are aligned, then push down the cam lever.

How much force is required to lower the cam is controlled by the lever cap screw. Pushing down the lever should be a positive action and you should be able to feel it lock with an audible snap. However, if too much force is required, you risk breaking something. This rule applies to all the screws and parts in a plane. They have to be tightened enough to hold the tool together, but if the plane is cast iron, it can break.

Adjust the Plane

The first adjustment step is to see how much the mouth is open. The appropriate amount depends on the plane. To adjust this, move the frog. Remove the cutter and loosen the frog screws. If you have an older plane, move the frog as needed by hand. If the plane has

The chipbreaker must mate tightly with the back of the blade or shavings will jam in the gap. Dress the edge of the chipbreaker on sandpaper to improve the fit of these parts.

a frog adjustment screw, use it. Of course, with a Bed Rock, loosen the frog screws behind the frog and make your adjustments with the plane fully assembled.

With the mouth established, adjust the cutting edge. A lot of woodworkers do this by sighting along the sole. I find it much more accurate to use my fingertips. I hold the plane sole with my left hand (I'm right handed) and place the tips of my first two fingers on opposite sides of the cutting edge. This allows me to judge the amount of projection and to determine if one side is higher than the other. With my right hand I make what ever adjustments my fingers tell me, turning the longitudinal adjustment wheel as necessary and establishing the lateral adjustment with the lever. My fingers will get me close to the appropriate adjustment, but trying the tool on wood is the final test.

Plane Maintenance

Maintenance is similar to tuning and set up, but is something that has to be done regularly. Like sharpening, maintenance is a function of use, not time. Do it when you need to do it. These are some signs. When you hone your cutter, look for pitch build up. It tends to form behind the cutting edge and along the chipbreaker's edge. A lot of wood dust under the cutter is another sign that the plane needs some work.

Disassemble the tool into all its parts, except for the knob and tote. You will be surprised at how much wood dust gathers under the frog. I sweep this out with a stiff brush. If there is pitch build up inside the body in the area of the mouth, I remove this with paint thinner. While at it, I usually clean the whole body, wipe it with a soft cloth, and set it aside to dry. Next, I clean the frog by submerging it in paint thinner. I brush off any residue and wipe it too. It is set aside with the body while I remove any pitch on the cutter and chipbreaker.

While the plane is apart, I hone the cutter to bring back a keen edge. Finally, I reassemble the plane and adjust it as I described above.

Use your fingertips to ensure the blade is centered in the mouth and projecting enough to make a cut. Test your setting on a scrap of wood.

Buying a Plane

Between the late-19th century and the mid-20th century, Stanley and its competitors produced so many planes that a plentiful supply remains. While they are easy to find, you have to look in places other than stores and catalogs. Fortunately, there is an active trade and used tool dealers are not hard to find. Your computer's search engine will pull up lots of them. Most are very used to dealing with Internet or phone sales. These guys are generally very knowledgeable. They provide tools for a lot of collectors who are looking for rarities, or to fill holes in their collections. So, it is important to stress that you are a woodworker and want a plane to use, not for a collection.

The result of your labor: The shaving emerges from the center of the mouth and clears the tool easily without clogging.

Most tool dealers use a universal grading system to define condition. Knowing the condition in advance will help you in your purchase. Ask the dealer to explain the system to you. These guys are usually very helpful and trustworthy. They know that a plane user seldom owns one plane, and that you will probably be back for more.

Online auction sites also offer lots of planes for sale. You are more on your own here than with a dealer. So, read the description with care. You will stumble across collector jargon such as "Type 7" and "Sweetheart." These are of no concern for a tool user. You just want a good, serviceable plane.

Planes are common items in antique shops and flea markets. The pre-war planes made by Stanley and its competitors were consistently high quality. So, it is only important to know what not to buy. Avoid tools with missing or broken parts. I will accept minor damage to the tote. Don't buy a plane that is excessively worn, or rusted. There are too many good ones out there to settle for anything less.

As the quality of handplanes declined after World War II and that decline accelerated after 1960, the woodworking version of Gresham's Law kicked in and bad tools drove out good. Avoid planes made in the last several decades, as well as non-Stanley brands such as Sears Handyman. These are cheap junk

In the last decade some companies have started to again produce excellent quality planes. Because many that are poor quality are being sold side by side, the trick is to know what to buy. "You get what you pay for" is a pretty good rule. I advise against planes that do not have a lever cap and the other Stanley features. These are tried and true features, and other arrangements usually indicate cost cutting.

