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ISSUE #167

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New! 10" Heavy-Duty Cabinet Table Saws *w/Riving Knife*

Perfect for cutting panels and wide stock!

- Motor: 3 HP, 220V, single-phase or 5 HP, 220V/440V*, 3-phase
- Precision ground cast iron table
- Table size w/extension: 27" x 75¾"
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- Arbor: ⅝"
- 52" rip capacity
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G0651 3 HP, single-phase
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INTRODUCTORY PRICE $1695.00

Includes 10" Blade!
See it on Page 23 of the 2008 Catalog.

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New! Heavy-Duty 17" Extreme Bandsaw *w/ Cast Iron Wheels*

Only Grizzly offers these features for this price!

Cast Iron Wheels & Trunnion

MADE IN ISO 9001 FACTORY!

See it on Page 97 of the 2008 Catalog.

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Larger precision ground cast iron table size: 24" x 17"
- Table tilt: 5° left, 45° right
- Max. cutting height: 12"
- 2 blade speeds: 1700 & 3500 FPM
- Double ball bearing blade guides
- Quick change blade release/tensioner
- Approx. shipping weight: 414 lbs.

Includes Deluxe Re-saw Fence, Miter Gauge & ½" Blade

G0513X2
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10" Table Saws *w/Cast Iron Wings*

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- Precision ground cast iron table size w/wings: 27" x 39⅝"
- Arbor: ⅝"
- 3⅛" capacity @ 90°
- 2⅛" capacity @ 45°
- 30" rip capacity
- SHOP FOX® Aluma-Classic™ Fence
- Approx. shipping weight: 298 lbs.

Z SERIES™

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G0444Z (right-tilt)
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- Motor: 3 HP, 220V, single-phase or 5 HP, 220V, single-phase or 220/440V*, 3-phase
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- Table size w/wings attached: 27" x 48"
- Cutting capacity: 8" L, 26" R
- Approx. shipping weight: 500 lbs.

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3 HP, single-phase
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G1023SLWX
5 HP, single-phase
ONLY $1195.00

G1023SLWX3
5 HP, 3-phase
ONLY $1195.00

INCLUDES SHOP FOX® CLASSIC™ FENCE

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- Motor: 3 HP, 220V, single-phase
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- Extension table size: 27" x 44"
- Arbor: ⅝" (accepts dado blades up to 13/16")
- Cutting capacity: 8" L, 54" R
- Max. depth of cut: 3" @ 90°, 2⅛" @ 45°
- Approx. shipping weight: 532 lbs.

54" Cutting Capacity!

INCLUDES SHOP FOX® CLASSIC™ FENCE & CAST IRON MITER GAUGE

G1023SLX ONLY $1295.00

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19" Heavy-Duty Extreme Series® Bandsaw

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table
- Table size: 26¾" x 19" x 1½"
- Cutting capacity/throat: 18¼"
- Max. cutting height: 12"
- Blade size: 143" L (⅛" - 1¼" wide)
- 2 Blade speeds: 1700, 3500 FPM
- Approx. shipping weight: 458 lbs.

Includes Aluminum Re-saw Fence Attachment, Dual Ball Bearing Blade Guides, Cast Iron Wheels & Fence

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EXTREME SERIES

G0514X
ONLY $1150.00

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21" Super Heavy-Duty Bandsaws *w/Tilting Geared Table*

- Motor: 3 HP or 5 HP, 220V, single-phase
- Precision ground cast iron table
- Table size: 29½" x 20¾" x 1⅞"
- Table tilt: 5° L, 45° R
- Cutting capacity/throat: 20"
- Max. cutting height: 14"
- Blade size: 165" long (¼" - 1⅜")
- Blade speed: 4600 FPM
- Approx. shipping weight: 684 lbs.

Includes 1" Blade, Cast Iron Wheels & Fence

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G0531 5 HP
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Professional Spindle Shapers

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- Motor: 5 HP, 220V, single-phase, TEFC or 7½ HP, 220V/440V*, 3-phase
- Precision ground cast iron table size: 35½" x 28"
- Spindle sizes: ¾", 1" & 1¼" x 7½"
- Spindle speeds: 3600, 5100, 8000 & 10,000 RPM
- Spindle travel: 3¼"
- Max. cutter dia.: 5⅞"
- Approx. shipping weight: 602 lbs.

5 HP, SINGLE-PHASE
G5912Z ONLY $2195.00

7½ HP, 3-PHASE
G7214Z ONLY $2195.00

Includes Fence & Cast Iron Miter Gauge

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New!

15" Planer *w/Spiral Cutterhead*

An unbeatable combination of stability, power, smoothness & mobility!

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron tables & extension wings
- Table size: 15" x 20"
- Max. cutting height: 8"
- Feed rate: 16 & 30 FPM
- Cutterhead speed: 5000 RPM
- 2 speed gearbox
- Magnetic safety switch
- Heavy-duty cast iron construction
- Approx. shipping weight: 675 lbs.

Foot Operated Built-in Mobile Base Provides Versatile Positioning

G0453Z
INTRODUCTORY PRICE $1295.00

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See it on Page 57 of the 2008 Catalog.

New!

8" Jointer *w/Spiral Cutterhead!*

Versatile parallelogram table adjustment system!

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron tables
- Total table size: 8" x 76⅜"
- Infeed table size: 8" x 43⅜"
- 4 row spiral cutterhead
- Cutterhead speed: 5350 RPM
- Max. rabbeting depth: ½"
- Deluxe cast iron fence size: 35"L x 1¼"W x 5"H
- Approx. shipping weight: 597 lbs.

Extra Long Infeed Table & Extra Tall Fence

INCLUDES FREE SAFETY PUSH BLOCKS

EXTREME SERIES

G0490X
INTRODUCTORY PRICE $1075.00

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See it on Page 41 of the 2008 Catalog.

20" Planer

- Motor: 5 HP, 220V, single-phase
- Table size: 20" x 25¾" (20" x 55⅝" w/ extension)
- Max. cutting width: 20"
- Max. cutting height: 8"
- Min. stock length: 7½"
- Max. cutting depth: ⅛"
- Feed rate: 16 FPM & 20 FPM
- Cutterhead dia.: 3⅛"
- Knives: 4 HSS
- Cutterhead speed: 5000 RPM
- Approx. shipping weight: 920 lbs.

Precision Ground Cast Iron Bed & Infeed/Outfeed Tables

G0454 ONLY $1295.00

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20" Extreme Series® Planer *w/Spiral Cutterhead*

- Motor: 5 HP, 220V, single-phase
- Precision ground cast iron table size: 20" x 25¾" (20" x 55⅞" w/ extension)
- Max. depth of cut: ⅛"
- Max cutting height: 8⅝"
- Cutterhead speed: 4800 RPM
- Feed rate: 16 & 20 FPM
- Approx. shipping weight: 909 lbs.

EXTREME SERIES

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G1033X ONLY $2395.00

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24" Professional Planers

- Cutterhead motor: 5 HP, 220V, single-phase or 7½ HP, 220V/440V*, 3-phase
- Feed motor: 2 HP
- Precision ground cast iron table size: 24⅛" x 31⅛"
- Max. cutting depth: ⅛"
- Max cutting height: 8"
- Feed rate: 17-26 FPM
- Cutterhead speed: 5200 RPM
- Knives: 4 HSS
- Approx. shipping weight: 1130 lbs.

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7½ HP, 220V/440V*, 3-PHASE
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12" x 83½" Parallelogram Jointer

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 12¾" x 83½"
- Cutterhead knives: (4) 12" x ⅛" 1⅞4"
- Cutterhead dia.: 3¾"
- Cutterhead speed: 4950 RPM
- Max.depth of cut: ⅛"
- Max. rabbeting capacity: ¾"
- Approx. shipping wt: 1036 lbs.

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Handles Fold In For Added Safety

G0609
ONLY $1595.00

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10" Extreme Series® Jointers

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 11" x 84"
- Max. depth of cut: ⅛" • Rabbeting capacity: ½"
- Cutterhead speed: 5000 RPM
- Cutterhead dia.: 3⅛"
- Approx. shipping weight: 977 lbs.

Built Like a Tank w/ Heavy-Duty Cast Iron Base

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EXTREME SERIES

4 BLADE CUTTERHEAD
G0455 ONLY $1695.00

SPIRAL CUTTERHEAD
G0480 ONLY $2095.00

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The Ultimate 12" Extreme Series® Jointers

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 12½" x 80"
- Center mounted fence: 4¾" x 39¼"
- Max. depth of cut: 5⁄16" • Bevel jointing: 90° - 45°
- Cutterhead dia.: 4"
- Cutterhead speed: 5900 RPM
- Approx. shipping weight: 1253 lbs.

G9860 INCLUDES FREE H2404 JOINTER PAL® KNIFE SETTING JIG

EXTREME SERIES

MADE IN ISO 9001 FACTORY!

INCLUDES FREE SAFETY PUSH BLOCKS

4 BLADE CUTTERHEAD
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SPIRAL CUTTERHEAD
G9860ZX ONLY $4150.00

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Forrest blades and dados owe their superior performance to a proprietary manufacturing process, hand straightening, and a unique grade of C-4 micrograin carbide. Nobody beats these American-made blades for quality or value.

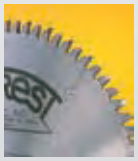
"Your blades are without question the best by miles, and I have tried them all."

Bob Jensen–Fridley, MN

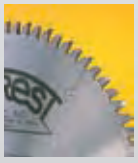
"From the first cut on, I realized that this blade was a bargain at any price! Nothing else I have cuts comparably."

Calvin Brodie–Spanaway, WA

Forrest has over 12 blades designed for serious woodworkers. **These blades are especially useful for high-end remodeling:**



Duraline – Available in several tooth count/style combinations for flawless cutting of laminates, acrylics, wood, and more.



Duraline Hi-AT – Best for cutting two-sided veneers and low pressure laminates without chip-outs or splintering.

Solid Surface Planer – For super-smooth cutting of solid surface countertops without scratches or long finishing times.

Woodworker II – *The* best-rated all-purpose blade for excellent rips and crosscuts on all hard and softwoods.

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Chop Master – For tight, perfectly cut miter joints and smooth cross cutting at any angle.

Dado King – The finest multi-tooth set for making flat-bottom grooves without splintering across *and* with the grain.

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All Forrest blades come with a 30-day, money back guarantee. So order today in any of these convenient ways:

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- **Call us toll free at 1-800-733-7111.** (In NJ, 973-473-5236) Ask about special discounts, free shipping on orders over $275, and discounts for blade sharpening.
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* As seen in Fine Woodworking's 2004 Tool Guide, pg.121.

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Woodworker II Wood Magazine TOP TOOL

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Chop Master Woodshop News 2007

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Dado King Woodshop News 2007

Duraline Hi-AT Woodshop News 2007

Custom Woodworker II Woodshop News 2007

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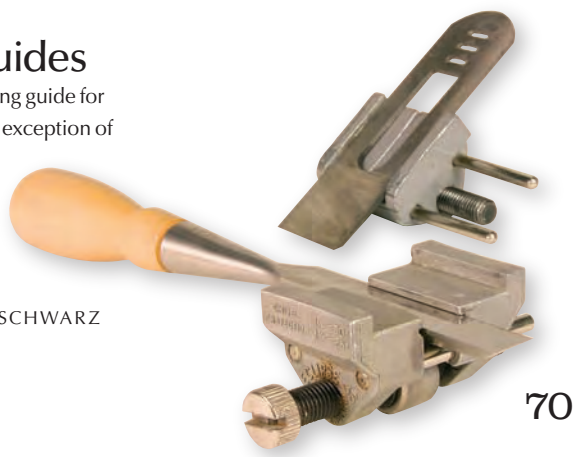
Features



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Regulars

30

ON THE FEBRUARY COVER

Perfect for storing lots of items into a small footprint, our maple chimney cupboard is also an exercise in mastering seven traditional, need-to-know joints.

COVER PHOTO BY AL PARRISH

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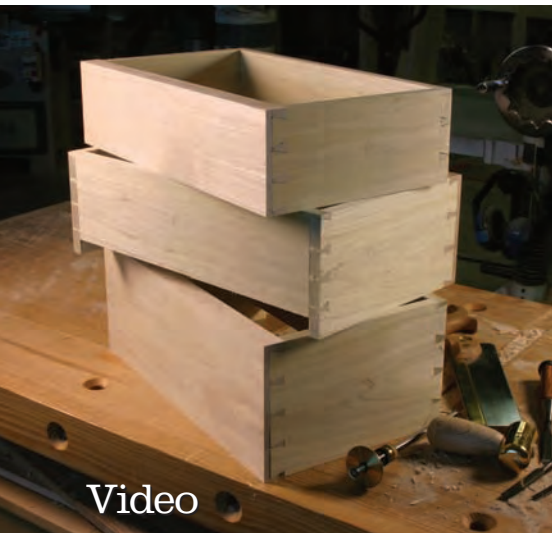

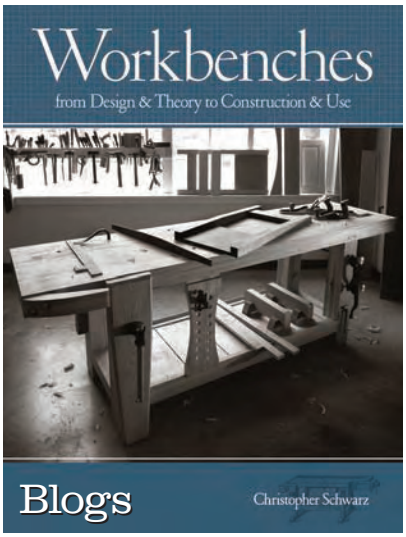

Video Gallery

Calculating Drawer Sides, Backs and Bottoms

Senior Editor Glen D. Huey shows you how to calculate a cutting list for any drawer whether it's an inset (fitted) drawer or an overlay (lipped) drawer. Here's the trick: You have to first fit the drawer front.

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On the Blogs

Workbench Book Review

Senior Editor Robert W. Lang takes a close look at Editor Christopher Schwarz's new book, "Workbenches: From Design & Theory to Construction & Use."

popularwoodworking.com/blogs

Craftsman 3-base Router

This reasonably priced three-base router kit from Craftsman hit the market just before Christmas. We ran it through its paces and posted the results on the blog.

popularwoodworking.com/blogs

New This Month: Rules for Jointers

Safety First

The jointer is a mainstay in most shops for surfacing lumber. Marc Adams's story on page 41 in this issue shows you how to safely use this powerful (and dangerous) machine, but this PDF list of rules and safety reminders is perfect for printing and posting in your shop.

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Project Plans

German Work Box

Simple to build, mobile and packed with storage, this toolbox stores your tools and keeps the ones you're using at the ready.

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Band-sawn Box

A well-executed band-sawn box requires no mind-numbing calculations and is an eye-catching, functional project that anyone can build with our instructions.

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And More!

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Contributors

Christopher Schwarz Interspersed with his work as editor of *Popular Woodworking* and *Woodworking Magazine,* Chris has spent the last year writing a book on simple yet almost vanished forms of workbenches (he's built more than 10 over the years). The new book, "Workbenches: From Design & Theory to Construction & Use," is now available at bookstores. A deluxe signed edition (the addition of a CD makes it deluxe – not Chris's signature) is available at his web site: lostartpress.com.

When he's not working wood, Chris likes to spend time cooking for his family. Every Tuesday is "New Food Night" at the Schwarz-May household, wherein Chris makes a new recipe or uses an ingredient his daughters haven't before tried. So far, the only thing they've steadfastly refused to eat is homemade chicken soup.

Geoffrey Ames holds several patents for Plastic Shipping Drums, was a scratch golfer for 25 years and started his woodworking business more than three decades ago. His early work was produced exclusively with hand tools, but he was forced to start using machinery for stock preparation. However, he still uses hand tools for most details.

Geoff is a Period Furniture Master specializing in 18th-century New England-style furniture. He teaches at The Homestead Woodworking School in Newmarket, N.H. Four of his pieces are featured in "Fine Furniture: A Resource for Handcrafted and Custom Furniture," by Kerry Pierce. For this issue, he built a scratch stock for the Jig Journal column that begins on page 82.

Carl Bilderback For more than 30 years, Carl worked as a professional carpenter and foreman, in charge of crews of upwards of 40 men. During his time in the field, he developed a technique for perfect patching, which he shares beginning on page 76. He says he's retired, but don't believe it. Carl is also an avid collector of old tools, particularly saws, and is active in the Mid-West Tool Collectors Association (mwtca.org). Carl's shop is in LaPorte, Ind.

Rob Millard builds Federal-style reproductions in a one-car garage shop (that also holds a car). He has contributed to a number of magazines and has written for the Journal of the Society of American Period Furniture Makers.

In this issue, he shows us the basics of inlay stringing and how to make a sand-shaded fan, beginning on page 57. You can see more of his work and buy his instructional DVDs at americanfederalperiod.com.

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CIRCLE #157 ON FREE INFORMATION CARD.

BY CHRISTOPHER SCHWARZ, EDITOR

10 Years and 10,000 Hours

A lot of people wonder about Contributing Editor Adam Cherubini, who writes about traditional techniques for our Arts & Mysteries column. And I wondered, too.

Adam has his fans. In fact, during a trade show this summer the president of a major machinery manufacturer grabbed my arm, looked me in the eye and said that Adam's column is the single best part of *Popular Woodworking*. He said that he always pulled our magazine out of the huge pile of mail on his desk just to read Arts & Mysteries.

After taking in Adam's 18th-century perspective, the guy would go back to the business of building table saws, planers and all the other tools that Adam never writes about (except to needle them a bit).

Adam has his detractors. I've had several phone calls from people who complain that Adam is wrong about this detail about sharpening, wrong about that detail on design or just plain wrong about everything that comes out of his New Jersey fingers.

Me, I'm a big fan. Not just because of his column, but because of something that a doctor said to me once about mastering any craft, from woodworking to brain surgery: All it takes is 10 years and 10,000 hours.

Let me explain. Until this fall, I'd never met Adam in person. We'd talked on the phone and exchanged e-mails about magazine deadlines and the Golden Section. But for all I knew, Adam – the person – could be a female impersonator who lived in Guam.

But in October 2007 I traveled to Philadelphia for a hand-tool show sponsored by Lie-Nielsen Toolworks, and Adam and I made plans to get together. So the night before the show we met in downtown Philadelphia, drank a couple beers and walked around the historic streets.

We trolled the oldest still-inhabited street in the city and Adam pored over the details of the homes' shutters, entry doors and divided-light windows. At the end of the night, Adam promised to visit the show and demonstrate one of his planes.

He made good on his promise and promptly took control of my workbench. He drew a crowd around him as he demonstrated his wooden fore plane and attempted to smooth some curly hickory. He grabbed people in the audience, showed them how to use the tool and set them to work.

Then he turned his entire attention to a boy of about six who was there with his father. Adam showed him how to hold the plane and push it. The workbench was too high for the boy, so Adam rigged a planing stop on the floor that was braced against the base of the bench. The boy went to work for the next half hour or so, making shavings and wearing a huge grin.

That boy has only 9,999½ hours to go. And he got an early start on it, thanks to Adam. And that – more than anything – is why I'm a fan of the Arts & Mysteries. **PW**

PHOTO BY CHRISTOPHER SCHWARZ

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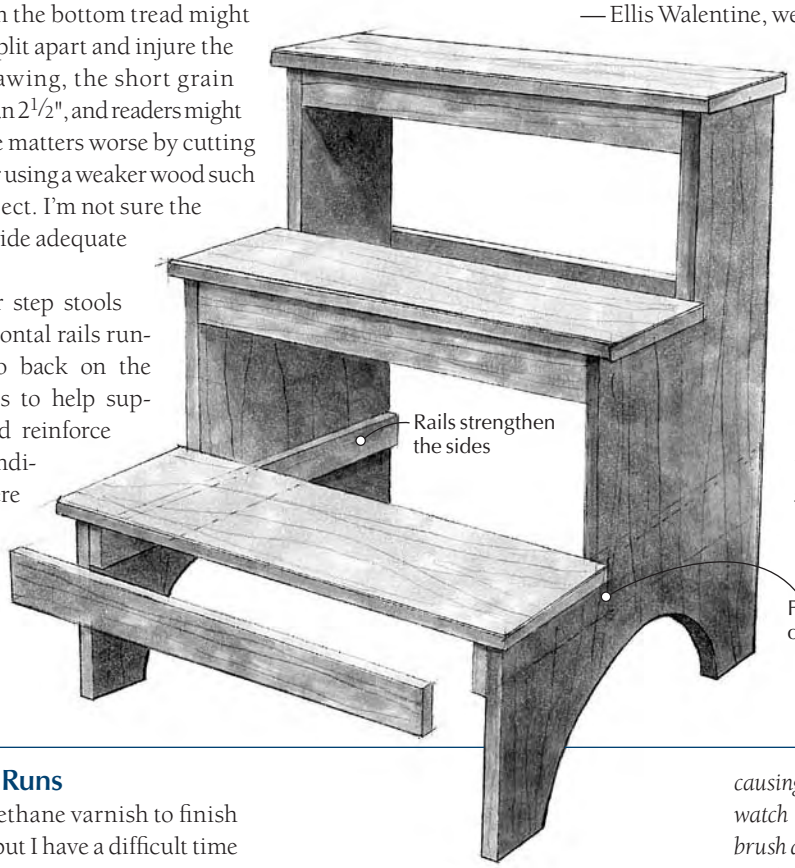
Short Grain on Step Stool Could Cause Splitting

I enjoyed the "I Can Do That" Shaker step stool article in the November 2007 issue (#165), but I have some concerns about the short grain in the side panels at the rear of the bottom tread. I am concerned that too much weight on the bottom tread might cause the sides to split apart and injure the user. From the drawing, the short grain appears to be less than 2 1/2", and readers might unknowingly make matters worse by cutting out a larger radius or using a weaker wood such as pine for this project. I'm not sure the pocket screws provide adequate reinforcement.