The cutter in a Stanley plane is thin. Some companies have developed high-quality replacement blades that are usually thicker and better resist chatter. I use these in my best planes that are reserved for the finest or trickiest work. The rest all have their original cutters.

There are also sources for rosewood totes and knobs. Thus, these parts can be purchased to bring an otherwise good plane back to original condition. **PW**

Antique Barn Finish

Add centuries of wear and tear to your projects using a tested formula that's simple and safe – no open flame!

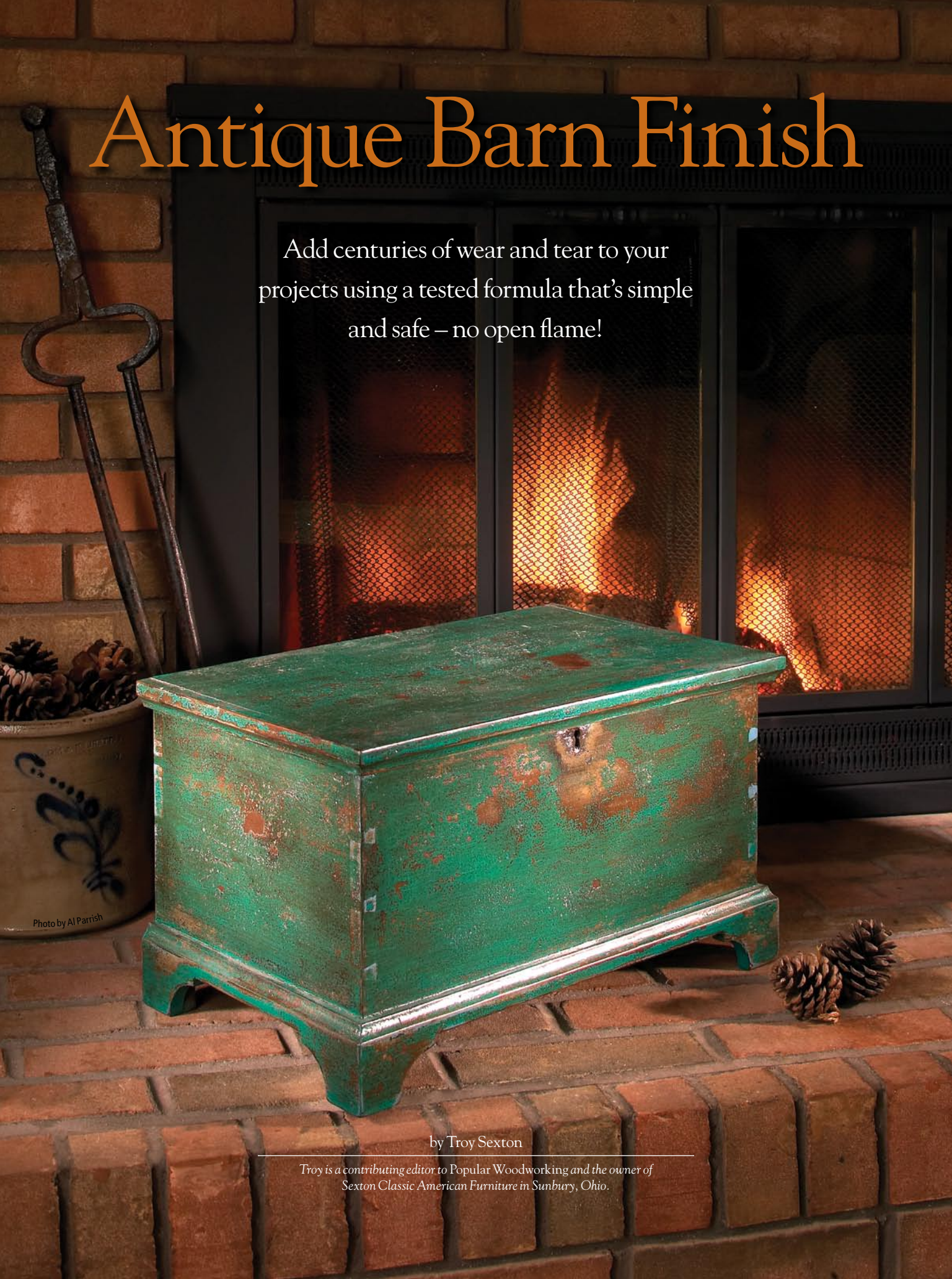


Photo by Al Parrish

by Troy Sexton

Troy is a contributing editor to Popular Woodworking *and the owner of Sexton Classic American Furniture in Sunbury, Ohio.*

This is the furniture finish that fooled our local auctioneer, a man with 30 years of experience selling antique furniture and farm equipment.

I had bought a mower from the auctioneer and he was dropping it off at my workshop when he spotted one of my furniture pieces that sported what I call a barn finish.

He walked over to the piece and asked what I'd repaired on it. I replied that it wasn't an antique that needed fixing; instead, I had just finished building it and was about to deliver it to a customer.

He didn't believe me.

After a few minutes of debate, I finally turned the piece over to show him a spot of new, raw wood that was unfinished.

"In all my years," he said, "I have never seen a finish like that."

New Finish That Looks Old

While I don't think this finish would fool an expert on antique furniture, it is a convincing way to add centuries of patina to your projects so they will fit in with an older home or other pieces of antique furniture.

This finish is my favorite to do. You cannot mess it up. Even if you don't like the final result, you can simply add another coat of lacquer and paint until you get the look you want. Every layer simply adds more texture to the project and makes the finish look better.

Unlike many antiqued painted finishes, this one is safe enough that I allow my daughter to do it. Other finish processes involve a stage where you char a layer of paint with a gas torch or by setting the piece on fire. I've tried those methods but I don't like them. And I'm sure my insurance company would agree.

Instead, I use a high-temperature heat gun. Look for one that reaches 1,500° Fahrenheit – these are available at industrial supply stores. The 1,000°-degree heat guns will work, but the hotter one is better. Heat guns are a bit slower than a torch, but they're safer. And I'll show you how to save some time by skipping a coloring step that makes no difference to the finished look of the piece.

Whenever you use this finish, be sure to practice on a sample board at each stage before you move onto the finished project. That way you'll see what the next step is going to look like. And when you are done, you'll have a great sample board to keep.

Begin With Abuse

Before you add color, the first step is to mimic 200 years of use and abuse to the piece. I use a utility knife to chamfer edges, a drill bit to create worm holes and an awl to make bite marks from a dog. To demonstrate lots of wear, use a chisel to imitate a mouse hole. Heat a tin can and place it on the wood to char it. At the end, beat it with a cluster of keys then sand the edges with a power sander.

Aging requires a little creative thinking to decide what areas of the project would see the most scuffing, but it will be obvious if you first look at some real antiques. Concentrate on the base, the knobs, mouldings, doors and drawers. Let the kids help – they'll require little training.

Don't Begin With Stain

At its heart, this finish begins with a layer of paint, then a coat of lacquer then another coat of paint. You then blister and scrape your top coat of paint and repeat the whole process again. Then, at the end, you wipe on a glaze to add grime and a coat of dull lacquer to seal it all in.

Some other antique finishes recommend that you start by staining the entire piece and then

continued on page 82

When adding age to your projects, work the edges of the doors and drawers especially. These get the most wear and tear in the real world.

One of the most effective tools for adding years to a project is a small bunch of keys on the end of a stick. When visitors to my shop see me beating my projects with this tool they freak out.

After you are done aging your project, there's one last step: Sand smooth the sharp edges you created with your knife and other tools. This step helps blend the old with the new.

continued from page 79

add the paint. I've done this many times myself, and I think you can skip that step. Any raw wood that you expose during the aging process will be colored by the glaze in the end. And in all my years of doing this finish, I've never had the finish peel, so I think a base coat of stain is unnecessary.

Begin by brushing on a coat of latex paint. (Hint: Allow the brush to fall on the floor and get some sawdust on it.) Let the paint dry. If some areas of the paint look thin, add a second coat.

Now spray on a coat of lacquer (or brush on a coat of brushing lacquer) and add another one or two coats of the same color paint. Let it dry and get your heat gun.

Lacquer Then Paint; Blister Then Scrape

Hold the heat gun close to the surface and move it slowly across the piece. After a few minutes the paint will bubble and blister.

Use your judgment here. The more blistering, the more texture you'll end up with. If you overdo it, simply add more paint and try the process again.

With the paint blistered, use a paint scraper to remove the bubbles. Get the surface somewhat smooth but don't get too aggressive. The little ragged edges of paint you leave behind will add texture to the surface.

Now apply another coat of lacquer and brush on one or two coats of your second color of paint (see "Choosing Color" on page 83 for some ideas on color combinations).

Then blister the paint with your heat gun and scrape the bubbles away. This will reveal patches of your first color below.

If you don't like the look, add more lacquer and paint; then blister and scrape it until you are pleased. Then take some worn sandpaper (the grit isn't critical – but not too aggressive) and level the blistered surface to smooth over the really rough spots.