Original Shaker step stools generally had horizontal rails running from front to back on the insides of the sides to help support the treads and reinforce any short-grain condition. These rails were omitted only if the cutouts at the bottom of the sides were very shallow and short grain was not an issue. I suspect the Shakers learned the hard way that such rails were necessary.

— Ellis Walentine, webmaster and host, WoodCentral.com



We had three editors, with a combined weight approaching 550 pounds, stand on the stool and jump up and down simultaneously. We didn't experience any breaking or glue-line separation, but we also haven't repeated the exercise over a long period of time. We did use poplar for the project, but were careful to select straight, tight grain. Plus, we took care when gluing up the panels to get a tight joint. However, better safe than sorry – and the addition of an interior side rail not only adds a measure of safety, it's historically accurate.

— Megan Fitzpatrick, managing editor

Avoiding Finish Runs

I like to use polyurethane varnish to finish my wood projects, but I have a difficult time avoiding runs when I brush it on vertical surfaces. It seems that no matter how thin I apply it, I still end up with runs. I've tried both gloss and semi-gloss varnish and end up with the same results. Please advise me as to how to overcome this problem.

Also, I usually use semi-gloss varnish so I can obtain a satin finish. I understand that gloss polyurethane is harder than semi-gloss polyurethane varnish. Would you recommend the application of one or two coats of gloss polyurethane followed by one or two coats of semi-gloss polyurethane to obtain a satin finish?

— Bill Savage, via e-mail

There shouldn't be any difference between gloss and semi-gloss when it comes to the tendency to run on vertical surfaces. There's really only one way to prevent the runs, and that is to get the finish thinner on the wood. Here's what to do.

Brush the finish out as usual, "stretching" each brush load as much as possible without causing gaps. Then look at the finish (actually, watch it as you are continuing with the next brush applications) in a reflected light so you can see if it begins to sag. As soon as you see any sagging or running, brush the finish out to remove it. Clearly, it is best if your brush is not loaded with more finish. The idea is to keep brushing out the runs and sags until they stop. If you have applied the finish too thick, you may have to remove some with a non-loaded brush and apply it somewhere else or put it into a jar by dragging the brush over the lip of the jar.

There's no difference in hardness between gloss, semi-gloss or satin. The flatter the finish, the less scratches and other marks show. You

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ILLUSTRATION BY HAYES SHANESY

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could make an argument that the flatter finishes show marks more because the flatting agent at the surface gets knocked down more easily, but this is very difficult to demonstrate. There's just not that much difference.

The sheen is completely controlled by the last coat. Previous coats make no difference. Go to popularwoodworking.com/finishing and read my article "Some Reflections on Sheen" to understand how sheen works.

— Bob Flexner, contributing editor

Tempering Metal

I'm probably not the first to comment on the "Making a Spokeshave" article (October 2007, issue #164) but I have a slightly different perspective. I enjoy reading your publication and also am a hobbyist blacksmith who is somewhat "color-shade challenged."

The easiest manner to test a piece of steel for the correct temperature for proper hardening is by passing a small magnet along the metal. If the metal is above the "critical temperature," or the proper temperature to harden, the magnet will not cling to the metal. If the metal is still attracted to the magnet, it is not hot enough yet; keep heating. This "critical temperature" varies from alloy to alloy and ranges in color from cherry red to yellow.

— Richard Zellers, Bloomington, Indiana

Is There an All-purpose Bench?

I have been following Editor Christopher Schawarz's writing on workbenches – history, construction, uses and the nuances thereof, with a great deal of interest. I am thinking about replacing my workbench with something that better fits my style. As I was thinking about what would be a good bench model for me, along with Chris's observations and comments, it dawned on me that Chris had missed perhaps the most common type of "woodworking" bench.

The home/garage/woodworking/fix the lawnmower/handplane/assemble the grandkid's toys/glue carcases/clean sparkplugs … well you get the idea.

At this point in history this maybe is the most common type of workbench out there, yet not much is written about it. Because of physical and monetary restraints my bench has morphed into a "whatever needs done" type of bench. Yet, it is a morphed bench; not a dedicated woodworking bench, per se. It kinda works, but …. Is there a practical bench model out there that would work for most of us who are amateur woodworkers and "whatever needs to be done" types? Chris, as the "Workbench Guru of the Internet/Blog" any thoughts?

— Larry S. Feasel, via e-mail

The funny thing about your letter is that we were just discussing this exact fact in the office last week. In addition to building furniture, I also work on a car and fix my kids' toys and do the inevitable plumbing and electrical that comes with an old house (sigh) and so on.

I don't use a woodworking bench for this. I use the best dang commercial bench ever made: a Workmate. It's portable, sturdy (mine is from the 1970s) and holds anything in its giant jaw/clamp. Plus it folds flat and stows away when not in use. I bought mine used for $30. I can't build any bench for that price.

This is probably not the answer you were seeking, but I'm afraid that's the sordid truth.

— Christopher Schwarz, editor

We're too Sexy

First, let me tell you that the last two issues of *Popular Woodworking* are perhaps the very best, in my opinion, over the last few years that I have been subscribing. Stellar job.

Now, a request. For the second time in my memory you have used the word "sexy" on the cover. We don't use the word "sexy" around my house because it has to do with, well, sex, and we have kids young enough that we don't talk about sex with them yet.

The first time you published the word, I didn't mind too much. I don't want to censor anyone, after all. And I could just not leave the magazine lying around the house. And the word "sexy" was used to describe table saws or something that is, well, sexy. If motorcycles are sexy, a table saw certainly is, too.

But now I am supposed to get sexy finishing results? Huh? Has your marketing division issued a mandate to get the word "sexy" on the cover every few months? Because I can't conceive of how even the most beautiful finish could ever be thought of as sexy.

So, I'd like to ask that the word "sexy" be used sparingly on the cover of your great magazine, and one way to do that would be to use it only when it really fits. For example, big power tools or high-end smoothing planes might be sexy. On the other hand, if you dropped the word altogether, that would be swell, too.

— John Baer, Santa Paula, California

What Plane Angle Works Best for Dealing With Hard Woods?

I own a good number of Lie-Nielsen tools and am currently considering purchasing a No. 4 1/2 high-angle-frog plane for use on hard woods. However, I would very much appreciate your advice on which angle to choose. I believe that Lie-Nielsen provides two variations. One is set at 50° while the other is set at 55°. I am interested in your thoughts regarding the advantages of one versus the other, and which you think would offer the greatest level of versatility.

— Nick Orda, Churchville, Pennsylvania

I tested all three pitches a couple years ago when that 55° frog was in prototype. I'll probably end up buying one.

I think it shines when used on curly woods more than anything else. It's not significantly harder to push (when you are taking thin shavings almost anything is easy to push). The iron seemed to dull faster for some reason, but it wasn't a serious problem.

If you work with standard domestic species, I think the 55° frog isn't necessary. But if you work with wild-grained wood, I think it's worth putting on your smoothing plane. Or you can purchase a bevel-up plane and pick any angle you like.

— Christopher Schwarz, editor

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Safety Articles Hit a Homerun

Congratulations on "Learn the Skills to be Safe" (November 2007, issue #165). It's rare to find a no-nonsense safety article so well written. I look forward to the rest of the series by Marc Adams.

— Bill Bartlett, Hastings, Ontario

Update on Rosewood

Editor's Note: After writing on our web site and in the magazine that Rosewood Studio, a woodworking school in Almonte, Ontario, had closed, we now have confirmation that the school has reopened under new management, and is accepting students. You can find a list of classes on the school's web site at rosewoodstudio.com. **PW**

Question? Comment?
We want to hear from you.

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*.

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THE WINNER:

Better Bench-dog Clamping

I have a commercially made benchtop that includes a typical tail vise and face vise with wooden jaws. I realized that, although the tail vise included holes for rectangular clamping dogs, the face vise didn't. To increase the versatility of my face vise, I drilled it with two 3/4"-diameter through holes, insetting them about 1 1/2" in from the ends to accept shop-made bench dogs.

I drilled the holes using a bit and brace, which allowed me to work slowly, checking frequently for squareness to the benchtop. Alternatively, most jaws like this can be removed completely for boring at the drill press.

I made the dogs from hardwood by gluing a 3/4"-diameter dowel into a square block with a 3/4"-diameter hole drilled in it. These blocks can be any convenient thickness. I made four dogs with 1/2"-thick blocks for holding thinner stock, and four with 3/4"-thick blocks for holding thicker pieces. After gluing on the blocks, I sanded each dowel a bit for a snug but easy-sliding fit in its hole.

These custom dogs greatly increase the versatility of the face vise, accommodating a wide variety of clamping situations. Smaller workpieces can be held by using two of the custom dogs along with store-bought rectangular dogs set in holes in the bench. If your bench doesn't include two rows of dog holes, you can drill them as necessary. The really nice thing about these dogs is that they swivel in their holes, so all kinds of shapes can be held, including curves and trapezoids. I find that my dowel dogs also fit my square dog holes, so I can even use them in my tail vise when necessary.

— Chris Warren, Carlsbad, California

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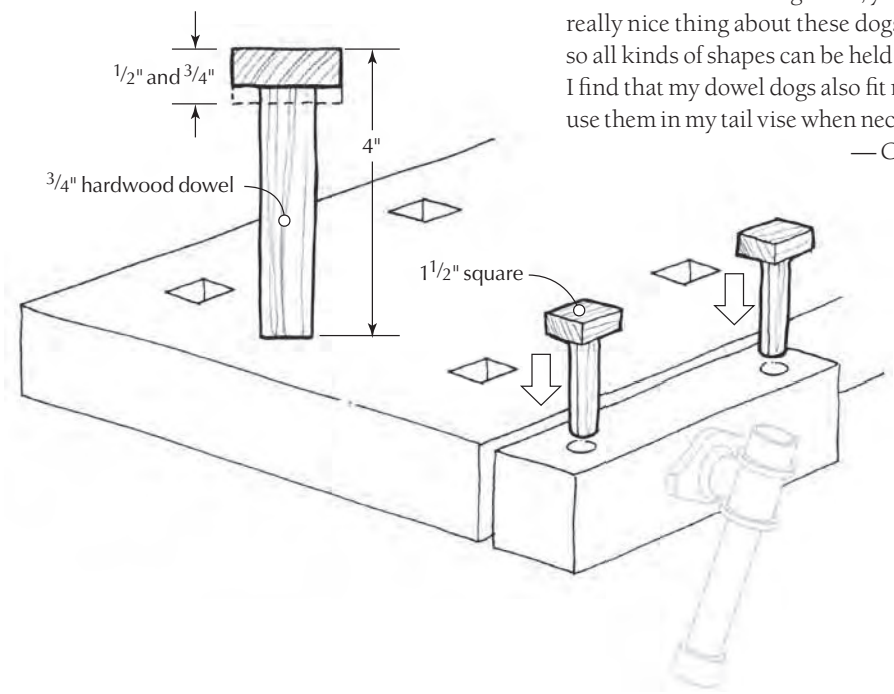

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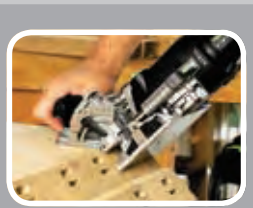

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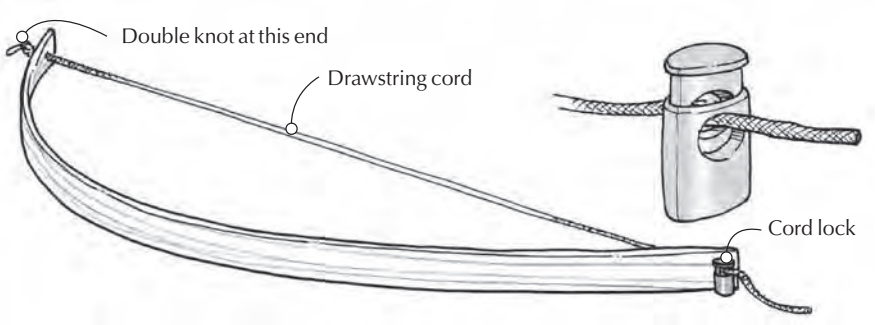
Quick-set Spring Stick

When laying out arcs for furniture rails, stretchers and other curved parts, I use a 1/8" x 3/4" strip of straight-grained hardwood as a guide, bowing it as necessary to achieve the curve I want. It can be tricky to hold the position of the stick with clamps or other methods, so I devised this simple approach using a drawstring from an old jacket.

I simply drilled a small hole in each end of the stick to accommodate the drawstring cord. To prevent the stick from twisting, carefully center each hole across the width of the stick. I tied a double knot in one end of the cord, then threaded it through both holes, slipping the original spring-loaded "cord lock" on at the end. To use the spring stick, I bend it to the desired shape and slide the cord lock against the stick. Adjustments are easy to make by sliding the spring-loaded cord lock in or out as necessary to amend the curve. You can make spring sticks in various sizes. I find that a 3' and a 4' length serve most of my needs. Drawstrings with cord locks are easy to find in second-hand store apparel, or you can buy the cord locks from camping goods stores.

— Jacques Joanette, L'ange Gargien, Québec



MDF Dust Reduction

Every time I cut MDF in my shop, I dread the amount of dust it produces. In spite of my dust collector, the super-fine MDF dust seems to find its way onto every surface in the shop. Fortunately, I have found a way to significantly reduce the amount of dust produced. Instead of using a standard table-saw blade that cuts an 1/8" kerf, I install a 7 1/4"-diameter 24-tooth ATB framing saw blade, which cuts an ultra thin kerf only about 1/16" wide. Available at most home-supply stores for about $10, the blade is designed primarily for use with a portable circular saw. However, its standard 5/8"-diameter arbor hole also allows you to use it on a table saw.

Because the kerf is only half the width of that produced by a standard 10" table saw blade, the blade produces only half the dust. And I've found that the quality of cut produced by this "framing" blade exceeds my needs in every situation. You'll also appreciate the reduced amount of force it takes to make cuts due to the blade's super thin kerf.

— Daniel Hebert, Canton, Georgia

Shop-made Flip Stop

Over the years, I have often clamped stops on my drill-press fence to register hole locations in workpieces. Unfortunately, I always seemed to lose the stops. Flip stops always seemed like a good idea because they stay attached to the fence all the time so you won't lose them. Plus, they flip up out of the way when you're done with a particular operation, but will flip back down to their original location if necessary.

I decided to make my own flip stops from easily obtainable hardware (from Woodworkers' Supply), off-the-shelf aluminum flat stock from my local home-supply store and a few bits of hardwood. The stops mount on 3/4" aluminum T-track that I screwed to the top of my drill press fence.

To build a flip stop, begin by making the slider blocks and spacers. Saw or rout two opposing 1/16"-deep rabbets on the underside of the slider to create a tongue that fits snugly in the T-track slot without binding. On the drill press, bore a through-hole to accept the T-bolt, then drill a blind hole in the end of each block to accept the press-in inserts. Drill a screw pilot hole in each end of the spacer. Next, lay out the shape and hole locations of the L-shaped brackets on 1/8" x 1" aluminum flat stock. It's easier to drill the holes before cutting the brackets to shape, so do the drill-press work first. Then cut the brackets to shape with a hacksaw or jigsaw and clean up the edges with a mill file. Assemble the parts and mount the stop onto T-track that's screwed to the top of a 3/4"-thick wooden fence. My fence is 1 3/16" high, which allows space for a 3/4" backer panel to slide under the stop in use. One final thing: You'll need to cut the end of the T-bolt level with the top of the thumb nut to allow clearance for the flipped up spacer.

— Jim Judge, Caspar, Wyoming

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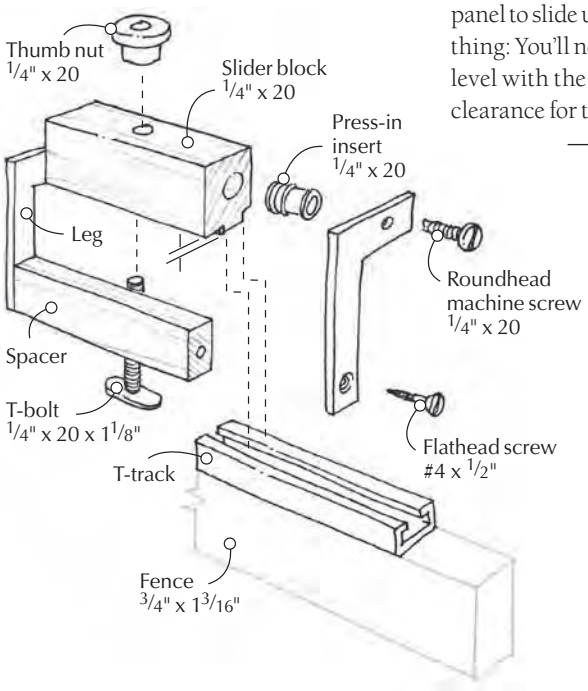

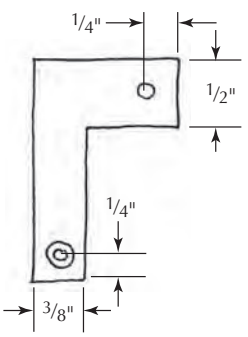

LEG

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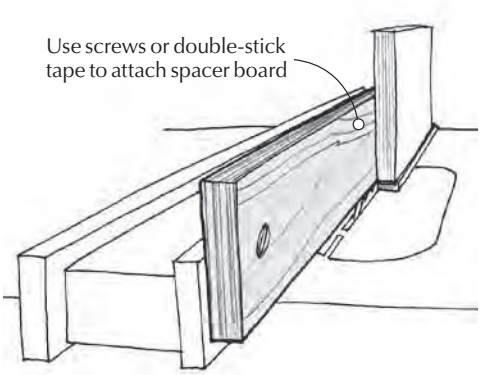
Two Edge-trimming Tricks

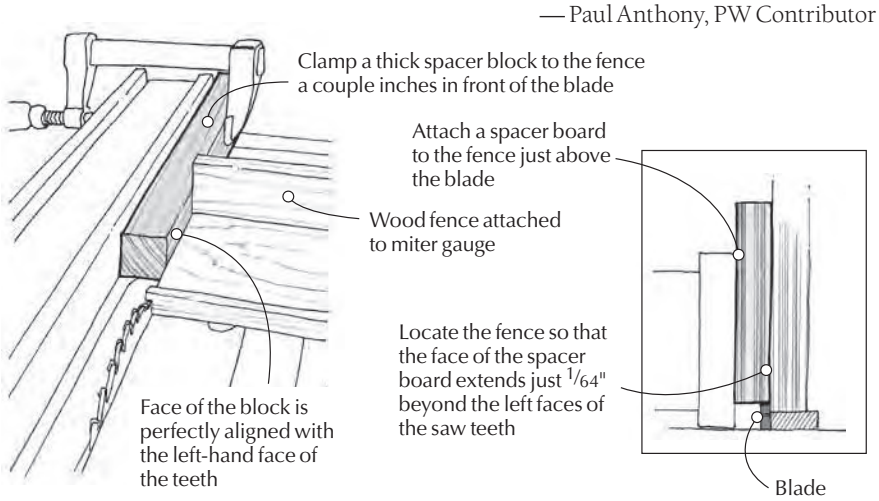
I make a lot of shelving from hardwood plywood, covering the panel edges with 1/4"-thick solid-wood edging. The edging, which is oversized in length and width, is trimmed flush with the plywood panel after the glue cures. Although the projecting edging can be routed using a flush-trim bit, it tends to tear out if there is more than about 1/16" overhang.

I find that, whenever possible, it's best to saw off the overhang on the table saw by raising the blade about 1/2" above the table, then attaching a spacer board to the fence just above the blade using double-stick tape. I locate the fence so that the face of the spacer board extends 1/64" or so beyond the left faces of the saw teeth. Now, when feeding the workpiece on edge against the spacer, the edging will be trimmed just proud of the panel surface, leaving only a small amount of waste to remove by planing, scraping or sanding.

After trimming the long edges, I set up to trim the ends. This time, I raise the blade about 1/4" higher than the edging in thickness, then I clamp a thick spacer block to the fence a couple inches in front of the blade. I position the fence so that the face of the block is perfectly aligned with the left-hand face of the teeth. To trim the edging, I first butt the end of the workpiece against the spacer block, with the overhanging edging between the block and the blade, then feed the workpiece forward, trimming the edging perfectly flush with the end of the panel. Use a miter gauge to feed narrow workpieces.

— Paul Anthony, PW Contributor



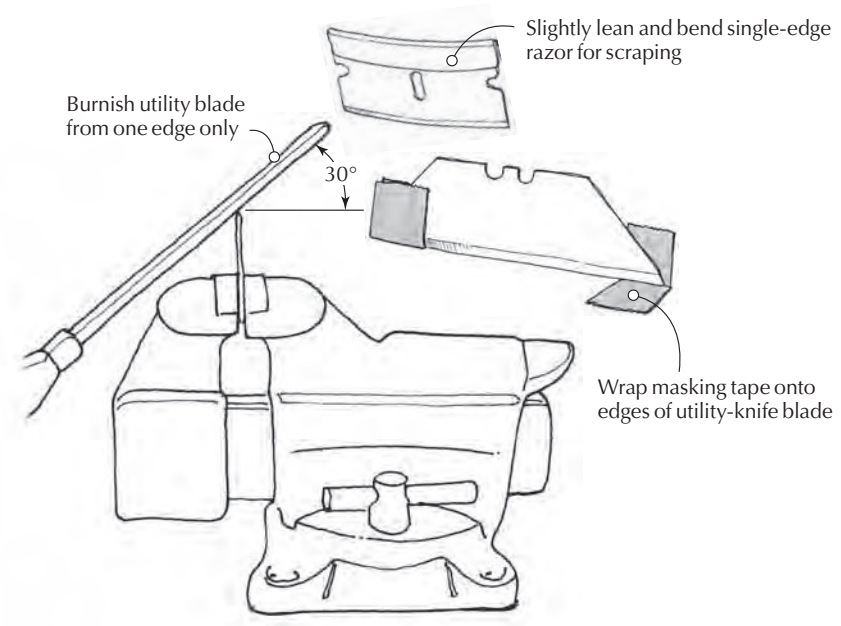


Razor Scraping

Many of us are familiar with the technique of using a razor blade to scrape away drips from varnish and other film finishes. It's a great way to level defects, especially if you use a brand-new razor. To keep the corners from digging in, you can bow a thin single-edge razor just as you would a card-type cabinet scraper. If using a stiffer razor, such as a utility-knife blade, I wrap a short strip of masking tape around each end to keep it from digging in. This also levels a drip perfectly to the adjacent surface, leaving only a slight plateau to remove with very fine sandpaper wrapped around a hard sanding block.

I find that utility-knife blades are also useful scrapers for smoothing small wood parts such as box pulls or decorative filigree. They work pretty well right out of the package, but there are times that I prefer more aggressive scraping. In those cases, I burnish a hook, or burr, onto the blade, just as I do with my card scrapers. (Unlike with a card scraper, you can only create a hook toward one face of a razor blade.) I burnish the burr at about a 30° angle off horizontal, taking a few light-pressure passes along the length of the blade with a scraper burnisher. Alternatively, you could use the rounded section of a chisel shank. A burr sure makes scraping go faster, and finishing up with an unburnished razor makes short work of the final-pass smoothing.

— William Murrey, Phoenix, Arizona



CONTINUED ON PAGE 24

CIRCLE #124 ON FREE INFORMATION CARD.

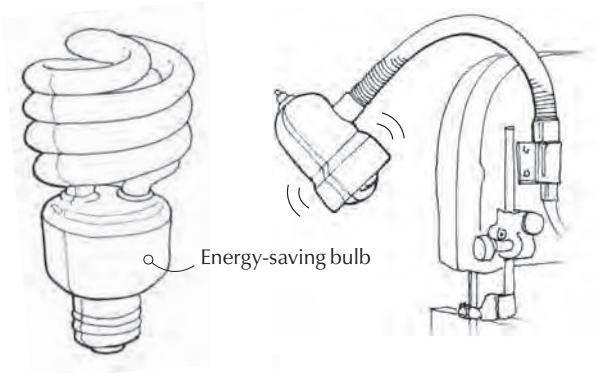
CIRCLE #146 ON FREE INFORMATION CARD.

CONTINUED FROM PAGE 22

Band Saw Bulbs that Take the Shake

When band sawing, I use a small gooseneck lamp that clamps right onto the saw. It works great as a task light because it's right at hand and adjusts as needed to help me see my cutline. Unfortunately, an incandescent light bulb tends to live a short life in one of these lamps because the saw's vibration often shakes the filament to an early death. I've found that it's much better to use one of those new energy-saving compact fluorescent bulbs. They don't have filaments and can withstand the shaking of the saw.

— Walter Keely, Beaumont, Texas

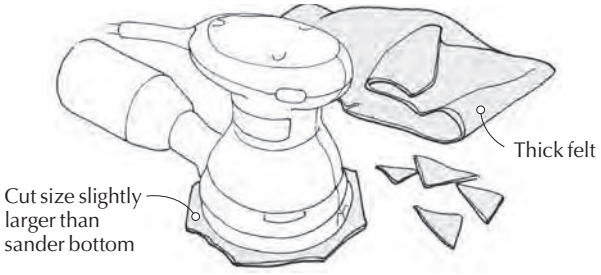


Random-orbit Buffer

To prevent rust and reduce feed friction, I apply paste wax regularly to my metal tool tables and other surfaces. It does a great job – but what a chore to buff the wax by hand! To make the job easier, I decided to turn my random-orbit sander into a buffer of sorts. I cut a piece of thick felt (available at any fabric store) to a size somewhat larger than my sander-disc diameter, and mounted a disc of coarse sandpaper on the sander. The felt doesn't have to be circular or even neatly cut; it just needs to be big enough to prevent the sandpaper from contacting the tool surface. I lay the felt on the surface to be buffed and use the sander on top of it as muscle to push the felt around. It sure makes the job a lot easier.

It's best to retract or remove blades and cutters when you buff to prevent snagging the felt. Rather than removing my band-saw blade, I usually just pinch the blade at its base with my free hand to cover the teeth (with the tool unplugged, of course.) **PW**

— Serge Duclos, Delson, Québec



CIRCLE #137 ON FREE INFORMATION CARD.

CIRCLE #126 ON FREE INFORMATION CARD.

CIRCLE #128 ON FREE INFORMATION CARD.

BY ADAM CHERUBINI

18th-century Tools for Every Shop

Often, the old ways are more efficient.

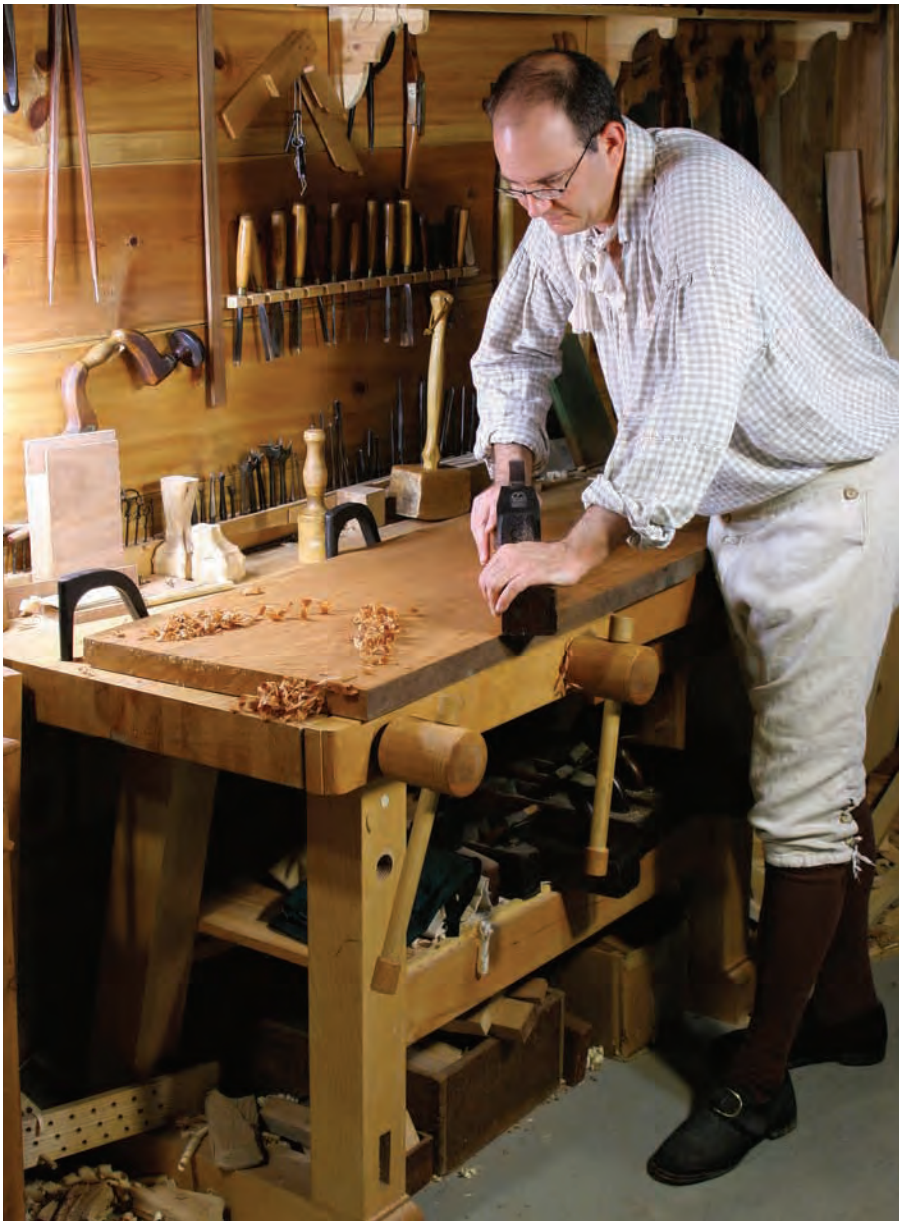
I use 18th-century hand tools because I make reproduction furniture. In my mind, the simplest, most efficient way to make authentic-looking furniture is to simply use the tools and techniques from the period. So for 18th-century reproductions, I think hand tools are the best tools. But for other jobs, I'm not so sure. Last year, I made plywood kitchen cabinets by hand. That wasn't fun. Eighteenth-century hand tools simply weren't designed for plywood and the sorts of joints used in kitchen cabinets. So I recognize my 18th-century tool kit isn't universally superior. But there are some 18th-century hand tools that I think no shop should be without, regardless of the sort of work done. In this article, I'm going to list the tools I think you should have and tell you why I think you should have them.

I've been reluctant to discuss topics such as this in the past. From its conception, Arts & Mysteries has always had a strong anti-consumeristic theme. Arts & Mysteries is now and has always been about skill. So I'll make a deal with you: I'll agree to talk about the tools you need if you promise not to ask me who makes the best versions and where to buy them.

Try Plane

Every shop needs a long handplane (traditionally called a try plane). Try planes are used to flatten or straighten stuff. Think of them as the 18th-century equivalent of a power jointer. The advantage they offer over a power jointer is that you can use them to work stock that's too wide or heavy for your jointer. Use a try plane to flatten a tabletop or your workbench. It's a lot easier and more accurate than a belt sander. Don't be afraid to work perpendicular to the grain.

Try planes are also used to straighten edges. They can be helpful if your stock is too heavy to



Eighteenth-century woodworking tools. *This 20"-wide piece of mahogany will make a great tabletop when I get it flattened. My long try plane may not be the fastest tool for the job, but I sure am glad I have it. I could never justify purchasing a 24" stationary power planer because I come across stock like this infrequently. This plane allowed me to buy a piece of wood I probably couldn't work otherwise. Eighteenth-century woodworking tools can be restrictive in some ways. In this case, however, my try plane has opened up opportunities I wouldn't have had without it.*

PHOTOS BY THE AUTHOR

Try plane. *Smoothing planes seem to be many woodworkers' gateway to hand tools. But a long try plane does things other tools can't. In my opinion, this should be every woodworker's first plane. I think it's an absolute necessity for every shop.*

Gauges. *Marking gauges may look primitive, but they are capable of things no other tool can do. You may find your marking gauges can help you build in new ways.*

Crosscut saw. *You don't have to wear a puffy shirt to love an 18th-century handsaw. This 20" crosscut saw can slice through a board faster than a jigsaw, and almost as fast as a circular saw. Because it's handier and lighter and takes up less space, you may find it's a time-saver for some jobs.*

Backsaw. *If you've ever needed a calculator to set up a compound-angled cut on your chop saw, this 16" backsaw would be a welcome addition to your shop.*

Cabinet scraper. *I made my cabinet scraper out of a saw blade that had a crack in it. Buy one. Make one. Just get one and learn to sharpen it; you'll be glad you did.*

safely pass over your jointer, and you'll never cut yourself working with small pieces.

When selecting a try plane I think you should get the longest plane you can find. The theory is that the longer sole will allow you to work more accurately. In reality, I'm not 100-percent sure it makes a huge difference. Look for a plane between 20" and 30" in length and don't worry too much if it doesn't take smoother-like shavings. You can always clean up after it with a smooth plane, cabinet scraper or, dare I say it, sandpaper.

Crosscut Handsaws

I can understand why someone might not want to do all their ripping by hand. Long rips through thick stock can be strenuous. But crosscuts are generally not difficult by hand and handsaws offer a few advantages over power saws. I'm not sure how folks rough crosscut boards, or glued-up panels that are too wide for a chop saw or radial-arm saw. If the stock is 6/4 or thinner, this is fairly easy work with a handsaw. I also take my panel saw to the lumberyard. Sometimes I find stock that doesn't fit in my van. So I just cut it right there and then while the yard man stares at me, tobacco juice rolling down his chin from his gaping mouth. (Handsaws are an anathema to some people; I hope not to you.)

I used a chop saw a few times and was disappointed with my accuracy. The saw cut perfectly straight and true, but I had some difficultly adjusting to the saw to the 82.3789542° angle scribed on the stick I was cutting. I had no stock, time or patience for test cuts. A backsaw filed crosscut will actually jump into a knifed scribe line. All the precision bearings in the world can't do that. If you have 20 of the 90° cuts to make, obviously it wouldn't make sense to use a handsaw if you had a chop saw handy. But for off-angle or compound-angle cuts, a simple backsaw can make quick work of the job.

Marking Gauge

Technically, a marking gauge is used to transfer a mark from one board to another. But I've found mine are useful for other tasks. I use them like a caliper, to see how uniform a thickness is (in the few instances when I actually care). I also set my marking gauges to chisels (using them as width gauges) to transfer a given measurement accurately and repeatedly. Instead of scratching a line as is typical, marking gauges can be used to mark the locations of nails or screws equidistant from an edge. The advantage I see of the marking gauge over the dial indicator or caliper is that you can mark and measure with it at the same time.

Making your own marking gauge is a fun afternoon project. My friend Dean Jansa wrote an excellent article in this column for the December 2006 issue (#159) detailing step-by-step instructions. In that column, he mentioned 18th-century-style fixed-pin mortising gauges. I wonder if some of you would benefit from making one of these with the pins set to the thickness of plywood.

Cabinet Scraper

The cabinet (or card) scraper is your friend. Get to know it better and you will be rewarded. No shop should be without one. I think period cabinetmakers used them to tame curly woods and veneers. You can use them to scrape glue, brass or your favorite figured wood. You can buy them new, or make your own out of old rusty saw blades. If you don't have one, get one. The only trick to using it is learning to sharpen it – and Editor Christopher Schwarz tells you how in the February 2007 issue (#160).

Moulding planes. *A side bead, small hollow and ovolo are all tremendously useful moulding planes. None of these are going to make that crown moulding your spouse has been wanting, but they can make even the simplest projects just a little nicer.*

Wide chisel. *This 7/8" chisel is one of my favorites. It's really too big for chopping dovetails, but it's the chisel I reach for first to pare them. No need to buy anything new. Just reserve one wide chisel for miscellaneous paring. As long as you remember not to hit it with a hammer or open paint cans with it, it'll be there for you when you need it.*

Gimlets. *These shell gimlets are among the earliest types. Shell gimlets do a pretty good job boring holes up to 3/8" in diameter. But you can get wire gimlets that are perfect for drilling the small holes required for drywall screws. Grab a gimlet and a screwdriver and you can have the job done without opening a tool box, or searching for an extension cord.*

Brace and bits. *You don't need a fancy brace like this one to take advantage of center bits. They'll fit in any adjustable chuck brace. I've found center bits to be useful for things other than simply drilling holes.*

Small Moulding Plane

Small moulding planes are wonderfully fast and effective. For a small job, it's hard to beat the quick work and smooth finish left by a moulding plane. They're really not that hard to use. You may need to read up on sharpening them and it may take you an hour to do it. This is something you could do on a jobsite. When your stock is straight grained, the finished moulding will be crisp and so smooth. Mouldings cut with a plane usually can't be improved with sandpaper.

Wide Paring Chisel

I'm guessing most woodworkers have at least one chisel. Many of you probably have a set of chisels. Craftsmen in the 18th century had several sets of special-purpose chisels. I think every woodworker would benefit from reserving one wide chisel for use as a dedicated paring chisel.

I use a wide chisel for a great variety of tasks. I clean up tenon cheeks and faces with one, pare end grain to perfect miters, and level proud dovetails and pins. The trick is keeping it sharp. Choosing a high-quality chisel will help with that. You don't need a special long-pattern paring chisel. Any wide chisel will do. You can pare bevel down (I do it all the time and actually prefer it). I recommend you grind it with a low angle (20°-25°). I like a convex rounded bevel and a little back bevel doesn't bother me one bit. Think of it more as a carving tool than something you hit with a hammer, and sharpen it accordingly.

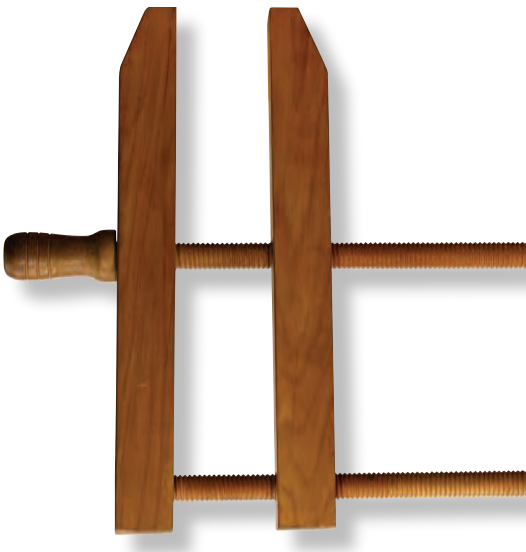
Each year, I go to Williamsburg, Va., to the "Working Wood in the 18th Century" conference. Call me nuts, but watching the cabinetmakers use their chisels to quickly, accurately and elegantly define features is like watching a professional athlete hit a homerun, catch a "Hail Mary" pass or sink a three-pointer. It makes me want to stand up and cheer. If you could see that, I think you'd feel the way I do about chisels. Get yourself a wide chisel, keep it sharp and try it.

Gimlet

I often come across jobs around the house that require the drilling of one small hole. I don't own a cordless drill, so I find the gimlet is a perfectly acceptable way to drill up to four or so small holes. If you have to drill many more than that, you might as well go find an extension cord. Gimlets can also be handy if you are working on a ladder, as you can keep a few in your shirt pocket.

Center Bits and Brace

Center bits are useful for boring large shallow holes quickly. To avoid break out, work until you feel the centerpoint break the far surface of the stock. Then finish the hole from the other side. As good as center bits are at drilling holes, I often use them for excavations. I made boxes for my oil stones out of solid wood. I use centerbits to excavate for half-mortise locks, or mouth patches in wooden planes. You may use a drill press for the same opera-



Wooden handscrews. *I made a pair of handscrew clamps when I first started woodworking and I've been using them ever since. The big square jaws allow me to clamp to my bench or sawhorses. They are more like portable vises than normal woodworker's clamps. I think every shop should have a pair.*

tions, but the center bit offers maybe a little more control. You can remove one shaving at a time and see it happening. You may find you don't need a set of these. Maybe just a single 5/8"-diameter bit will suffice.