Final Color and Topcoat

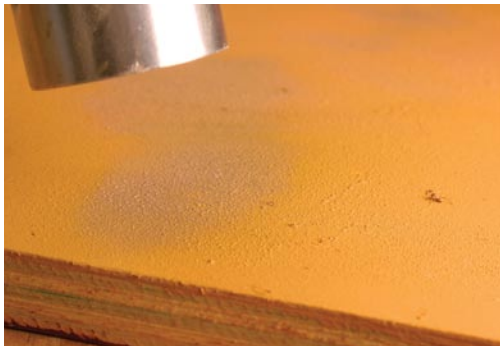
The final coloring step adds the real age. I wipe on a fast-drying brown glaze that is compatible with my lacquer. Glazes are available from professional paint stores. The exact color isn't critical.

You could use a gel stain or liquid stain instead of a product labeled as glaze. But liquid stains soak into the paint more than I like and take longer to dry. (All coloring that takes place between coats of finish is technically glazing, but you can use a variety of products for the process.)

When the glaze is dry, add your final topcoat. I like a dull lacquer; gloss just wouldn't be right.

The best part of this finish is that there is no wrong way to do it. If you're not satisfied, put another coat of paint on. Every single layer makes it look better.

And what if you do something wrong and the finish starts to peel? No problem. Antique finishes peel. It might even look better in the end. **PW**



After a coat of your base color, a coat of lacquer and a second coat of your base color, use a heat gun to blister the paint.

Scrape off the blisters with a common paint scraper. You don't have to use a lot of downward pressure. Stop scraping when you've popped all the blisters off.

After a coat of lacquer, apply the second color of paint with a brush. If the brush has fallen on the floor and picked up some sawdust, that's all the better.

After another coat of lacquer and then paint, blister the top color with your heat gun. The more blistering, the more base color will show through.

Scrape the top coat of blistered paint until you see a satisfying amount of your base color. This is a matter of taste, of course, but there is no wrong way to do it.

Use a piece of worn sandpaper to smooth out the artificial wear and tear you've introduced. This will knock off the large bits of paint, but still leave some texture.

Rag on a brown or black glaze. The glaze will mute your colors and build up in the texturing you've created. This is where you'll start to see the final effect of your efforts.

CHOOSING COLORS

In general, I like to choose paint colors that are brighter than you might expect. I like bright blues and teal greens, especially on smaller pieces.

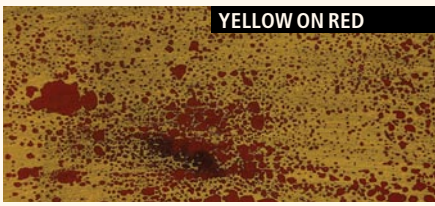
My rationale for liking the wild color is that early American pieces were typically painted in bright colors to help brighten up dark rooms. Plus, once you add the glaze to the surface, the colors become a bit muted.

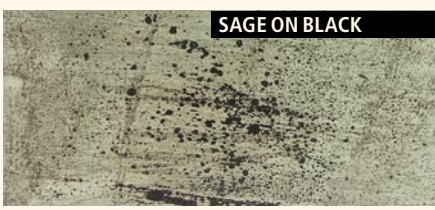
When you go to choose colors, I think it's best to go to the home center or paint store and pick a couple colors from the store's "historical" palette of paints. Everybody's got one these days. How authentic are they? I don't know, but they look good.

During the last couple decades, here are some of my favorite color combinations in addition to the red over yellow I show at left:

- Black over red is the most popular combination. Red over black works too.
- My wife, who has excellent taste in these things, really loves yellow over red.
- Green over black or red are both good choices.
- Off-white looks really good over brown or brick red. It doesn't, however, work over black.
- Sage green over black and dark blue over black are both nice combinations.
- A little on the wild side perhaps, teal over red is a vibrant choice.

Before trying a wild combination on a large piece, give it a try on a small one to see how it looks. I think you'll be surprised by how good the bright colors look with this finish. — *TS*





Songs from the Workbench

Singer and songwriter Guy Clark builds both melodies and guitars in the woodshop of his Nashville home.

Photos by Al Parrish

Singer, songwriter and luthier Guy Clark in his Nashville workshop, where he crafts guitars and award-winning songs.

Songwriter, singer and luthier Guy Clark doesn't like technology.

"I put away all my recording stuff, built this workbench, ordered some wood and started building stuff," he says. The most high-tech machines on display in his workshop are a Delta band saw, a Craftsman drill press, a stereo receiver and a tape player.