Wooden Handscrew

When woodworkers think of clamps, they often think about gluing. When period furniture makers think about clamps, they think about holding. My bone-crushing wooden handscrews are invaluable to me. They are big and very strong. I think you only need two. I like those with wooden screws better than the metal-screw versions, which all seem to have one left-hand screw thread; it always confuses me. The wooden-threaded versions have two right-handed screws, which I like better. But if you are smarter than I am, go ahead and get the metal-screw clamps. Get the biggest pair you can find. But don't turn your nose up at cheap, old wooden clamps at the local antique shop. They are there on the floor under the table with the cast iron kettle with the plastic daisies in the spout.

Conclusion

When recommending tools to woodworkers, it's easy to lose sight of the importance of the work and instead become mired in the often ambiguous world of "performance." In this article, I've tried to suggest not necessarily top-performing tools, but tools that add some additional capability to a wired shop. In so doing, I've revealed the very heart of this column.

Last year, I wrote about my vision of what period furniture making is all about. It was a series about period woodworking, for period woodworkers. I'm not looking for puffy-shirt wearing converts, though. And this is not an elite clique. I'm hoping folks with no desire to reproduce 18th-century furniture read this column and glean something of use for their work. It may be something as small as trying a gimlet instead of a cordless drill.

I hope that instead of restricting yourself to one sort of tools as I have, what you read here in Arts & Mysteries will encourage you to try new things, explore new possibilities for your woodworking – whatever sort that may be. **PW**

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

BY CHRISTOPHER SCHWARZ

Pleasant Hill Firewood Box

A classic Shaker design with enough curves to make it interesting.

The buildings at the Shaker Village in Pleasant Hill, Ky., are filled with handy firewood boxes. After a few visits to the colony, I concluded that this example is the best one.

Tucked into a room in the Centre Family Dwelling, this firewood box represents what I like about the Western Shaker furniture styles. This box has a few graceful and unexpected curves, yet it still looks decidedly Shaker.

Building this box is simple. With the exception of the curves on the sides, all the cuts are straight. With the exception of the hinged lid, all the joinery on the box is glue and nails.

The biggest construction challenge is gluing up narrower boards into the panels that make up the box's sides, front and bottom. I glued these up using pocket screws as clamps, a technique we detailed in the November 2007 issue (#165) of the magazine.

However, because this project is painted, there's an easier solution at the home center. In the lumber section of the store you'll likely find wide laminated pine panels that are pieced together at a factory from narrow strips. If you purchase this material, you won't have to glue up any panels and can go right to cutting.

The other option is to buy No. 2 common 1 x 12s. I bought five 8'-long 1 x 12s so I could cut around knots. I also bought a small piece of 1/4"-thick Masonite. Why? Read on.

Repurposed. *While originally designed to be used to hold firewood and kindling, this Shaker piece also can be pressed into service as a recycling bin.*

Make a Template

When you're working out a complex design or need to make multiple and identical parts, a full-size template is handy.

With this project, a full-size template helps you get the curves just right and helps you fit the pieces to the hinged kindling box. Plus, if you ever need to make more of these boxes, the template will give you a good head start.

Use the illustration to draw your template on the Masonite using a ruler and a compass. All the curves are a 7" radius, so the layout work is easy. Cut the template to shape using a jigsaw and sand the edges until the template looks good and has smooth edges. If you want to adjust the design, here's your chance to alter it and see how it looks. Glue up all the panels you need and get ready to cut the sides.

Construction

Trace the template's shape on your side pieces and cut them with your jigsaw. Clamp the two sides together and shape the curves with a rasp and sandpaper so the two are identical. Using the side pieces as a guide, determine the actual width of the box's bottom, the width of the

LEAD PHOTO BY AL PARRISH; ILLUSTRATIONS BY MARY JANE FAVORITE

bottom of the kindling box and the width of the front of the kindling box. Cut these three pieces to finished size. Glue and nail them between the sides.

Now work on the front of the box. Cut this panel as close to size as possible – I like to leave it a hair long. Glue and nail the front to the carcase. Trim any overhang with your block plane or #100-grit sandpaper.

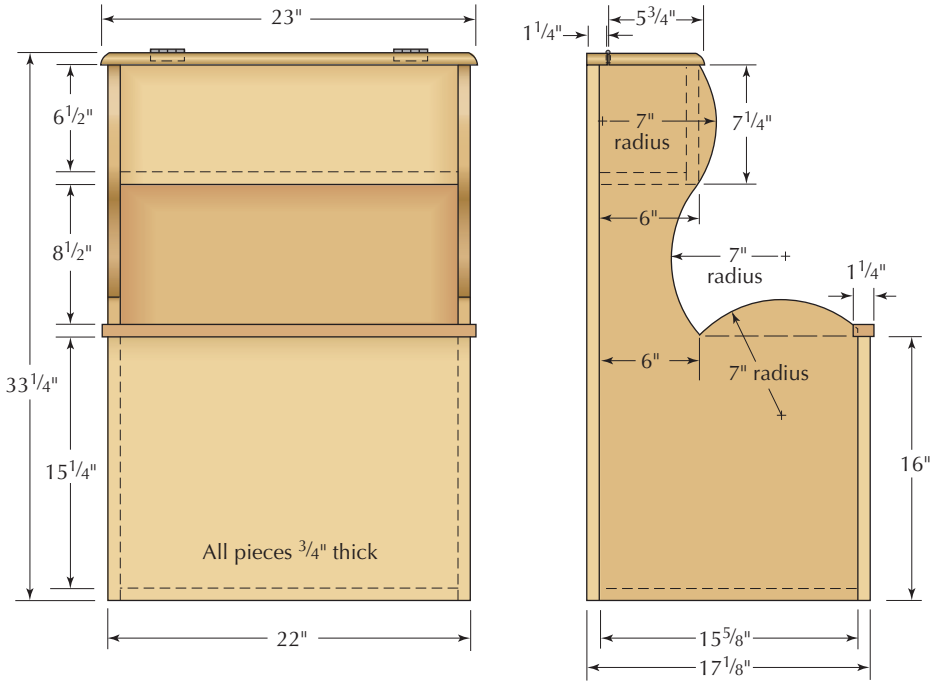
Now repeat the same process with the back pieces. I used three horizontal boards for the back. Two of the boards were 1 x 12s. The third one was ripped to fit just right. If you like, you can plane a small chamfer on the back boards' long edges as a decorative detail. This adds a shadow line where the backboards meet one another.

Crosscut the hinge rail and lid at the same time so they are the same length. Your miter saw is an excellent tool for this sort of operation. Screw your hinges to both the hinge rail and the lid. Then glue and nail the hinge rail to the carcase.

The last bit of construction is the box's front edge. I took the difficult route to fit this piece in place. I notched out the underside of the workpiece with a handsaw and chisel so the notches nest neatly over the curve on the sides. You can fit the piece any way your skills or tools allow.

Disassemble the lid and hinges and sand the project up to #150-grit. Break all the sharp edges of the piece by hand with a piece of old sandpaper. The finish is simply three coats of semi-gloss paint. As shown, this piece is a little more barn red than the original. But it is still a red that is consistent with the original Shaker paint recipes. You should, of course, finish yours to suit your decor. **PW**

Chris is the editor of this magazine and the author of the book "Workbenches: From Design & Theory to Construction & Use" (Popular Woodworking Books). You can contact him at 513-531-2690 x1407 or chris.schwarz@fwpubs.com.



Watch those curves. *A full-size template helps in many ways. It allows you to refine the design details, determine the finished sizes of key components and to lay out your cuts.*

Firewood Box

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	Sides	3/4	15 5/8	32 1/2	Pine	
❑	1	Front	3/4	16	22	Pine	
❑		Back	3/4	32 1/2	22	Pine	Three boards
❑	1	Bottom	3/4	15 5/8	20 1/2	Pine	
❑	1	Kindling box bottom	3/4	5 1/4	20 1/2	Pine	
❑	1	Kindling box front	3/4	7 1/4	20 1/2	Pine	
❑	1	Kindling box lid	3/4	5 3/4	23	Pine	
❑	1	Hinge rail	3/4	1 1/4	23	Pine	
❑	1	Front edge	3/4	1 1/4	22 1/2	Pine	Notched around sides

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.

Visit ICanDoThatExtras.com to download the free manual.

BY THE POPULAR WOODWORKING STAFF

Two Jobs, One Machine

European-style machines blend two major machines into a small space in the workshop.

Combination machines, European-style machinery that combines the jointer and planer into a single tool, will quickly become big winners with home hobbyists and small-woodworking business workshops.

Look for the Grizzly Industrial machine to lead the way. Featuring a split jointer table and quick changeover planer setup, the 5-hp, 220-volt motor delivers a maximum 12" cut in both jointer and planer mode. It's available with a spiral cutterhead (G0634 priced at $2,295) or with a four-knife setup (G0633 priced at $1,795).

We have the G0634 in the shop and think the additional money for the spiral cutterhead is well worth the investment; it's quiet in use and produces a nice finished cut.

The Grizzly jointer/planer has a small footprint that requires only 64 cubic feet of shop space. So, if you're starved for space, this machine addresses your concerns.

Because the planer is positioned beneath the jointer, the jointer bed is set rather high, at 35½" above the floor. And, the height increases if you plan to move this 672-pound machine around the shop – you'll need a heavy-duty mobile base.

Adjusting the jointer depth of cut is a bit awkward. Grab the infeed hand grip by reaching over the table and under the bed. It can be a stretch as you twist the hand grip to make changes to raise or lower the table.

Some woodworkers might think the 59⅝"-long jointer-table is too short. Somewhere along the way, we've decided long jointer tables indicate a better machine. That's bunk. While there are a couple operations where a longer table is necessary, the majority of everyday jointer use (flattening stock) is easily handled with a table of this length.

You change to planer mode by removing the fence (something that I didn't care for, although it's not a complicated task), releasing the table-lock levers and lifting the jointer bed. The blade guard must be swung away as the tables are maneuvered. Once the tables lock in the upright position, flip the planer dust chute and you're ready to thickness your stock. Moving the planer bed is a simple chore with a smartly positioned handwheel.

When converting back to jointer mode, the planer's bed must drop below the 4½" mark prior to reversing the chute and lowering the jointer tables.

If space is a concern, or if you just want a 12" jointer and planer for the cost of most 12" jointers, take a close look at the G0634.

— Glen D. Huey

Grizzly Jointer/Planer

Grizzly Industrial ▪ 800-523-4777
or grizzly.com

Street price ▪ $2,295

For more information, circle #165 on Free Information Card.

Lift and flip. *Release the levers, lift the jointer table then flip the dust collection hood and the planer is ready to work. Then, you'll have to crank up the planer bed for most operations.*

PHOTOS BY AL PARRISH

Scientific Approach to Hand-cut Dovetails

The first impression most people (including me) have of this saw is one of disbelief. Backsaws have been one-handed tools since their inception, so why would anyone want to use two hands? The answer is part of a rethinking of precision handsawing on the part of Glen-Drake Toolworks. Glen-Drake's marking gauges and hammers are favorites of ours, and this unusual new saw features the same quality construction and ergonomic design.

The idea behind the Wild West Joinery Saw is that one-handed sawing makes drifting to one side of a line, or off vertical, almost inevitable. Plenty of practice can improve the situation, but for many woodworkers, it remains a life-long battle. With a two-handed grip, the attitude and balance of the saw is easy to maintain both when starting and during a cut.

The less obvious but equally important change is in the blade. There are no teeth on the last few inches of each end, and the teeth are filed fine at the beginning and end of the blade with more aggressive teeth in the middle. This makes the saw easier to push and eliminates any tendency of the teeth to grab and deflect the blade as the stroke is reversed.

Glen-Drake has developed a new method for cutting dovetails and other joints that includes a unique marking tool called the Kerf-Starter that scribes a line the exact width of the saw blade. Combined with a set of feeler gauges, it is possible to use this method to predictably cut properly fitting joints.

I found that the saw and system works as advertised – the biggest problem I had was overcoming my own habits and preconceptions. With the kerf established before cutting, a simple push starts the cut. Any adjustments needed during cutting are made at the end of a stroke, by comparing the back of the saw blade to the layout line.

A more detailed explanation of this technique is available on the web at popularwoodworking.com/feb08. Glen-Drake also has a free DVD available explaining in detail the use of this saw, as well as the full line of the company's tools.

— Robert W. Lang

Wild West Joinery Saw

Glen-Drake Toolworks ▪ 800-961-1569 or glen-drake.com

Street price ▪ $190, blades $39

For more information, circle #166 on Free Information Card.

Machined Dovetail Jigs for any Budget

It didn't take me long to figure out I needed to use dovetail joints on my furniture. The problem at the time was how to make tails and pins so they were correct and looked good.

Dovetail jigs by Leigh Industries have taken care of this for many woodworkers (that's how I began using the dovetail joint). Now, Leigh has made the machined dovetail possible for woodworkers on almost any budget with the company's new "Super Jigs." Each Super Jig has the ability to produce a variety of dovetail and box or finger joints, and they have a low entry-level price point.

The Super Jigs (available in 12", 18" and 24" sizes) allow the user to cut through dovetails and half-blind dovetails (both variably spaced) as well as sliding dovetails. In addition, the user can make 5/16" and 5/8" box joints without additional templates. And for the first time with a Leigh jig, half-blind dovetails can be made in a single pass using a simple spacing attachment and a nylon rod that fishes through the fingers to adjust the depth of cut – something you cannot do with the company's flagship D4R. But, you give up the variable spacing ability.

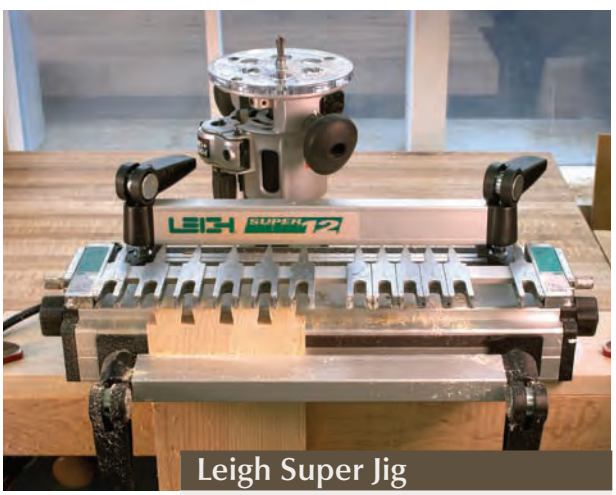
If you've used any dovetail jig, you know that tweaking the pins and tails is sometimes required to achieve the best fit. The Super Jig includes the patented "E Bush," an oval-shaped bushing, for fine-tuning. A simple twist of the E Bush changes its active diameter and that tweaks the fit of finger joints as well as half-blind dovetails.

There are a few differences between the Super Jigs and the D4R besides price. For one, the body of the Super Jig is constructed of two aluminum channels fitted together, versus the single extrusion of the D4R. Some rigidity was sacrificed with this change.

Another difference is found in the guide fingers. The Super Jigs have one-piece fingers, not split fingers as with the D4R unit. Because most often the pin size is used at its smallest setting, I feel the loss of adjustment in the guide fingers is an improvement; it's less to fuss with when setting up the jig.

Each Super Jig includes an 8° and 14° dovetail bit as well as a 5/16" straight bit (all with an 8mm shank), a 1/2" to 8mm collet reducer so the bits work with your standard 1/2" collet, the E Bush and a square-drive screwdriver necessary for adjusting the fingers.

— GH



Leigh Super Jig

Leigh Industries ▪ 800-663-8932 or leighjigs.com

Street price ▪ $199 – $329

Ryobi's Router Table Boosts Your Routing

A router is one of the most-used handheld power tools. It has all but replaced moulding planes and shapers in most shops. And the router table has pushed the shaper even farther out the door. If you don't yet have a router table, Ryobi has a new unit that sports all the premium features for about half the cost of other benchtop competitors.

The Ryobi Intermediate Router table (A25RT02), available at Home Depot, has all the features that make a router table work. To begin, the table is 1"-thick laminated MDF and, while sized at 32" x 16", there's plenty of workspace on the tabletop.

Centered on the tabletop is an insert plate that's countersunk and drilled to accept many different routers. While the screws placed in the ends hold the plate firm, there is a small amount of flex at the sides; however, I detected no movement during routing.

The fence system has an adjustable sacrificial MDF front that adjusts nicely around the router bit – think zero-clearance capabilities – improving the dust collection through the molded vacuum port that accepts both $1\frac{1}{4}$" and $2\frac{1}{2}$" hoses. The fence system itself is easy to adjust and has an aluminum T-track mounted on top to hold jigs or the included featherboard, which is even height-adjustable.

Another feature on the fence assembly is the articulating router cutter guard. The plastic dome covers the router bit to keep your hands away from the cutter and is designed to ride over, but remain in contact with, the workpiece. The guard also is easily flipped up to allow access for bit changing.

Another useful feature is the under-mounted switch assembly with twin receptacles. One plug is for the router and a second can power a vacuum. The on/off switch has a built-in locking switch key to prevent any unauthorized use.

— GH

Ryobi Router Table

Ryobi ▪ 800-525-2579 or ryobitools.com
Street price ▪ $100

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

Pint-sized 4-function Powerhouse from Makita

The big news in cordless tools is that they are getting smaller, lighter and more powerful. The days when having plenty of power meant an extension cord are, thankfully, gone. New lithium-ion battery technology has allowed tool makers to pour 18 volts of power in a package that just a couple years ago could deliver only 12.

The engineers at Makita have risen to the challenge with a lightweight comfortable variable-speed drill/driver (with high and low ranges), impact driver and hammer drill all in one tool. Multi-function tools don't always make sense, but this one does.

Like many woodworkers, I don't need a hammer drill or impact driver often enough to justify a separate tool – but when I need one, I need one. Adding these functions to a tool I need to have anyway saves time and money.

With the battery, this driver weighs just 4.14 pounds. It comes with a charger and two 3.0 Ah batteries, and features an LED task light that comes on when the trigger is depressed. The chuck is a sleeve chuck that accepts only hex-shank bits. A three-jaw chuck is available as an accessory.

The forward/reverse/lock switch is located directly behind the trigger, and the function and speed switch is located on top of the drill. With so many functions controlled at this single location, it takes some practice to get the switch locked in the right place. This is particularly true of the speed switch (which serves only the drilling function). In testing, it took a few tries before I was able to get the speed of the tool consistently engaged.

All in all, this is a solid, quality tool, and if you travel to job sites regularly with more than one drill, or if you want a drill for around the house that can do almost anything, it becomes a must-have.

— RL

Makita BTP140 Hybrid

Makita ▪ 800-462-5482 or makitatools.com
Street price ▪ $400

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

New Wooden Plane Maker from England

When it comes to performing a specialized job by hand, nothing beats a wooden-bodied plane. In the heyday of the wooden plane there were thousands of patterns for cutting mouldings and joints.

Now there are but a handful of commercial makers of wooden planes. And as of now, you can add one more maker to that list.

Philip Edwards of Broadstone, England, has begun making several varieties of interesting wooden planes for sale that have a decidedly 18th-century look and feel.

I tried out his miter plane (at the top of the photo) and a second unusual plane design to raise panels for drawer bottoms and small boxes. The miter plane is designed for working end grain (think of it as an early-style block plane). I've written a full review on our web site (popularwoodworking.com/feb08).

The mini panel-raising plane is an absolute blast to use to cut the shoulder and bevel of a panel. The plane's nicker scores the grain at the shoulder of the panel, then the skewed cutter removes the waste. Because the cutter is skewed it pulls the tool's fence against your work. And when the plane stops cutting, the joint is complete. The profile on this particular example is designed to reduce a 1/2"-thick panel to 1/4" at its edges. That makes your panel fit perfectly in a 1/4"-wide groove.

The cutter is simple to sharpen and the plane is easy to set up and use. And the learning curve is short. Chances are your first panel will be perfect.

Edwards also makes workhorse bench planes (such as smoothing, jack and try planes), hollows and rounds and a nice-looking plow plane for cutting grooves for drawer bottoms. You can see his full line at phillyplanes.co.uk.

Despite the current weak dollar, Edwards's planes are still affordable in the United States and are worth a serious look. Though not as over-the-top in detailing as a Clark & Williams plane, they are extremely well made and hard-working tools. **PW**

— Christopher Schwarz

Mini Panel-raising Plane

Philly Planes ▪ phillyplanes.co.uk
Street price ▪ £85
For more information, circle #169 on Free Information Card.

Like an oil change. *Flattening my benchtop is routine maintenance. How do I know when it's time? My handplanes stop giving me predictable and flat results. That usually tells me it's time to true the top.*

Flatten a Workbench's Top

BY CHRISTOPHER SCHWARZ

Is it necessary? And if so, what are the best techniques?

Like any tool or machine, a workbench requires accessories (jigs, fixtures, appliances) and occasional maintenance to actually do anything of great value. A bench without a bench hook is a dining table. A bench with a cupped work surface is an exercise in bewilderment and wasted effort.