A handmade workbench festooned with hand tools lines one wall; another wall is lined almost floor to ceiling with row upon row of cassette tapes. The late Texas singer/songwriter Townes Van Zandt — a longtime friend of Clark's – gazes over the scene from a photograph at the back of the room. A blueprint detailing the anatomy of a flamenco guitar doubles as decoration on the opposite wall. Steam rises from an omnipresent coffee cup, filled several times during our visit. A hand-rolled cigarette smolders in a skull-head ashtray (a gift from Emmylou Harris).

Clark's three main tools are an old Stanley fore plane, a paring chisel, and his favorite – a $10 Swedish-made beginner's carving knife.

It is here in this cozy workshop in the basement of his Nashville home that Clark writes almost all of his music, and handcrafts traditional flamenco-style guitars.

You've likely heard Clark's name lately. His most recent album, *Workbench Songs*, was nominated this year for a Grammy Award for Contemporary Folk/Americana Album. In 2004, he was inducted into the Nashville Songwriters Foundation's Hall of Fame, and in 2005 he was honored with a Lifetime Achievement Award in Songwriting by the Americana Music Association.

by Megan Fitzpatrick

Comments or questions? Contact Megan at 513-531-2690 ext. 1348 or megan.fitzpatrick@fwpubs.com.

And, if you're a fan of Jerry Jeff Walker, Ricky Skaggs, John Denver or Lyle Lovett, you've heard Clark's tunes. "L.A. Freeway" was a breakthrough song for Clark as a songwriter when Walker hit the charts with it in 1972. Skaggs had a No. 1 hit with "Heartbroke" in the early '80s. "Home Grown Tomatoes" was on several Denver albums; and "Step Inside This House" was the title song off Lovett's 1998 two-disc set of Texas songwriters.

A Knife, a $12 Guitar, a Career

Clark was born in 1941 in the West Texas town of Monahans, where he got his first taste for woodworking. "I got my first knife – a little pocketknife and a whetstone – when I was a kid," he says. "I just started making things. It

came naturally to me and I love doing it." He went on to develop those early woodworking skills as a teenager when the family moved to the Gulf Coast. There, Clark had a summer job as a ship's carpenter where he helped to build 80' wooden fishing boats (an experience he drew on while writing "Boats to Build," the title track from a 1992 album). In the late 1960s, Clark moved to Los Angeles where he worked for a time as a luthier in the Dobro Manufacturing Co., alongside the Dopyera brothers, inventors of the resonator-style guitar.

After a few years of dealing with the Los Angeles lifestyle (listen to "L.A. Freeway" to discover his thoughts on the subject) he moved to Nashville in the 1970s with his wife Susanna, a visual artist who's painted album covers for, among others, Willie Nelson, Nancy Griffith and, of course, Clark himself. They've lived there ever since.

Clark learned to play on a $12 flamenco guitar – the first guitar he took apart and put back together (and then took apart again). Sometime in the mid 1960s, he doesn't recall exactly when, Clark started building classical guitars. He made seven or eight of them. "None are still in one piece today," he says.

Today, Clark builds 19th-century-style flamenco guitars. Why this style? Perhaps, he says, because that's what his father's law partner taught him to play on, and the first guitarist to whom he listened was the flamenco great Sabicas, whose blazing fingers revolutionized the genre and introduced it to the non-Spanish speaking world. He's also a big fan of the legendary Andrés Segovia. And of course, growing up in West Texas exposed Clark to a lot of Spanish-influenced music, which is evident in many of his songs, as well as his guitars.

Clark's workshop, in a converted basement bedroom in his Nashville home, is decidedly low-tech – just as he likes it. A photograph of the late singer/songwriter Townes Van Zandt, a longtime friend of Clark's, hangs over a Delta band saw at the end of Clark's worktable.

Rasps, files, glue, chisels and carving tools make up the bulk of the equipment in Clark's small shop, all stored within easy reach of his handmade workbench. In front are two of the 10 flamenco-style guitars Clark has made. A template awaits his next instrument at the far end of the bench.

Signed in Blood

Clark always builds his guitars two at a time, experimenting with ways to achieve different sounds by tweaking the pieces for each. As he works on one, he lets the glue set up on the other. "That way, I'm always waiting for one to dry," he says.

The construction process starts with a cork-covered hardwood template. The front of the guitar is affixed to this template from beginning to end, as the rest of the guitar is built off the face. The sides are bent around a steam pipe, ribs are added to the interior, the headstock is carved and the neck added to the guitar body before the back is put on. A lot of commercial companies build the neck and body separately, Clark says, "but there's something about the integral construction techniques that really fascinates me."

For tools, Clark relies on a set of old standards: good chisels, a Stanley fore plane – and a $10 Swedish beginner's carving tool. "It's the best darn knife I've ever bought." He prefers Japanese pull saws to western push saws, and doesn't like power tools much. First of all, they're simply too technological for a guy who likes to work with his hands directly on the wood. But Clark's primary objection is that they're simply too loud. In fact, he rarely even listens to music when he's building, despite hundreds of tapes from which to choose but an arm's-length away. "I like the silence, the

peacefulness of it," he says.

After the guitar is fully constructed, it's removed from the template and French polished. "No oil on raw wood – ever," says Clark. "I think that would deaden the sound."

The last step is to mark each guitar as a Guy Clark original; Clark has a unique way of going about it. He pricks his little finger, smears the blood on his thumb, then presses a bloody thumbprint onto a card. After the thumbprint is dry, Clark signs through it and numbers it. "That label is on the inside of every guitar I've built," he says. It also serves as the album art for *The Dark*, which Clark released in 2002.

But you won't find too many of those labels; a handcrafted flamenco-style Guy Clark guitar is a rare commodity. Of the 10 he's made, he's given only three away – one each to Jamie Hartford, Rodney Crowell and Lyle Lovett. And as far as Clark knows, Hartford is the only one to record while playing a Clark guitar, on "Magdalene" off Clark's latest album. Clark himself plays a Martin guitar on all of his recordings.

A hand-carved Mayan-inspired headstock is a signature design for Clark's guitars. But perhaps the best way to confirm a Guy Clark original is to run a DNA test. Each guitar is labeled with his signature handwritten through his thumbprint inked in blood.

Clark displays his planing chops on a neck blank.

A Mystery in Sound

While he's certainly an expert at making the tones that come out of a guitar sound great, Clark says he doesn't actually know the secret of building a guitar that sounds great. That is, he can't explain how it's done; there's certainly a little bit of luck and magic involved in the process, as well as skill, he says.

"That's one of the neat things about building guitars … at some point you just have to string it and start playing it to see how it sounds. It's fun to make them. But the minute you fall in love with them, they break your heart," he says. Clark admits that the prettiest guitar he's ever made really didn't sound too good. So now it's in pieces in his shop as he figures out how to make it sound better.

It's a delicate process, carefully planing the top to reshape the edges where it meets the sides. The thinnest slice can change the sound of the instrument, he says. And, of course, the wood species has a lot to do with it as well. Clark finds stock selection to be the most mysterious part of making a guitar. And he doesn't necessarily buy into theories of wood stiffness, or what note the raw wood sings. He's says he's just experimenting to see what sounds best. Usually, he opts for rosewood and sitka spruce for his guitar bodies; "Mahogany's sound is just too soft," he says.

Clark is glad he has the time to play around with the sound of his instruments, and not have to meet a deadline. "It's not like a competition: 'Man, how good can you do it?' I just love doing it. But I couldn't make a living building guitars," he says. "I build guitars so I can write songs on them."

Each of these pursuits serves Clark as a welcome break from the other, though writing music is his day job, as it were. He feels guitar building and songwriting fulfill a necessary left-brain/right-brain workout that helps him achieve more with both. When he's home, Clark says he tries to log time in his workshop every day pursuing both of these passions. "It's a dream come true, to be able to build guitars and write songs in the same room," Clark says. **PW**

Photo by Guy Clark

Clark took this photograph as he was working on his latest guitar, midway through the construction process.

Round Bowl; Square Rim

'Found-edge' turnings offer unique edge shapes and a glimpse at wood origins.

Square bowls – or perhaps more accurately, found-edge bowls – are one of my favorite variations on the general theme of natural-edge pieces. I started making these (oh-so-many years ago) not long after I started turning. The random shapes of the wood chunks I was putting on the lathe were often far more interesting to me than a simple round bowl.

Among other things, the design opens up many possibilities for showing off unusual pieces of wood, especially crotches and pieces with a strong contrast between the heartwood and sapwood. This kind of bowl can serve almost as a Rosetta Stone for someone unfamiliar with trees and wood. The pattern and orientation of the grain in a plain, round bowl may seem to have nothing to do with the piece of tree from which it came. But a found-edge bowl makes its origins clear.

Making these pieces also allows me to indulge one of my particular obsessions in turning: What happens when a turned surface intersects one that is not turned. I love to play with the shapes exposed on the edges, especially when the thickness of the rim area changes. And I like the contrasting textures – the smooth, sanded wood next to the bark edge next to the saw-cut ends.

by Judy Ditmer

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

Try to pay attention as you are cutting up wood you have gathered, and you will probably begin to notice pieces that are practically crying out to be used for projects like this.