There are a variety of ways to go about flattening a workbench top, including some that are patently nuts. But before I march down that list of your options, I ask: Does the top need to be flat?

Whenever I'm in an old barn, workshop or even an antique mall, I can't resist poking around the guts of any old workbenches I find. When my wife and I take the kids on a hayride, I end up in the chicken house checking out the 18th-century wooden screws on a face vise. When we visit living history museums, the kids are chasing the animals, and I'm asking the guy dressed as a cooper if I can poke around the undercarriage of his bench.

I've found little evidence that these benches were flattened regularly. Many of them bear toolmarks that are deep and of varying ages. I've seen benches that are so worn from use that the edges look as round as a pillow. One bench I saw in Columbus, Ohio, was so worn away in one spot that its 3"-thick top was less than an inch thick.

1 ***In the right light.*** *Move your bench so that one end points to a window. This makes it easier to read your winding sticks as you look for gaps underneath them and for alignment across their lengths.*

LEAD PHOTO BY AL PARRISH

2 ***Look for warp.*** *My winding sticks here are 36"-long aluminum angle. Place one winding stick at the far end of your bench and the other one about 24" away. Sight across them both, looking for high and low spots. Move the far winding stick to the other end of the benchtop and repeat.*

3 ***Cup or bow?*** *Now that I know the geography of the top, I'll drag one stick all along the top and watch the gap under the winding stick. This quick check confirms my suspicions about where the high spots are (and they are usually along the long edges of the top).*

And when I check the 19th- and early 20th-century books, there's very little attention given to the workbench top. While there is detailed instruction on sharpening, tool maintenance and the act of building a bench, flattening its top isn't often listed as routine shop maintenance. At most, they'll note that the top should be flat.

There are several explanations for this:

1. Workbench flatness is overrated and a product of our modern obsession with granite surface plates and dial calipers.

2. Early woodworkers would use "planing trays" – a disposable workshop appliance that attached to the bench and allowed woodworkers to plane cabinet-scale parts at a variety of angles.

3. Or a flat workbench was so important to those who handplaned panels and furniture components that its flatness was a given.

I don't have the answer, but I suspect that all three are true to some degree. If you've ever done any handwork on a bench that was cupped, bowed or twisted, then you know that it's not a good way to work. The downward pressure from a handplane (particularly wooden-bodied planes) can bend your work into a low spot in the bench. When using long planes in particular, a low spot will prevent you from ever planing the board flat.

You can use small wooden wedges under your stock to support it and prevent it from bending into a low spot on your bench, but the problem is that you will have difficulty knowing when your board is flat. A workbench top that is fairly flat is also a fair way to gauge of the flatness of other boards.

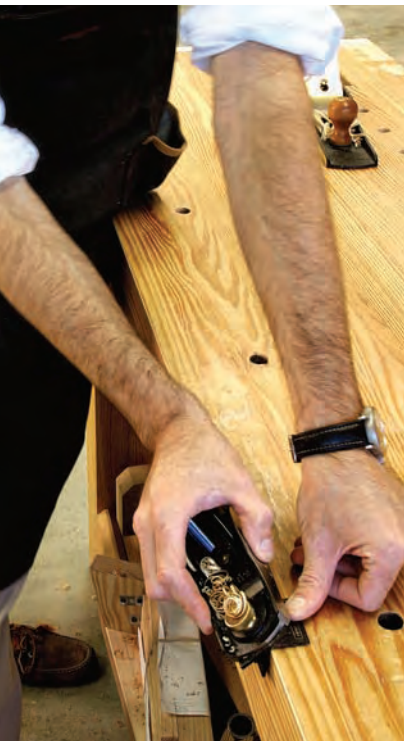
Two Solutions for Tops

So my recommendation is that if you can wield a handplane (even just enough to be trouble), then you should either use a planing tray or strive to keep your top fairly flat. You can overdo this. It's not necessary to flatten the top using methods that involve a machinist's straightedge and feeler gauges. And I would ward you away from methods that use a router that runs on a carriage suspended over your bench. I've watched people do this, and it is a lot of trouble to build these devices.

I think there are two smart paths: Learn to use a jointer plane (flattening a workbench top is the best practice for this) or remove your benchtop and take it to a cabinetshop that has a wide-belt sander.

(Side note: Some workbench designs can be flattened using home woodworking machines. One such design has a benchtop that is made of two thick 10"-wide slabs with a 4"-wide tool tray screwed between them. Simply remove the screws and run each 10"-wide slab through your portable planer. Reassemble! Side, side note: I dislike tool trays, a.k.a. hamster beds.)

I can hear the workbench purists squirming from where I perch. Won't sending a workbench top through a wide-belt sander embed it with grit that will mar the workpieces of future projects? Not in my experience. Once you dust off the top and put a finish on it, such as an oil/varnish blend, the grit becomes part of the finish.



4 ***Stop spelching.*** *Before I get down to business, I'll cut a small chamfer (1/16" to 1/8") on the long edges of the top. This will prevent the grain from blowing out (the British call this spelching) when I plane cross-grain.*

5 ***In my cups.*** *In general, my tops become cupped in use. So I remove the two high hills by working directly across the grain. In this instance the cup is slight, so I started with a jointer plane. If the cup is severe, start with a jack plane so you can take a thicker shaving.*

6 ***Across and down.*** *Every stroke across the top should overlap the stroke before. The shavings will give up easily (though I am told that the iron will dull more quickly). Work from one end of the top to the other. Then back down. Repeat until the plane's cutter can touch the hollow in the middle.*

7 ***Diagonal makes a difference.*** *Work across the top diagonally now, overlapping your strokes as before. Take care at the starting corner and stopping corner – your plane's sole won't have much support. You can proceed with speed during the middle strokes.*

8 ***And the other way.*** *Switch directions and work diagonally the other way across the top. Repeat these two types of passes until you can make shavings at every point in a pass.*

9 ***Finish planing.*** *Now reduce your depth of cut and use your jointer plane along the grain of the top. Overlap your stokes and repeat your passes until you are getting full-length shavings.*

10 ***For the obsessed.*** *You don't have to smooth-plane your benchtop, but it's good practice with a large laminated surface. You can begin smooth-planing with the grain; there is no need for cross-grain or diagonal strokes.*

11 ***Cross-grain shavings.*** *When working across the grain, this is what your shavings should look like. Take the heaviest cut you can manage and keep your handplane under control.*

12 ***Diagonal shavings.*** *Full-length shavings taken at 45° will look like thick ribbon. Shoot for a thickness of .005", or perhaps a bit more.*

13 ***For the obsessed II.*** *If you smooth-plane your benchtop, set your tool to take a shaving that is .002" or less. You can take even more if your top is behaving and it is a mild wood.*

14 ***Wipe on, wipe off.*** *Rag on two coats of an oil/varnish blend. When everything is dry, a coat of wax will help your top resist glue, but it will make it slippery (a bad thing – hand-tool users don't want their stock sliding everywhere).*

Plus, even if there is a little #220-grit in my benchtop, that fine grit is a lot kinder to my workpieces than what else gets embedded in my bench during my normal work: bits of dried glue, dyes, pigments and occasional stray metal filings.

Flatten it With a Handplane

Because I don't have a wide-belt sander, I prefer to use a handplane to do the job. Once you do this a couple times, you'll find that it's a 30-minute job – and a lot less lifting than carting a top across town. The first time I ever tried to flatten a benchtop with a handplane (years ago) I was 100 percent successful, and I just barely knew what I was doing.

Flattening a benchtop is like flattening a board on one face. First you remove the high spots. These high spots could be at the corners or there could be a hump all along the middle (though I have never had one of these in my benchtop). Find the high spots using two winding sticks – parallel lengths of hardwood or aluminum angle that are longer than your bench is wide.

Mark any high spots in chalk or pencil and work them down with a bit of spirited planing using a jack, fore or jointer plane set to take an aggressive cut and equipped with a cambered iron. Get things close. Check your results with your winding sticks.

Fetch your jointer plane and work the entire top using diagonal strokes that overlap. Repeat that process by going diagonally back the other way across the top. After each pass, your shavings will become more and more regular. When your shavings are full length, your top is flat (enough). Now plane the entire top with the grain and use slightly overlapping strokes. It should take two or three passes to produce regular full-length shavings. You are finished. So finish it with some oil/varnish blend and get back to work.

Need details? Visuals? I've prepared a pictorial essay of the process that should help you get started. My digital camera codes each photo with the time it was taken. The first photo was snapped at 10:46 a.m. By 11:44 a.m. I was done. And remember: I'd stopped to take photos about the process, and each photo had to be illuminated with our photographic lights. I think the photography took longer than the actual work. **PW**

Chris is the editor of Popular Woodworking. *This article is adapted from his new book "Workbenches: From Design & Theory to Construction & Use" (Popular Woodworking Books), available from lostartpress.com.*

Power Jointers

by Marc Adams

One of the very first lessons of working wood is how to "S4S" a board – surface it on all four sides. One small caveat to the process is that the board also be flat and true after the process. There are many ways to get from point A to point B in the S4S process, but in today's shop you can bet that one of those ways will include the jointer. Edge-joining is the simplest and most common job performed on a jointer and serves both as a way to straighten edges before ripping and as a great way to remove saw marks after ripping to help create an inconspicuous glue line. But it is also an excellent machine to help flatten the face of boards in the beginning of the milling process. Jointers are terrific for removing twist, bow, cup and crook. They can also be used to cut rabbets, chamfers, tapers, spring joints and even tenons. A jointer is

PHOTOS BY AL PARRISH

Watch your fingers. *The power jointer is one of the most useful woodworking machines – but it also is one of the most dangerous. Proper procedures and guards are important.*

A Better Way to Work • Part 3

WOODWORKING Essentials

nothing more than a stationary version of the handplane, but it will do the job much faster and in most cases more accurately. I can't imagine how much more energy grandpa put into the S4S milling process, but for me today it is much easier thanks to the jointer.

Now that we have established that the jointer is one of the most essential tools in the shop, it is important to understand that it is also one of the most dangerous tools as well. Everyone talks about how dangerous table saws are, but if a true hour-by-hour, usage-to-accident ratio were to exist between the two machines, I bet we would find that more people are injured on jointers per hour of usage than on table saws.

Although the jointer has a guard that is fairly user-friendly, it still affords an opportunity for exposure to the cutterhead. Usually accidents occur because of one of four reasons: 1) Joining wood that is simply too small, too thin or too short for the machine to safely cut. 2) Kickbacks due to improper control or too much cutter exposure. 3) Failure to use push sticks and other appropriate safety devices along with failure to follow the 3" and 12" rule. The jointer does provide good control surfaces (the 90° pocket between the fence and table) and as long as your stock is well supported within this control, with clear and unrestricted access, you will minimize your risks. 4) Failure to understand what can reasonably go wrong and where your hands will end up when it does.

I would also like to go on record as saying I believe that the fence system on jointers shouldn't be able to tilt or angle. Fence systems should be welded to a perfect 90°. Here's my logic: Most all fences can tilt toward the guard, presenting a "trap" point making it harder to handle stock and obscuring your view of what's taking place at the point of contact. Manipulating wood through the machine with an angled fence is difficult, and the degree of accuracy and consistency isn't that great.

One of the best woodworking lessons is learning what machines to choose for each operation. You always want to use the safest machine with the most control. In order to cut angles, bevels and chamfers you can use a jointer, table saw, router table, shaper or handplane.

Today, with all the choices in router bits, it would be much easier and safer to cut chamfers and bevels on the router table at nearly any angle. In the past 15 years at the school with more than 150 of the best woodworking instructors of modern time, we have never had an instructor use or demonstrate cuts on a jointer other than at 90°. My belief is that manufactures should make all fences at 90° and sell a sub-fence that can be attached to the fence that has the tilt feature. For those people who insist on jointing wood at angles, they could buy an aftermarket accessory fence that still allows the jointer fence to tilt.

Using the jointer can be a very safe process when you fully understand the machine, its purpose and the correct technique to safely manipulating a board throughout the cut.

At 90° all the time. *Nearly every jointer cut occurs with the fence at 90° to the bed. So why do we as consumers insist that the fence tilt? If I had my way, I'd weld the fence at 90° and sell a sub-fence that allows angle cuts. I bet that very few people would actually use them.*

The porkchop. *The jointer's guard on North American machines is fairly friendly to the user. It swings out of the way during a cut and keeps the knives exposed to your hands to a minimum. What's important is that you use the guard and push sticks and push blocks. The guard alone is not enough.*

Jointer Limitations

There are several different sizes of jointers, and it never fails that the one you own will be just smaller than the width of the board that you want to joint. The size indicates the length of the knives or the width of stock that can be cut. The 6" and 8" machines are the most common sizes in today's shop. The second capacity factor is the machine's maximum depth of cut. The depth of cut is determined by the height of the infeed table relative to the cutterhead. This can range from 0 to ½" with a typical depth of cut being 1/16" to ⅛". Cuts deeper than ⅛" should be made by making multiple passes over the cutterhead.

Jointers definitely have limitations on what they can safely cut; this is where most woodworkers get into trouble – not understanding those limitations. However, common sense coupled with good intuition should be your guide. If you are at this machine and something tells you that this is probably not safe, or if you have uneasy feeling about the cut to be made, it's the best indicator that you are beyond the limits and it's time to look at another way to perform the cut.

Remember the house rule is the 3" and 12" rule. Your hands have to be 3" from any guards, shields, pulleys or pinch points. And when your board is less than 12" in length you should take a moment of pause and evaluate if that piece of wood is too small or beyond the limits of that machine. These rules work together. If your board is so short that your hands are at risk, then you need to either abandon that machine or use additional safety devices.

The jointer has several concerns that involve small, short or thin wood as well as end-grain cuts and those where you have to watch the grain direction with care. I simply set size rules that have become the law for using my jointer. Remember these sizes are at the limits of the minimum size I like to deal with – all on the small size. Obviously, all size requirements assume that the width of stock being cut is less than the blade length. In other words, if you have a 6" jointer, then your stock must be 6" wide or narrower. We will discuss ways to hold or support these small pieces later.

1. Never face joint pieces less than 5/8" in thickness. If a board is too thin, under 5/8", it can chatter when being cut, it can flex or distort under pressure, and could be more susceptible to kick-back and tip-in. It might be better to consider alterative ways to machine thin stock, such as handplaning, sanding or using a stationary planer.

2. According to the Powermatic and Delta manuals, material that is being face jointed should be no less than 3" wide. In other words, if you are face joining narrow-width boards, under 3" in width, alternatives for cutting should be considered.

3. Never face joint or edge joint short-length boards; my rule on jointers is to avoid jointing boards under 12". However, with good safety devices and proper push sticks, which can put your hands beyond the 3" limit, it would be possible to joint boards slightly less than 12" long. Small pieces have a tendency to "tip" into the cutter, which could cause the wood to kick back and expose the user to the cutterhead. I definitely would not joint boards less than 8" in length under any circumstances. Again, I would look for alternative ways to joint small pieces other than on a jointer.

4. Edge jointing is the most common type of cut made on a jointer and with a properly working guard can present the least amount of blade exposure. Edge jointing requires that the stock be held tight to the fence and down on the table, which will place the stock in a sound control pocket. It's possible to edge joint materials on their edges down to 1/16" in thickness, as long as that thin material is rigid in nature, such as Formica. For thin stock it is important to use some type of additional holding support such as a magnetic featherboard.

5. Edge jointing can be considerably dangerous when the workpiece becomes narrow or thin. For thin and narrow stock, push sticks and hold-downs must be used, but should not be restrictive. There are no written rules about how small stock can go for edge jointing, but if you put all the above rules into effect it would give us a fair idea of what limits we should impose. Stock less than 5/8" in thickness is out. Stock narrower than 3" and shorter than 12" in length will require precaution and the use of additional safety devices.

6. End-grain cuts are dangerous and usually involve short lengths. Never joint the end grain of a narrow piece of lumber – always follow the size limits listed above. When end-grain cuts are necessary on properly sized wood, I recommend that you make a small cut on one end, approximately 1/2" in – avoid tipping into the cutter. Then turn the board around and make a pass in the other direction. This will help prevent tear-out along the edge of the board. In general, however, I try to avoid all end-grain jointing.

7. Try to keep each pass to 1/16" to 1/8" in depth. This creates an issue. In the first article of this series I mentioned "exposure." Exposure has two concerns: First is the amount of blade exposed during the cut, and the second type of exposure relates to the number of unnecessary repetitive passes.

In this case, I believe that it is better to make two passes at 1/16" to remove 1/8" than it is to remove all 1/8" in one pass. This is in contradiction to my original "exposure" rule. However, in jointing wood, additional depth of cut exposes more cutter, which creates more "bite." This bite presents more kicking force. It also potentially creates more tear-out. By making two lighter passes, if the first pass has grain tear-out, it will afford extra material to make a second pass in the correct grain direction. Less cutter means less kicking force and less exposure.

The Working Parts of a Jointer

Jointers, regardless of the make, features and size, all have the same basic components. These components include a heavy metal base, an infeed and outfeed table, fence, guard and cutterhead.

On quality jointers, both the infeed and outfeed tables can be moved up or down by either a lever or hand wheel. A cutterhead typically has three or more knives and rotates at a speed of 3,500 to 4,500 revolutions per minute (rpm). The fence is used to guide the stock through the cut and to provide control at angles from 90° to 45° in both directions. The guard covers the cutterhead except for the portion that is opened during the cut. In order to understand how to correctly and safely use the power jointer, we must first understand the working parts.

Vital equipment to remaining vital. *You should have a variety of push sticks and push pads to accommodate any common-sized workpiece in your shop. The orange plastic push pad shown has been modified – I added adhesive sandpaper to pad.*

Infeed Table

The infeed table is where you place your work to start the cut and is what I call the "push" side of the machine. It is imperative that the infeed table be flat and parallel to the cutterhead, have a positive depth-of-cut adjustment and a locking device that keeps the setting secure. The infeed table also offers the rabbeting ledge. It is the infeed table that sets the depth of cut. Although it is nice to have a long infeed table to help support the stock, there is no real advantage to having a longer infeed table than outfeed table.

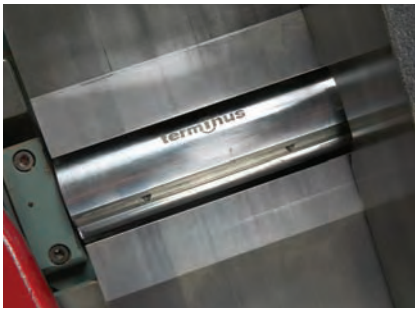
Cutterhead

Cutterheads can have two, three or four straight knives (or dozens of replaceable square-shaped carbide inserts) that should be set perfectly level and at the same protruding height as each other. For the jointer to work properly the cutterhead must be parallel to both the infeed and outfeed tables. Today it is possible to upgrade the standard cutterhead with an aftermarket cutterhead.

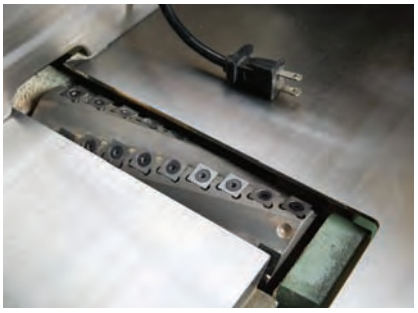
These new heads offer quick-change blades that are absolutely accurate in their height and location relative to each other. Changing blades goes from taking hours to just minutes and does not require any set-up devices. They are affordable and fairly easy to install. Costs on a new cutterhead can run from $300 to more than $1,500, depending on if the head offers straight knives or helical knives. These upgrades are worth every penny.

In order to wear the blades uniformly, I suggest that you move the fence often to allow better wear. As a matter of fact, I recommend that you try to use your blades in three divisions. I always use the first 1" closest to the fence as the sharpest part of the blade and will use this inch only when jointing glue edges. I use the center part of the blades as the general jointing section, and use the very front edge, closest to the guard, as the side of the blades that over which I can run particleboard and plywood.

By breaking my blades into working zones, it allows the blades to wear better and always allow me a sharp side and a general side for varying cuts.



The gold standard. *When I bring a jointer into the shop at the school, the first thing I do is remove the stock cutterhead and add a Terminus cutterhead, which makes changing knives a simple process instead of a chore (visit terminus-stl.com).*



The new standard. *Many new jointers are equipped with sweet carbide-insert knives, as shown here. These last longer than standard steel blades. You get four fresh edges on each insert. For some woodworkers, that can be a lifetime of work.*

It cuts on the pull. *I'm surprised by how many people don't pull their work across the cutterhead from the outfeed table. Keeping the stock under control on the outfeed side of the table is absolutely key to getting straight stock.*

Get to Know Your Outfeed Table

The outfeed table is the most important part of the jointer and is what I call the "pull" side of the machine. If you have ever experienced a snipe or an undesirable taper in the cut, it is more than likely an outfeed table issue.

The outfeed table should be set at exactly the same height as the arc of the knives at their highest point during rotation. If the outfeed table is set too high, you won't be able to feed your stock through. If the outfeed table is set too low, you will get snipe at the end of your board. If the outfeed table is set just a few thousands of an inch higher or lower than the arc of the cutter, it can create either an undesirable taper in the cut or a slight spring in the cut (a spring cut is a situation where more wood is removed in the center of the board than on either end).

The Fence You Won't Adjust Much

Most fence systems are centered at the cutterhead and have two levers that allow the fence to adjust in two directions. One lever allows the fence to adjust in and out across the width of the blades, which determines the amount of knife exposure when cutting. The other lever allows the fence to pivot at an angle in order to cut bevels and chamfers. The fence is usually about three-quarters of the length of the overall size of the infeed and outfeed tables combined. Its placement goes halfway over the outfeed table and halfway over the infeed table. Some fences are designed to be both parallel with the infeed and outfeed tables or set at a skew angle to the blades to create more of a shear action when cutting gnarly woods.

The main purpose of the fence is to help control the stock when being fed through the point of contact, however the fence does serve different purposes when face jointing versus edge jointing stock. When face jointing (making the face of a board flat) the fence provides no bearing to the quality of squareness

of cut and is used for control only – it doesn't matter if the fence is perpendicular to the table. However, when making edge joints the fence provides both control and a way to ensure that the edge is square. The best place to check for square between the fence and the table is just beyond the blades, right at the edge of the outfeed table.

On Guards

American guards are quite different than European guards but both work well and should only be removed when rabbeting, which I don't recommend. (European jointers don't have the rabbeting ledge.) The American style of guard (sometimes called a "pork chop") swings from the outside of the jointer toward the fence and is typically spring loaded.

The European guard is set just above the thickness of the wood and stays over the blades at all times. During the cut you adjust the height of the guard so that the wood will fit under it during machining. Make sure either style of guard is working properly before using your jointer.

Keep your thumbs. *Many woodworkers hook their thumb over the end of the board during face-jointing, even with thin material. And they are putting themselves seriously at risk. Use a push stick, as shown at left, which will stand in for your precious digits.*

The Technique

Because the jointer has two common cutting actions, edge jointing and face jointing, it is important to understand that each action will require a little different handling technique. These techniques can also change according to the length and weight of the material being cut.

One important technique is that you never hook your finger or thumb to the back edge of any board at any time. If the board were to kick back it would break your thumb, and if the board for some reason drops into the cutterhead at the end of the pass, you could get seriously injured. Also, as long as your hands are beyond the 3" rule, I would not recommend push sticks. I know that is not what you are taught, but I firmly believe that you have more control with your hands than you do with push sticks. I would never use my hands to push wood through a jointer when they will be at risk – under the 3" rule. That is when I would definitely use some kind of push stick or safety device.

Rule for face-jointing. *The fence doesn't have to be very accurate for face-jointing. The whole goal is to use the fence as a control pocket and to manipulate the boards safely over the cutterhead.*

Understanding Push and Pull

It is important to define the difference between "push" and "pull" on a jointer. Of course, cuts should always start on the infeed or push side of the jointer.

When your hands are in a position to push wood into the cutterhead they are always at risk. If by accident they were to slip off the board, more than likely they will fall in a forward direction, with force, directly into the cutterhead and result in a serious injury. This is the dangerous side of the cut; it also happens to be the kickback side of the machine.

Because the board on the infeed or push side has yet to reach the point of contact, it is more than likely not square and could even still be rough, bowed, warped or cupped. Because these conditions more than likely will exist on the board on the push side (at the beginning of a cut) it really doesn't make any difference how square the fence is on this side (jointer fences are typically warped and not square along

their entire lengths). On the infeed side of the cut the fence is almost always used more as a control surface than a squaring surface. This is why it is not necessary to check that the fence is perfectly square at the very front when edge jointing. The best place to check that your fence is square to the table is closer to the point of contact or just after the point of contact.

The outfeed, or pull, side of a jointer is by far the most important and critical to the accuracy of the cut and is the safer side of the machine. When your hands are in a position to pull wood on the other side of the cutterhead they will always be at less risk. If by accident they were to slip off the board, because they are beyond the blade, they will fall forward – away from the blades resulting in no injury. I teach students to get their hands to the outfeed side of the machine as soon as possible and learn how to "pull" your board through the process.

Once a board reaches the point of contact and the cut has occurred, from that point on as long as the board is maintained in a controlled position it will stay flat and tight to all control surfaces (both the table and fence). In other words, focus on technique and hand placement are most important once the cut takes place and then after. This is why the focus on pull is more important; it helps you to maintain the stock tight in the control pocket after the board has been machined. If you push a board concentrating on hand placement at the infeed side, your cuts will never be as accurate because the board itself is not accurate at this point.

Better Edge Jointing

Always stand to the left of the machine on the infeed side. Your feet should be parallel with the machine in order to allow you to take a step or two forward if necessary. Never stand flat-footed facing the machine. Always put the flat face of the stock against the fence when jointing.

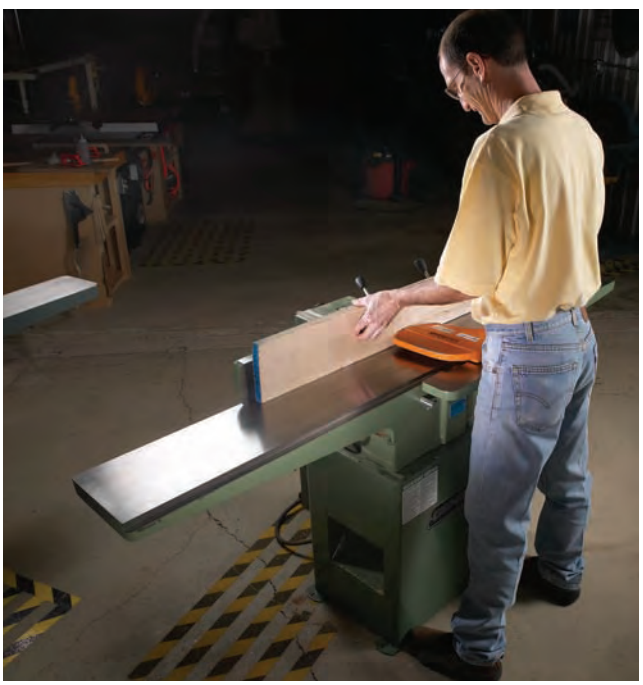
It is important to understand that using a jointer accurately and safely is all about good technique. Good jointer skill begins by understanding the three actions/motions that have to take place to edge joint a board. First the board has to be held down to the table. Second it has to be held tight against the fence. And third it has to be pushed and pulled forward. This is where 95 percent of all bad technique occurs. Three actions – two hands, the math just isn't quite right. The best way to solve that problem is to dedicate hands. Have one hand be the "hold-in hand" against the fence. Designate the other hand as the pushing/pulling and hold-down hand. I use my right hand as the push/pull and hold-down hand, and my left hand as the hold-in-to-the-fence hand.

I grip the board with my right hand (as long as it is within safe size limits) at the halfway point – never at the end. Remember, do not hook your finger or thumb over the edge at the back of the board. This becomes the push/pull hand and keeps the board down against the table. This hand will be responsible for as much of the forward motion as possible. It is perfectly fine that this hand stay on the board throughout the entire cut as long as it maintains the 3" rule.

I try to position this hand and my body to make one motion from start to finish without having to re-grab or reposition. If the board is long enough that you have to re-grab or reposition, I always make sure that the repositioning happens on the pull or outfeed side of the jointer.

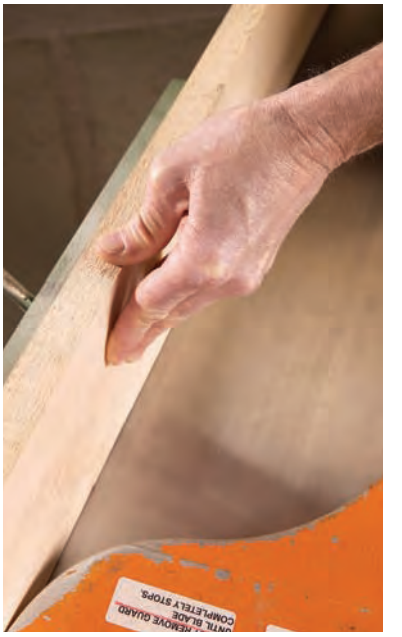
Remember: The best-jointed edge happens when the motion is continuous. If you must re-grab to complete

In good standing. *Note how my feet are positioned so I can step forward in an easy and natural manner with my work if necessary.*

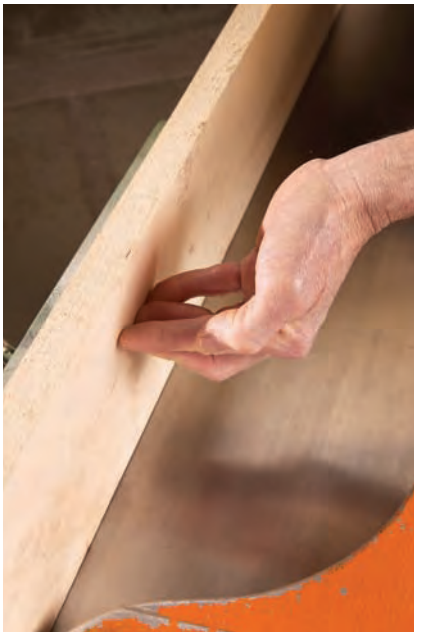


Bad stance. *This is the wrong way to stand at the jointer. My mobility is greatly limited and I can trip myself.*

It's in your hands. *Each hand has a job. My left hand's job is to push the work against the fence. My right hand's job is to move the work forward and down.*



Bad finger. *If you hold your left hand like this and you slip, there's a chance your hand will drop into the cutterhead. Don't do it.*



Better fingers. *With your fingers positioned like this, the force is directed at the fence and your hand is much less likely to slip downward toward its doom.*

the cut, try to do it as smoothly as possible – it will be necessary in this case to have the left hand continue to pull the wood until you can get your right hand back into position – both hands should be on the pull side of the jointer at this time. This is also the reason that your feet should be facing parallel to the machine so that you can step forward with the board throughout the motion.

The left hand or the hold-in hand is what keeps the stock supported against the fence and can provide a little push/pull and hold-down when necessary. There is definitely a correct way to position this hand and it must go to the outfeed table as soon as possible in the process. Most people place their left hand with the fingers facing down. This is absolutely wrong and dangerous. In this case your fingers are facing down toward the table and if you slip off they will more than likely fall into the cutterhead.

Instead, I place my fingers facing the fence with my thumb completely off the work. Because my main vector of force is not toward the table with my fingers, they can't slip down. If there is a need for downward force, I'll just move my thumb to the top edge of the board. This puts my hand in a position that is less likely to slip off the stock.

The function the left hand serves is very important to the quality of the cut and should stay close to the point of contact, but not violate the 3" rule. I start with this hand on the infeed side to help get the stock into the control pocket. Once the stock is just beyond the cutterhead, I move this hand just beyond the guard and place it on the outfeed table and position it just like a featherboard.

The human featherboard. *When your left hand moves to the outfeed table, position it to press the work against the fence as if your hand were a featherboard.*

This hand now focuses on keeping the board tight to the fence and the hold-down force now becomes the total responsibility of the right hand.

Edge Jointing Small Stock

When jointing stock that is still within the size limitation of the machine, but small in size, it will be vital that safety devices be used. I prefer to use magnetic featherboards and push sticks that hook over the back but still allow me to position my hand at the center of the stock. I prefer not to use traditional push sticks (which look like a snake with an open mouth) because they create a vector of push at the back of the stock. If the stock is long enough (but too thin or narrow) I set the push stick on the back side of the fence so it is ready to pick up once my hands have pushed the board to the point where the 3" rule will be violated. I pick up

Wrong. *Gripping your paddles like this traps your hand and it can get pulled into the cutterhead.*

Right. *This modified grip gives you both control as well as safety.*

the push stick then to finish out the cut. I do not start with the push stick already against these longer boards, because I lose control.

Face Jointing

Face jointing is where the entire face of the board makes contact with the blades. This contact can remove cup, warp and twist from one face of the board. The fence in this case is used only for control and does not need to be perfectly square to the table. Remember wood under 5/8" thick is too thin to face joint. Hand position for this cut is different than edge cutting. Both the right and left hand perform the same task. They are both used to hold the wood down to the table and push/pull the wood forward and through the cutterhead. Consistent speed and uniform pressure make face joining a little safer than edge joining. Remember: As the board passes beyond the cutterhead there will be a great deal of blade exposure before the guard can spring back closed. It is fine to pass your hands over the cutterhead as long as you are using safety devices.

I never place my hands directly on the wood – regardless of the thickness. I always use a paddle grip in my front hand, which will be my left hand. The back hand, which will be my right hand, uses a push block that grips the back of the wood, but allows my hand to be over the wood.

As far as the paddle grip goes, I always replace the foam on the machine's push pads with sticky sandpaper to give it better grip. I never hook my hands into the handle grip. If the stock were to kick back and pull the push pad, my hand would be trapped. I always place my hand on top of the handle, but not in the handle.

I do not use a standard push stick when jointing if I can avoid it. With conventional push sticks that hook at the back of the stock, the vector of push is only at the back portion of the board which provides little control or inaccurate control.

Important Safety Steps – The Rules

If you follow the rules and make them a part of the jointing process, then the "skill" of using a jointer will always be accurate and be safer for the user. **PW**

Marc Adams is the founder of the Marc Adams School of Woodworking in Franklin, Ind., one of the largest woodworking schools in the world. For details, visit marcadams.com or call 317-535-4013.

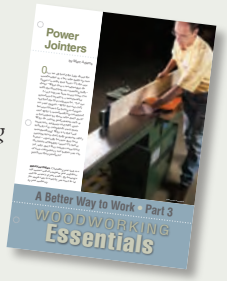
Online EXTRAS

For those readers who want to read more on jointer safety, including rules for using the machine, visit the magazine's web site at:

popularwoodworking.com/feb08

Work with More Accuracy (and Safety) in your Woodshop

The best way to use your machines is rarely explained in the manual. Find out how to operate machines to get accurate results without sacrificing safety.



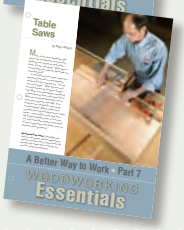
- **Part 3**
  Power Jointers
  Most people use their jointers wrong, resulting in warped stock and unsafe operations.

IN FUTURE ISSUES

- **Part 4**
  Miter Saw
  Stock miter saws are neither accurate or safe. Here's how to fix both problems.

- **Part 5**
  Band Saws
  Band saws are safe if used correctly; however it's easy to step over the line and get bit.

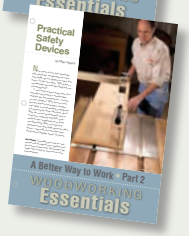
- **Part 6**
  Planers
  Powered planers seem like a safe machine until you start testing their limits.



- **Part 7**
  Table Saws
  The fundamental skills to get good (and safe) results with one of the most important woodworking machines.

IN PAST ISSUES

- **Part 1**
  Learn the Skills to be Safe
  The groundwork for a lifetime of accurate woodworking is to understand your tools.



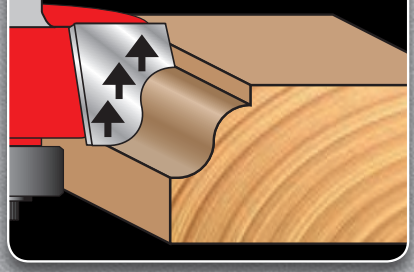
- **Part 2**
  Practical Safety Devices
  Choose the right guards, push sticks and hold-downs to work safely.

What's The Secret To Flawless Edge Profiles With NO REWORK?

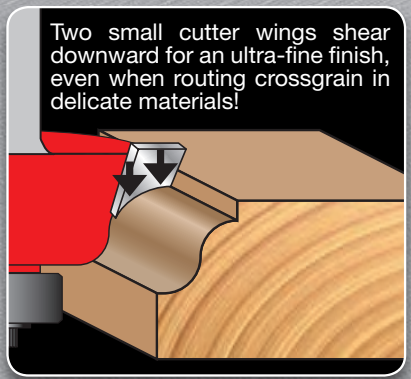
Freud's New Quadra-Cut™ 4 Cutter Design

How It Works!

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



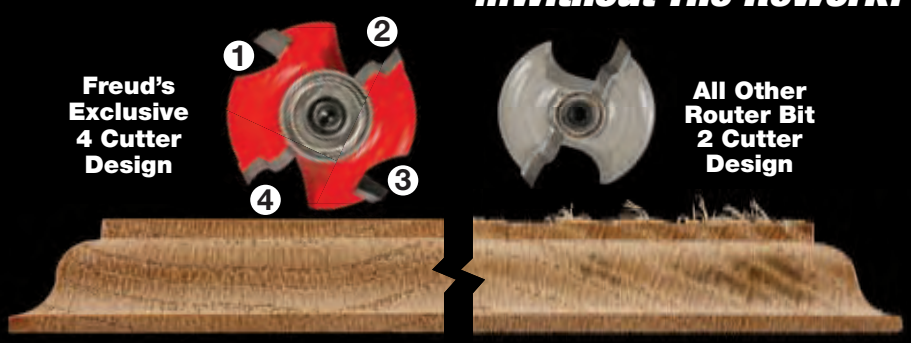
Two small cutter wings shear downward for an ultra-fine finish, even when routing crossgrain in delicate materials!



U.S. Patent No. 8,899,252

CIRCLE #118 ON FREE INFORMATION CARD.

For A Smooth Sanded Finish... ...Without The Rework!



"Mirror-smooth finish with sharp, clean details!"

– Chris Marshall, Woodworker's Journal

"Super-smooth cuts!"

– Glen Huey, Popular Woodworking

Look For These Popular Profiles in 1/2" Shank Quadra-Cut™ Design:

- Classical Cove & Round Bit
- Rounding Over Bit, 3/8" Radius
- Rounding Over Bit, 1/2" Radius
- Rounding Over Bit, 1" Radius
- Beading Bit, 5/16" Radius
- Beading Bit, 1-1/8" Radius
- Table Top Classical Bold Bit
- Table Edge Bit
- Rounding Over Bit, 5/8" Radius
- Rounding Over Bit, 1-1/2" Radius
- Raised Panel Bits

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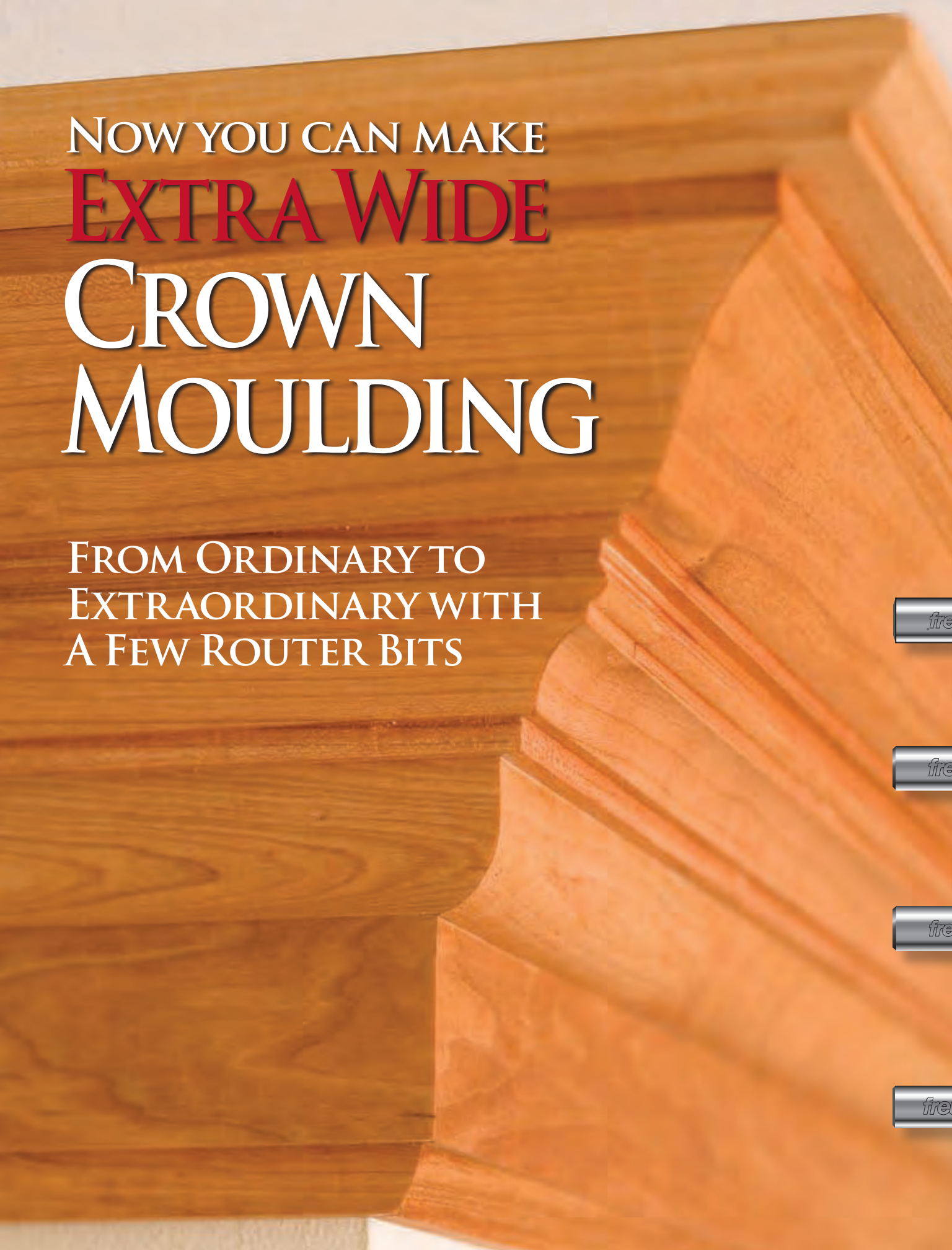
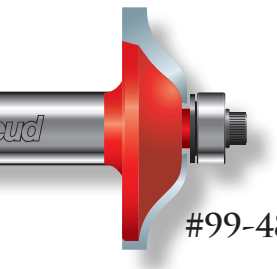

Now you can make
Extra Wide
Crown
Moulding
From Ordinary to
Extraordinary with
A Few Router Bits

A friend of mine moved into a condominium a few years ago. He thought the balance of space and lack of yardwork were a wonderful blend. Unfortunately, he had certain expectations about the quality of the interior that the original builders hadn't shared. Architectural woodwork was at a minimum, and where it did appear, a basic, white door trim was used for everything.