A note about safety: You must be especially careful while turning these bowls. If one of the corners protrudes farther out from the piece than the other corners, it will be effectively invisible while the piece is spinning. It can do serious damage if your hand or arm gets in its way. When you are working in the edge area, make sure the toolrest extends well beyond the longest corner of the workpiece, and never allow any part of your body to cross to the active side of the toolrest. And don't even think about touching any part of the workpiece with the lathe turned on.

Photos by Al Parrish

A "square" bowl is turned using the saw cuts and the outside edges of a chunk of wood as the edges of the bowl itself.

Some likely raw materials and the requisite tools. One of the crabapple pieces in front became the bowl I turned for this article.

1

The workpiece is mounted with a faceplate screwed to what will be the top of the bowl. Use the tailstock for extra support while roughing out; a piece like this may be quite out of balance throughout the turning. With a side-grind bowl gouge, turn from the bottom toward the rim with the flute (groove) pointing in the direction you are turning, and cut with the edge just to the left of the center of the tool (the lowest part of the edge).

Flatten the bottom using the bowl gouge to cut toward center. Use the low side of the gouge. Leave a crisp bump in the middle for later use in centering the workpiece on the waste block.

2

3

Continue shaping the outside of the bowl. Here you can see exactly how the gouge is cutting. Keep the bevel riding on the wood behind the cut. That's how you keep control of the tool and the cut.

4

If the rim is turned downward, as mine is here, you will need to reverse the direction of the tool motion on that part. Push the tool into the cut, not toward the workpiece itself, and blend into cut you made from the side. (Also, see "A Familiar Tool" on page 93.)

5

You should check occasionally to be sure the workpiece hasn't loosened on the mount. Screws can pull loose if they are in a softer spot in the wood. Stop the lathe, touch both the faceplate and the workpiece with a finger of your left hand, and give the piece a sharp tap with the heel of your right hand. If the piece has loosened, you will be able to feel it with your left hand.

Here, the outside of the bowl is completed. You should sand it at this time; when the bowl is re-mounted, it won't be possible to sand safely. (There are some tips on sanding the corners later on in the article.)

Transfer the measurement of the nub you left on the bottom of the bowl to a waste block, and cut a recess. Adjust the fit until the surfaces match. (For in-depth instruction on how to do a glue mount, see "At the Lathe," February 2007, issue #160.)

Put thick cyanoacrylate glue on the bottom of the piece and spray accelerator on the waste block. As you place the bowl on the glue block, twist it to spread the glue evenly, and carefully hold it flat against the block until the glue sets.

To hollow the inside of the bowl, point the gouge to the right, move it from the rim toward the bottom and center, and cut on the right (low) side of the gouge. If the rim turns downward at the corners, reverse the cutting direction, etc. for this part. (See "A Familiar Tool" for use of the scraper here.)

A long fingernail-grind spindle (detail) gouge is useful for any detailing at the rim. Complete the turning of the edge/rim area now, before hollowing out the interior; the wood will move as you excavate the bowl, and you won't be able to return to this area later.

Continue shaping the inside of the bowl. Notice that for safety, the toolrest is placed so it extends well beyond the longest corner of the bowl. Keep your hands on your side of the rest.

The scraper is useful for evening up any bumps you can't get rid of with the gouge. (See "A Familiar Tool.")

You can power-sand the interior of the bowl in the usual way (the surface of the bowl and of the disc should be moving in opposite directions where they meet), but you will probably need to do some work on the rim (especially the corners) with the lathe stopped.

Sometimes raising the grain between grits helps to achieve a smooth surface. Just wet the entire surface with water and let it dry completely before proceeding.

15

You may be able to do some sanding of the rim with the lathe on. Use some kind of sanding pad to keep your fingers away from the corners, and be careful to hold it so that it will not pull your hand into the workpiece if a corner catches the pad. Don't push it into the surface; just allow it to stroke the wood.

16

Place a flat chisel edge along the joint between the bowl and the glue block. Give it a sharp tap with the mallet …

17

… and the bowl should separate from the mounting block.

18

I've mounted the bowl in a doughnut jig to turn the foot clean. I'd show you the details, but they won't let me have the whole magazine, so that's a topic for another day. (In the meantime, check out issue #160 for another method of turning a foot.)