As an accomplished woodworker, my friend decided to replace the trim with something more fitting, so he went shopping for some cherry moulding. If it could be found, it was expensive and not very attractive. So he decided to make his own.

My friend's story is one repeated every day. We have the skills to make our own mouldings, and now Freud has added a complete range of router bits to make the process easy and exactly what we want.



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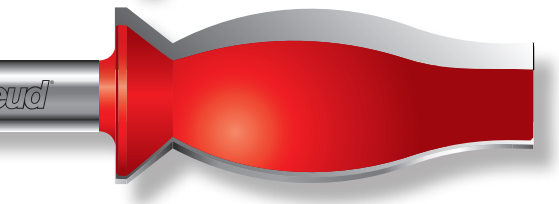

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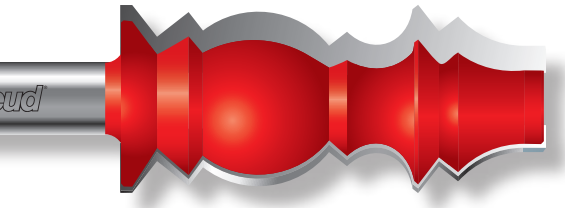

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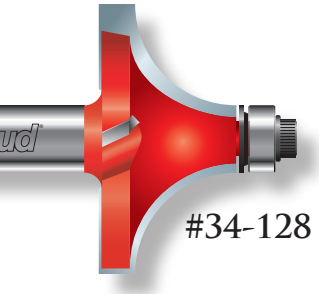


#34-128

A Step Above

While there are many crown moulding cutters for large shapers, these aren't machines that most woodworkers have in their shop. There are router bits for many architectural profiles, but when you start contemplating larger crown moulding, the choices are rather slim.

Freud has now made things easier by breaking a large crown into several pieces and offers mix-and-match router bits to make a variety of profiles possible.

The range includes a lineup of bits that match the most popular mouldings on the market, yet you can select any wood you want making it truly custom and cost effective.

These vertical cutters allow you to use a larger router (minimum $2^1/_4$ hp) that's mounted in a standard router table, to make your own custom crown in any premium wood species with very little fuss.

Trim the Whole Room

Freud also has a full range of architectural millwork bits for making chair railing, wainscoting, baseboard, casing, beadboard, and interior and exterior doors. With these new bits from Freud, you can match your trim to your favorite wood species, including this crown moulding.

Helpful Hints

The step-by-step instructions on the inside of this poster will walk you through the details to create a simple wide crown installation (using just one board) and also provide installation instructions for adding a few other simple mouldings to that board to create an even more impressive crown moulding.

There are a couple things to remember when running this type of large moulding. Using a router of adequate horsepower is critical. These are larger router bits and require a minimum of a $2^1/_4$hp to achieve a clean profile.

The proper speed for the bit and the type of material you are using will also be critical. While a slower speed is usually recommended, running a couple test pieces at slightly different speeds will let you get a feel for the best operating speed.

Because of the width and length of the pieces used in moulding, you will need to use infeed and outfeed supports to hold the mouldings. Any deviation in the height of the moulding as it moves past the router bit can ruin that length of moulding. Also, use featherboards to hold the wood both down against the router-table surface, and back against the router-table fence. Pressure should be maintained against the fence both before and after the router bit.

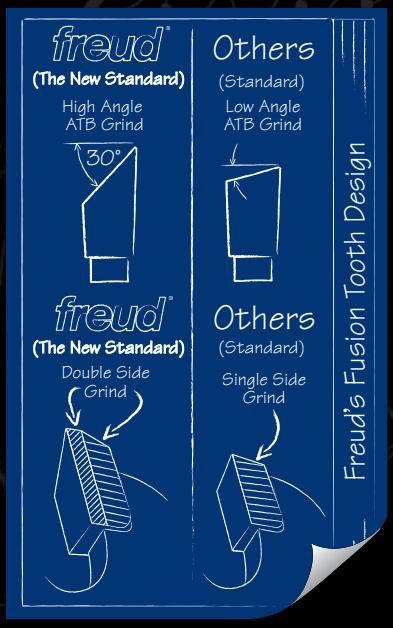
Last, with each species of wood, determine how deep a cut you can efficiently take in a single pass. Wood species with highly figured grain may require lighter passes.

For Furniture, Too!

Not planning on adding crown moulding to your home? How about using these versatile bits for other woodworking tasks? The Freud Wide Crown bit sets can also be used to produce a variety of attractive crown, waist or base mouldings for your own custom furniture projects. You can also create custom fireplace mantles and decorative wood shelving to match the decor and wood species that best meets your needs.

Premier – FUSION

The New Standard In General Purpose Saw Blades



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Unique anti-vibration design with special polymer filler dampens vibration for smoother cuts

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Freud is proud to offer the discriminating woodworker the Premier Fusion Saw Blade - The New Standard in General Purpose Saw Blades. The patent-pending Premier Fusion blade is the most technologically advanced blade on the market with a radical new "Fusion" tooth design that combines a double side grind with a 30 degree Hi-ATB to produce a glass-smooth, chip-free top and bottom surface while ripping and crosscutting. The unique Fusion tooth design, combined with Freud-made TiCo™ Hi-Density General Purpose Blend of Carbide, superior anti-vibration design and patented Perma-SHIELD® non-stick coating make for the ultimate general purpose saw blade.

Choose from four blades in the Premier Fusion series – 8", 10", 12" and 14". Use a Premier Fusion blade once and you'll be convinced that it is the best general purpose saw blade that you have ever used – guaranteed.

Perfect for:

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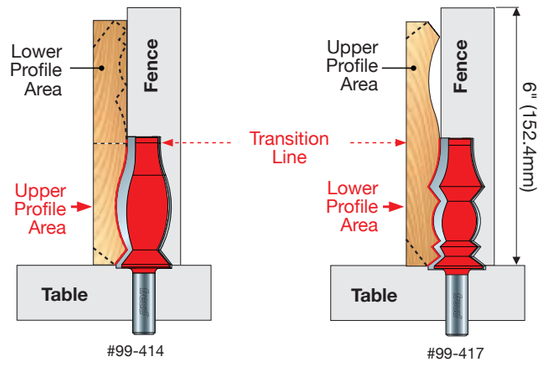
To sign up for Freud's e-mail newsletter or to find a dealer near you visit: **www.freudtools.com**. Red sawblades are a registered trademark of Freud America, Inc.

CIRCLE #170 ON FREE INFORMATION CARD.

The Perfect Setup

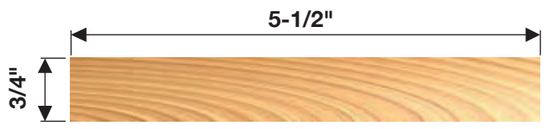
1 Preparing the Tools

To get the best performance from the wide crown bits, you should use a variable-speed router with at least 2 1/4-hp motor. While router-table fences are adequate for most tasks, when running tall, wide crown a 6"-tall auxiliary fence is necessary. Roller stands to support long material on the infeed and outfeed also make things easier. And remember: Don't try to run short stock (less than 24" long), even for test pieces.



2 Preparing the Materials

When choosing your lumber, remember that straight grain stock that is free of knots is best. Quartersawn, or riftsawn lumber will provide the best milling experience. Mill all the material to 3/4" thick, keeping the boards as flat as possible as you go. Then rip the stock to 5 1/2" in width, leaving two square edges to work with.

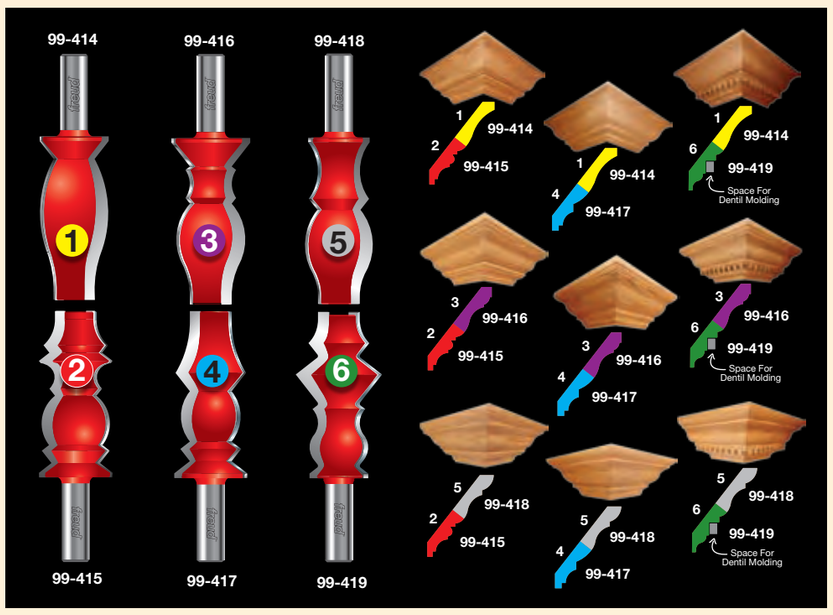


3 Setting the Lower Profile

To set up the cut on the lower half of the board, install the router with the wide crown moulding router bit for the lower profile in place in the router table. Adjust the height so the bottom bevel on the cutter is aligned with the top surface of the router table as shown in the photo. The top of the cutting edges will be 2 7/8" above the router table, so keep your hands clear of the bit at all times, making adjustments only while the router is unplugged.

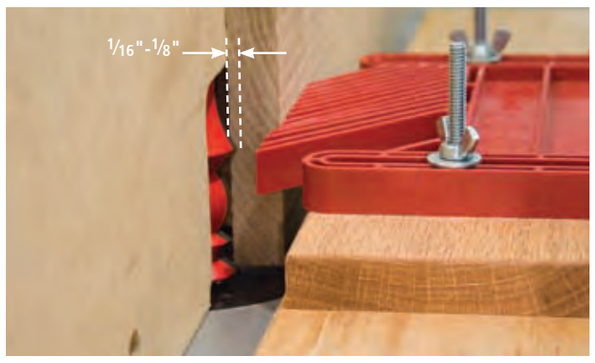
Nine Possible Profiles!

By interchanging the multiple wide crown bit sets from Freud, you can achieve up to nine different crown profiles to best match your application. And the indvidual bits can also be used to create other smaller crown mouldings or other profiles that can be used in other woodworking applications.



4 Setting the Fence and Featherboards

Set the router fence for a 1/16" to 1/8" depth of cut, positioning the featherboards to hold the material snug against the fence. Position the infeed featherboard 3/4" above the router-table surface. Position the outfeed featherboard 1 1/2" above the table. With the router unplugged, turn the bit by hand to make sure it clears the table, fence and featherboards.

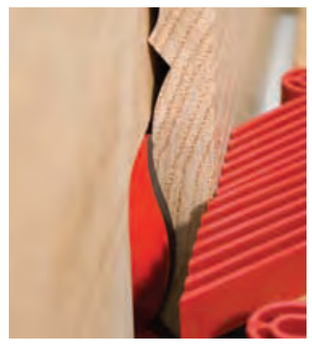


5 Cutting the Lower Profile

Always test your cut on a scrap board of the same thickness, width and species. Use at least three passes of increasing depth to rout the profile to avoid tear-out and chipping. For the final pass, align the top of the carbide with the face of the router-table fence (left photo), taking a light (1/16") cut. After making the final pass, mark the position of the fence on the tabletop to help you align the fence for the final pass on the upper-profile cut.

6 Cutting the Upper Profile

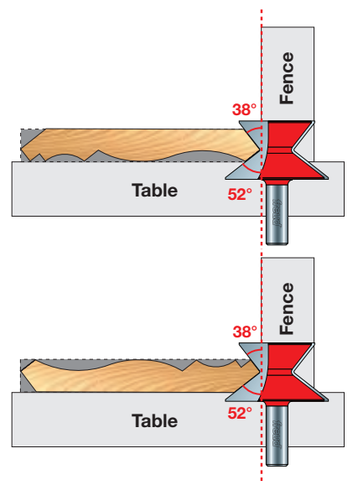
With the router unplugged, remove the featherboards and replace the lower cutter with the upper-profile cutter. Adjust the bit height so the bottom bevel on the cutter is aligned with the top surface of the router table. The top of the cutting edge should be 2 7/8" above the tabletop. Set the fence to a 1/16"- to 1/8"-depth cut and reposition the featherboards as you did in step #4. Make passes of increasing depth until you are ready to make the final 1/16"-deep pass. Set the fence to the mark made at the end of step #5. This should align the top of the bit with the upper curve of the lower-cutter profile. Rout your test piece first to check the alignment between the two profiles. Adjust as necessary and make your final pass.



7 Finish Cuts

For the final cuts on the top and bottom of the moulding, replace the standard router-table fence, unplug the router, and install the 99-421 Bevel Cutter bit. Again, check to make sure the bit spins freely. Align the face of the fence with the inside of the "V" groove of the router bit. Attach a featherboard to the fence to hold the moulding against the table surface. To bevel the top edge of the crown, feed the stock face down across the upper portion (38° bevel) of the cutter. Set the height of the bevel cutter bit to align the 52° bevel with the existing chamfer on the face of the crown moulding. Make a test cut to check the alignment, then make your cut.

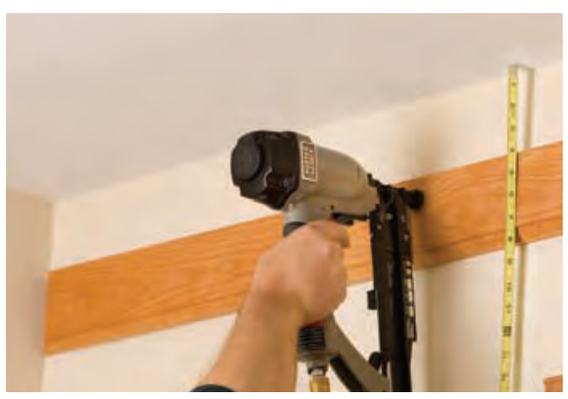
To bevel the bottom edge of the crown, feed the stock face-up across the lower portion (52° bevel) of the bevel cutter. After unplugging the router, set the height of the bit to align with the 38° bevel on the existing chamfer on the face of the crown moulding. After testing the alignment, make your cut.



Installing Beautiful, Custom Crown

1 Setting the Base

Because this crown is adequately supported by the wall and ceiling, the backing boards shown in the illustration next to 'Bits and Pieces' below aren't necessary. Start attaching the crown in a corner of the room. Locate the wall studs and hold the baseboard at the appropriate distance from the ceiling. In this case that distance is 4" down (or 8" down to the edge of the profile). Nail the baseboard in place, with the 45° bevel on the end tucked tightly into the corner. If your room is longer than your board, make a joining scarf cut on the opposite end of the board to continue the moulding run.

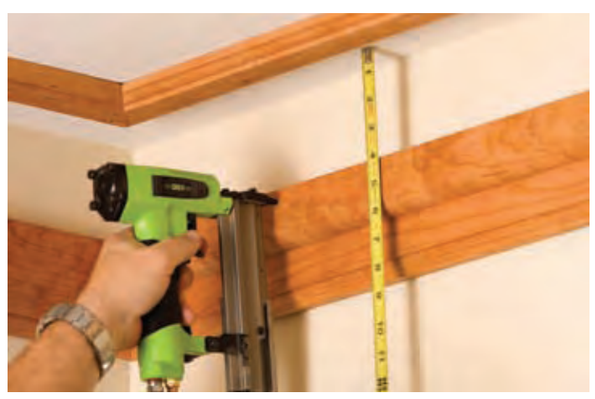


2 Adding the Cap

After adding the mating baseboard on the adjacent wall, the next step is to cut a 45° miter on one of the cap pieces. Next measure out from both walls the appropriate amount to allow the crown to extend out from the walls. In our case that distance is again 4" to the point of the miter. (or 6" to the edge of the profile). Test the crown to confirm the location. After locating the joists in the ceiling, nail the cap piece in place. If you're unable to attach to ceiling joists in all locations, place two nails angled toward each other in the cap piece (this is called toenailing) for extra support.

3 The Buildup

After adding the mating cap piece along the adjacent wall, we added an extra piece with a simple roundover profile to add dimension and appearance to the built-up crown. This piece is nailed in place over the baseboards and is held 4" down from the ceiling (or 6" to the edge of the profile). This location is also flush with the top of the baseboard, making things even easier to align. Nail the mating roundover profile along the adjacent wall. I used a 23-gauge micro-pinner to hold these pieces in place, which left only a small nail hole.



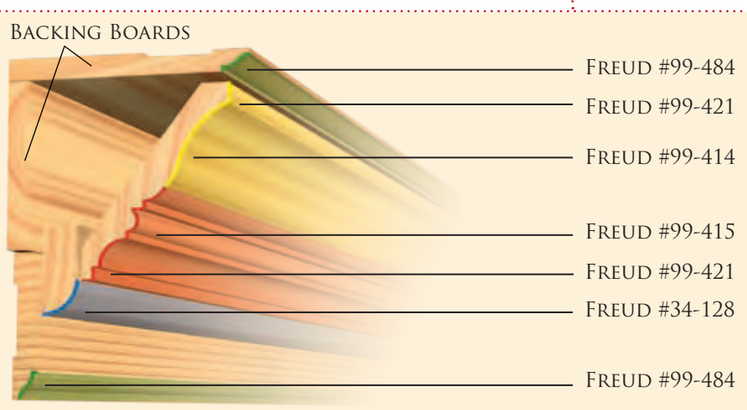
4 Adding the Crown

It's now a simple matter to add the wide crown piece to the built-up mouldings already in place. Cutting the corner miter at the proper angle may be the hardest part. It's a good idea to check the corner miter on the two mating crown pieces to ensure a good joint before nailing the crown in place. Make any adjustments to the angle as necessary to improve the joint. Then pin the crown in place both to the upper cap and to the roundover buildup.

Whether an inside or outside corner, a majestic wide crown can add a finish to a room like no other detail.

Bits & Pieces

Some houses require larger crown mouldings in premium wood species (such as cherry) than are usually commercially available. The Freud Wide Crown router bits combined with other Freud router bits allow you to build up your crown moulding to make 8", 9", even 12"-tall crown. The diagram at right gives you a sample of one such majestic crown option, and the bits required to create it. This crown uses backing boards to offer a completed corner. The steps above give you installation directions to make this impressive architectural addition simple, and save a little lumber.



Basic Inlay Techniques

Simple techniques and small details can add visual interest to your projects.