19

Here is the completed piece. I'll spray this with lacquer, which doesn't require any buffing out. Buffing is hard to do on the lathe (as I prefer to do) with this kind of piece, and I can control the sheen exactly with flattener. (Again, a topic for another day.) **PW**

A FAMILIAR TOOL WITH A DIFFERENT GRIND

Getting a clean, even cut with the gouge on this kind of bowl, where you will be cutting wood, air, wood, air and so on, is notoriously difficult. A heavy, curved scraper is often a good tool for finishing cuts on bowls; it can even up a surface with slight breaks in the curve, or shave off the little ridges that are sometimes left after even the most careful gouge work. But scrapers can be grabby if they're not used at the correct angle, particularly for this kind of cut. Here's a simple modification you can make on your scraper that will make it safer and easier to use for such cuts.

This shows the bottom of the scraper. Everyone has an idea about how to grind this tool (I like a long bevel), but it's basically a big slab of steel with a curve around the end and a bevel on the bottom.

Grinding another bevel (shallow, not steep) on the top of the tool changes the geometry of how the edge is presented to the wood. The scraper will be less aggressive and less inclined to pull itself into the workpiece.

Here's the modified scraper in use, cutting the irregular edge of the bowl. You still need to use a delicate touch for this cut; you should be stroking the surface, not mauling it. — *JD*

The Quest for the Holy Tail

Klausz, Kirby … or WoodRat?

Illustration by Pat Lewis

The sacred dovetail, the Holy Grail of woodworking, done by hand, marks ascension from Shop Sweeper to Master Craftsman. Pins first or tails first: that is the question. Are you a Frank Klausz man or an Ian Kirby man? Do you practice for hours cutting lines and chopping waste? Have you run in to the house to show an uninterested spouse your first gapless effort? "That's nice, dear." Hand-cut dovetails make woodworking a more frustrating pursuit than golf.

So here I am, with morning coffee, in my cushy brown recliner, surrounded by crenelated parapets of woodworking magazines, articles and dovetail videos. Tail-first occupies the left side, Pins-first the right. A Hungarian-accented Klausz speaks from the video: "Let me show you how I do this. First cut the pins, then chop the pins. Then mark the tails then …."

After a few gulps of Kona, I decide to see what Kirby's side offers. Tails are a harder cut. If you tackle them first and use them to mark the pins, you solve a major problem of precise angle cutting later. Makes sense. However, because you need to know the angle to cut, you "mark out" the tails first. Now we are into slopes, angles, more tools and calculating.

Finally, my coffee finished, I head to the garage. Excuse me, the woodshop. Only my wife still calls it the garage. Warm-ups take the form of cutting pins. When made well, they are the George Clooney of wooden dentures. Mine, however, resemble jack-o'-lantern teeth.

Saw, saw, cut, cut, chop, chop … I follow Klausz first. My result suffers from Acute Gaposis. In frustration I turn to Kirby and the tails-first method. It goes like this: Measure, mark, saw, saw, cut, cut, saw or chop …. Again, Acute Gaposis. Then, the First Truth of dovetailing reveals itself.

First Truth: Step One is always perfect! When I followed Klausz my pins were perfect. When I followed Kirby my tails were perfect. The problem was always in Step Two. Acute Gaposis comes from not matching Step Two to Step One.

Restating the problem: What is the best way to match the sides of the dovetail surfaces in the Second Step? I gathered a few extraneous tools off my workbench and set them on my WoodRat.

Oh, did I mention that I have a WoodRat? For a small shop like mine a WoodRat is indispensable. And, it makes dovetails. Today's project, however, was making great dovetails by hand. So the WoodRat became a convenient shelf. Besides, what woodworker worth his or her salt can't make dovetails by hand – other than me?

After making some angle templates out of scrap hardwood, I begin to mark and cut tails first. Kirby would have you remove the waste in a pin hole with a coping saw. Well, that didn't work very well. Chopping with a chisel worked better, but chopping is difficult if the pin is narrow.

I looked at my WoodRat for guidance. "Mr. WoodRat how would you solve this problem?"

Turning my eyes up into the blinding halogen shop light – an epiphany.

Do the first step – tails – on the WoodRat. It is already set for perpendicular mortise-and-tenon cuts. Step One is the least critical test of the craftsman. The pin holes will smile through the tails and the rest is done by hand. Mark the pins and they will be straightforward to hand cut with your dovetail saw. Chop the waste between the pins and you're done.

So with the WoodRat and its dovetail router bit, I've found my Holy Grail – a method of creating George Clooney dovetails before I'm too old to enjoy this wonderful pastime. And best of all, it is a solution guaranteed to upset almost everyone. **PW**

by Dick Mallard

Dick is a businessman, educator and former flight instructor. Five years ago, he rediscovered woodworking, five decades removed from his 8th-grade woodshop.