BY ROB MILLARD

PHOTOS BY THE AUTHOR

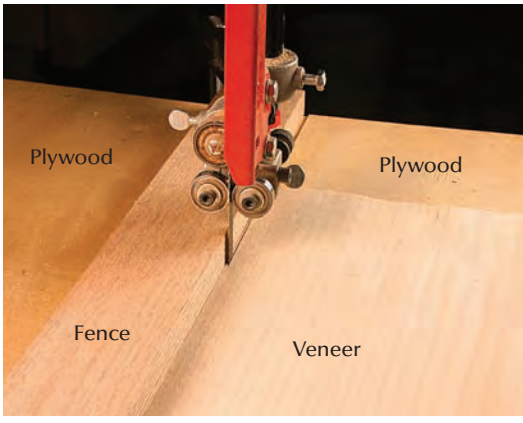
Inlays, even simple ones, can add a great deal of visual interest to a woodworking project. Unfortunately, too many woodworkers have never tried inlay due to its perceived difficulty; in truth it can be a very simple procedure. It does require working to tight tolerances, and it can complicate finishing, but the process is straightforward and easily mastered. What follows is the technique for embellishing a piece with a simple line inlay (called stringing) and a sand-shaded fan.

Edge cleaning. *Shoot a straight edge onto the store-bought veneer before ripping the string.*

An efficient way to cut. *With a simple jig and a marking gauge you can cut or rip string inlay easily.*

Get the point. *The pointed cutter ends of the shop-made scratch stock define and cut the edges of the recess.*

Accurate depth. *To get the depth just right, measure the groove as the cutter progresses. Depth at the edge of the groove is most important.*



Power ripping. *Cut veneer stringing at the band saw using a zero-clearance insert (a piece of thin plywood). A very thin blade minimizes waste.*

Stringing

While strips of veneer are commercially available, I prefer to make my own, either from solid wood or, as here, with 1/16" veneer. This gives you far more options and is easier to work with. Commercial stringing is sliced from veneer, so the pieces are very thin, making your groove depths critical. Commercial stringing also has tendency to curl from the moisture in glue, complicating installation. Shop-made stringing suffers from none of these issues.

To slice off the individual pieces of stringing, I use a cutting gauge and fixture. This fixture is nothing more than a 36" straight board with a piece of wood glued to the edge to form a lip on both sides. One lip is used to index the veneer against, so the cutting gauge can slice off an accurate strip. The other lip rests against the edge of the workbench.

Select veneer with straight grain, because even with the fixture, the cutting gauge will have a tendency to follow the grain. Plane the edge of the veneer straight, and place this edge against the lip and with the first pass, lightly score it with the cutting gauge. Make as many passes as necessary to free the piece of stringing. With the veneer used here, it's best to cut from both sides for a cleaner strip. I cut my pieces of stringing so they are about 1/16" x 3/64".

An alternate way to cut the stringing is to use the band saw to slice it off. This is how I make most of my stringing. It results in more waste, but it's faster. I fit the saw with an auxiliary table made from 1/4" plywood with a saw kerf in it to keep splintering to a minimum. I also use a very thin (.014" x 3/8") blade to keep waste to a minimum. Even with the plywood table there will be some loose fibers on the sawn pieces of stringing; these are easily removed with fine sandpaper.

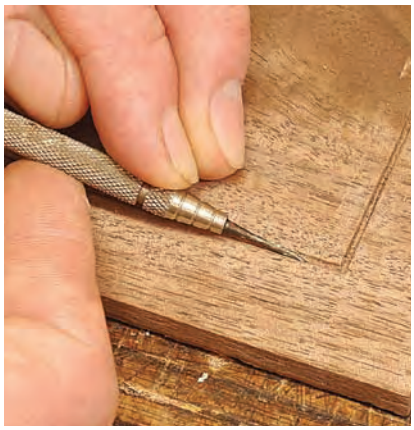
With the stringing made, it's time to make the groove in the wood to receive it. Like the stringing itself, this can be done with hand or power tools.

For small jobs, I like to use a scratch stock to form the groove. I make the cutter from a broken piece of band saw blade.

Start by filing a V-notch with a three-corner file. Then file the sides of the cutter leaving a "tooth" equal to the width of the stringing and with the V-notch centered in the tooth as closely as possible. This is where precision is important; use a dial caliper to get the cutter to exactly match the width of the stringing. After filing, hone the faces to remove any burrs.

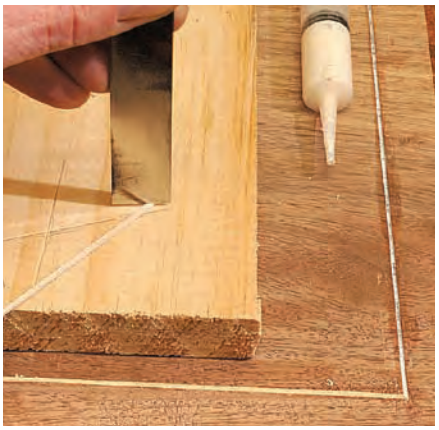
To form the groove, just lean the scratch stock slightly in the direction of the cut and, using light downward pressure, push it forward. Most of the pressure should be focused on keeping the fence of the scratch stock in contact with the edge. The farther from the edge the inlay is located, the more care must be taken to ensure that the scratch stock is held at right angles to the edge. Failure to do this will result in a line of stringing that wanders.

Cuts going with the grain will cut cleanly with a minimum of effort, but some care is required to have the grooves made across the grain to come out splinter-free; to accomplish this, start with very light downward pressure and hold the scratch stock as vertical as



Flat bottoms. *Remove the V-shaped bottom of the inlay area. A sharpened eyeglass screwdriver makes a great tiny chisel.*

More power. *You may want to speed the job along with a router or Dremel tool outfitted with a 1/16" end mill.*



Mini-miters. *Mitering each corner of the stringing is best accomplished using a sharp chisel and a clear reflection.*

Inlay installation*. Add hot hide glue to the stringing then fit the inlay into the recess. Use a veneer hammer if you need to persuade the stringing.*

Ironing down the string. *The glue may set before the inlay is in position. Heating the area with a household iron reactivates the glue for another try.*

possible. The scratch stock is difficult to start and stop, so this will leave some handwork at the intersections to finish off with a knife and a small chisel – jeweler or eyeglass screwdrivers make an excellent (if crude) chisel for this task.

Obviously, the V-shaped cutter will leave a corresponding-shaped bottom, which is not the best glue surface, but it's actually the sides of the groove that provide the necessary bond. It is critical that the depth be accurately cut. If too deep, there will be an excess of glue under the stringing that will draw it down as it dries, leaving a depression when fully dry. A groove too shallow only increases the risk the stringing will be scraped or sanded through – and that's a disaster.

For larger projects, the scratch stock is rather slow, so I frequently use carbide end mills (a machinist's tool) to form the grooves for the stringing. These are available in a great variety of diameters. I keep 1/32" - 1/8" on hand, increasing by 1/64". These come with 1/8" shanks, which work well in a Dremel tool fitted with a router base, or with an adapter in any standard router.

The end mills cut clean, accurate grooves, regardless of the grain direction. I've never had one break in use, despite carbide's brittle nature, but I take care not to force the cutters.

The only problem with using the end mills is that the 1/16" veneer isn't always exactly 1/16" thick. This is not an issue when I make my own stringing from solid wood, but I've found factory veneer is often slightly undersized. I've had excellent results making two passes with a 7/64" end mill mounted in the Dremel tool. The small amount of run-out that results from making two passes cuts a groove that is very slightly wider than the cutter.

Conversely, you want to avoid having to make two passes when routing for accurately sized stringing, because this too will widen the groove – only not in a beneficial way.

As with the scratch stock there will be some handwork at the intersections. Sometimes the end mill will leave a small amount of fuzz at sides of the groove, which I remove with quick pass of a folded piece of fine sandpaper.

Install the Stringing

Where the lines of stringing intersect, they must be mitered. The fastest way that I've found to do this is to use a sharp chisel. By using the reflection on the back side of the polished chisel, you can quickly and accurately judge the proper angle. A chisel works well with any species of stringing I've used, except for true ebony, which, due to its hardness, must be sawn.

I typically use hot hide glue to adhere the stringing. I brush the glue on the stringing, push it in place with a veneer hammer, then heat it with an iron to reactivate the glue.

A more common and perfectly acceptable method is to use white glue in a syringe: Lay a bead in the groove and then push the stringing in with a veneer hammer. After allowing the glue to cure for at least 12 hours, you can scrape and sand the stringing flush.

Sand-shaded Fan

The addition of a sand-shaded fan is an excellent way to enhance a piece of furniture. I've made a great many of these, but I'm still amazed at how such an easy-to-accomplish inlay enhances a project. The fan has the look of something made by a true craftsman, and under a coat of finish it has an incredible three-dimensional look.

The fan begins as a full-size drawing on a piece of scrap wood. From the drawing, determine what size pieces of veneer are required to make the individual segments. I cut the pieces of veneer large enough so I can sand shade both edges, getting two segments from each piece of veneer.

It is important that the shading be uniform from segment to segment for the proper look. To take some of the pressure off the shading process, I plane the edges of the veneer after shading to achieve uniformity.

The quality of the sand is an integral part of the success of the shading; sand that is too coarse or not uniform in grain size will make it difficult to achieve a nice, even shading. I've gotten good results from sand sold as a paint additive, and that sold in craft supply stores. The only other items required are a hot plate and a small iron skillet.

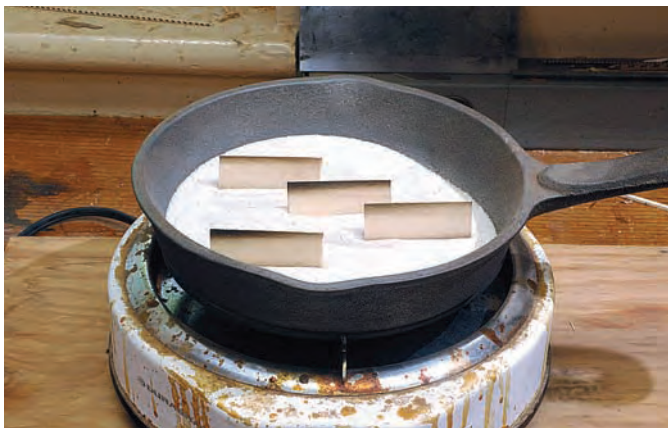
Pour about a 1/4" of sand in the skillet. When I first made these, I was concerned about the temperature setting, but I found that within reason, it is not possible to have the sand too hot.

With the sand up to temperature, stand a segment on its edge in the sand and check it frequently. You're looking for graduated shading, with no hint of charring at the edge (but because they will be planed, some charring won't hurt). After a few pieces, you'll get a feeling for how long to let them "cook," and you can have several pieces in the sand at the same time.

Take the shaded pieces and give them a thorough wiping down to remove any grit (grit would dull the plane as you refine the shading). Place a segment on the template, and using a wide chisel or plane iron, cut it to size. Put the next segment's shaded edge against the non-shaded edge of the first segment, and cut it to size on the template.

As you build the fan, hold the pieces together with veneer tape. Draw the arc on the taped-together fan, and using an appropriately sized gouge, cut the scallops at the end of each segment.

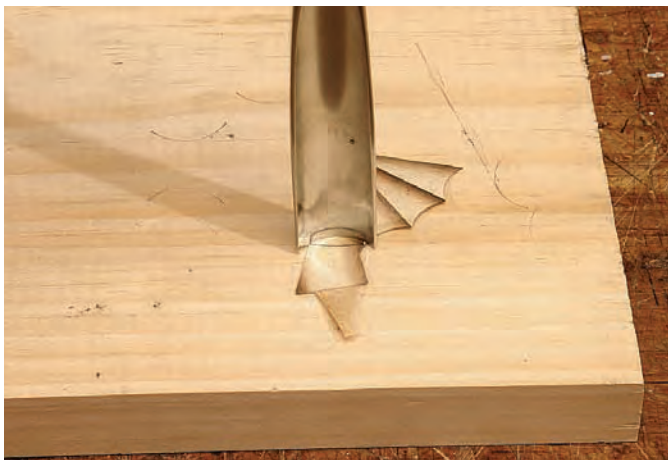
From black-dyed veneer, cut pieces to fill in the scallops, and hold them in place with



Shading takes skill(et). *An iron skillet is the best way to shade the fan blades. Watch the process carefully to achieve consistent results.*

Building begins. *After the plan of the fan is drawn full-size, use a plane iron to cut the shaded fan blades to size.*

Mark the arc. *A compass marks the outer edge of the fan, which is held together with veneer tape.*



Gouge the ends. *Use an appropriately sized gouge to create the scallop at the end of each blade.*

veneer tape. To make it easier to work with and to facilitate wrapping the arced edge of the fan with stringing, I glue the fan to some straight-grained veneer. Here again I use hot hide glue, but white glue is fine. Keep the fan pressed between boards protected with packing tape or waxed paper when not working on it, because it will have a tendency to curl up.

After the glue has cured, saw the fan to shape and refine the cut edge with a fine file. The arced edge is wrapped with a piece of stringing. The inlaid stringing was cut to 3/64", but the stringing for wrapping must be cut so it is a full 1/16" thick, because it is difficult to bend something that is wider than it is thick.

Depending on the size of the fan and the species of the stringing, you may need to dampen and heat the stringing to conform to the edge of the fan. I do this by selecting a piece of bar stock or pipe with a radius equal to or slightly smaller than the fan, and heating it with a propane torch.

Having wetted or soaked the stringing, I then bend it around the heated bar, with a piece of brass or stainless steel shim stock as a backer, to prevent fracturing.

On a board covered with packing tape I glue the stringing to the fan using white glue and several push pins as clamps. When the glue has cured, trim the ends of the stringing flush to the fan and clean up any glue on the back of the fan that would interfere with its bonding in the recess.

Inlaying the Fan

If time permits, I like to use traditional methods in my work. I have tried to make the recess for the fan with hand tools, but it is quite slow and fairly difficult.

Unlike period fans that were made from thicker veneers, today's veneers are so thin, that considerable precision is required for the depth of the recess, making the router the best tool for creating the recess.

If necessary, trim the fan's right-angle sides so they match the corner of the inlaid stringing. Carefully scribe around the fan. Deepen the scribe line and rout out the waste, getting as close to the line as possible. As noted above, it is critical to have the depth set very accurately; this is especially important if inlaying into a veneer surface.

Clean up the sides and bottom of the recess with a chisel and properly shaped gouges then check the fit of the fan. I glue the fan in with, you guessed it, hot hide glue. Here again white glue is fine, but with either glue you'll need to add waxed paper and a clamping block to hold the inlay secure. After the glue has cured at least 12 hours, you can carefully scrape and sand the fan flush.

The next step is the most fun—applying the finish and admiring the crispness and refined appearance of your inlays. **PW**

Rob builds Federal-style reproductions in a one-car garage shop. Also, he has written for the Journal of the Society of American Period Furniture Makers. *Visit his web site at americanfederalperiod.com.*

Tipping the ends. *Black-dyed veneer pieces, cut with the same gouge, add another layer to the look of the fan.*

Push pin clamps. *The curved stringing for the front edge of the fan is attached with white glue and held in position with push pins.*

A fine line. *Carefully cut a line for the fan inlay after the piece is trimmed and final shaped.*

Preparing the recess. *Once the recess is routed to the correct depth and close to the edges, remove the remaining waste with small chisels.*

Chimney CUPBOARD

BY MEGAN FITZPATRICK & GLEN D. HUEY

Seven solid joints comprise this sturdy custom storage unit.

There's a backstory to this chimney-cupboard project. Last March, I planned a week off to renovate the 6½' x 8' bathroom in my 110-year-old house (I was sure it wouldn't take long – after all, I only had to gut it to the studs and joists, hang new drywall, reroute plumbing …). Three months later, I finally had the tile in and grouted, and a working shower. A month after that, I installed a medicine cabinet and put up the wainscoting and the trim. So close on a year later, I'm almost done. But the small space allowed no room for built-in storage, and I was unwilling to tear out adjoining plaster walls to enlarge the space.

So I needed a tall, free-standing cabinet that fit with my amalgamation of Victorian and Arts & Crafts design elements, and it had to fit into the narrow area between the shower door and commode, making the most use of available space. This three-drawer chimney cupboard was designed to accommodate a variety of storage needs, and fit a specific location. At 10½" the depth, due to space limitations, is fairly shallow. And, I wanted the piece to match the exact height of the shower wall, 78½" (I've been told I can be a tad persnickety). The point (yes, I do have one) is that it's easy to start with a design idea in mind, and adjust the dimensions and design elements such as inset versus lipped drawers, or hardware and mouldings, to meet your specific needs.

First Steps

Before heading to the shop, we first designed the project in Google SketchUp (sketchup.com), a powerful (and free) design program that allows you to build in virtual space and get all the elements and measurements just as you want them (the files for this project are available at popularwoodworking.com/feb08).

Then, based on the measurements established in the drawings, we headed to the shop and pulled rough maple planks from our rack, selecting straight-grained boards for the face frame and side panels, and laid out the various elements. We rough cut the pieces to length for the face frame pieces and sides, adding 1" to the final lengths, then milled the stock to ¾" on the jointer and through the planer.

Face First: Mortise-and-Tenon

This is a face-frame cabinet, so building that frame is the initial step in the process. By completing it first, you can then use the finished frame to make any necessary size adjustments to the other pieces.

At the table saw, we ripped the rails, stiles and drawer dividers from the same S4S board, and crosscut them to final length. Then it was on to laying out the mortises on the rails.

Determine the face of each frame member, then clamp the stiles together with the working edge facing up. Use the drawing to locate each rail and divider along the length of the stiles and mark the top and bottom edge of each rail with a line completely across each stile. Next, move in a ½" from the top end of the stiles and draw a line setting the location of the mortise for the top rail. Move toward the center of each layout area ¼" and place a partial line for each of the remaining rails. Mortise only between these partial lines.

Using ¾" stock makes this a simple process. Set up a marking gauge to find the center of the workpiece. Using the marking gauge you've already set up, strike the centerline of one of your mortises (you'll use that mark to line up the bit at the mortiser).

You're now ready to make the cuts. Chuck a ¼" hollow-chisel mortising bit in the mortiser, set the depth for 1¼" (setting the depth of cut on the strong side), then line up the bit point with the centerline you marked in the top mortise. Bore a series of holes across the mortise, leaving a little less than ¼" in between each hole (this helps to keep the chisel from deflecting). Go back and clean out the remaining waste, then make another series of passes from end to end in the mortise to clean out any remaining waste, and to break up any large

OPENING PHOTO BY AL PARRISH; ILLUSTRATIONS BY ROBERT W. LANG

chips (this will make it easier to knock out the sawdust). Then move on to the next mortise. Because each mortise is centered on your 3/4" stock, you can flip the workpiece end-to-end and the setup will remain consistent.

With all your mortises cut, it's time to move on to the tenons on the rails. Again, 3/4" stock makes it easy to center the tenons in your workpieces, and not have to change setups or spend much time measuring. Glen suggests using 3/4" stock for all face frames when possible; that way the layout becomes second nature (after so much time in the shop, he can eyeball it to within a millimeter, so he spent a lot of time rolling his eyes every time I reached for my 6" rule and/or sliding square).

Each tenon is 1 1/4" in length and 1/4" in thickness. Raise the blade in your table saw to just a hair under 1/4". Set your fence at 1 1/4" to the outside edge of the blade, and make the cuts on all four shoulders of each end of each rail. Raise the blade to 1/2" when cutting the edge shoulder cut on the top rail. We used a tenon jig (the one Senior Editor Robert W. Lang built for the August 2007 issue, #163)

Square cuts. *To ensure you get a nice, squared mortise, first make a series of cuts spaced a little less than 1/4" apart; this will help keep the chisel from deflecting.*

Versatile storage. *This tall chimney cabinet is perfect for any narrow space, whether in the kitchen, bath or elsewhere in your home.*

Rolling shoulder cuts. *Make all four cuts on one end of each rail at the table saw, using a sled or sliding table.*

Tenon jig. *This tenon jig keeps the workpiece secure as you cut off the cheeks of your tenons.*

to cut the shoulders. Your fence setting will vary depending on your jig, but the idea is to leave a matching 1/4" tenon when finished, with the blade raised to 1 1/4".

Cut the shoulder off the outside of the rail to keep from trapping waste material between the blade and the rail. It's a good idea to check the fit of that tenon in your mortises to see if you need to make any slight adjustments in your saw settings before you finish the rest of the cheek cuts. The goal is a snug fit. You should be able to insert the tenon into the mortise using hand pressure and maybe a little mallet tap – if too much force (or too little) is necessary, you'll want to adjust your fence accordingly.

Once you have that right, make the rest of your cheek cuts then head to the band saw to remove the remaining waste. Set up your fence a heavy 1/4" from the outside edge of the blade so you're cutting away waste on the inside of each tenon (that way you can just flip the piece to make the second cut, without having to adjust the fence). This will make each tenon just a little loose from top to bottom in the mortise, allowing room for minor adjustments. Exercise caution to get the depth of your cut just right – if you cut past the proper depth, the kerf will show on your finished frame (see the door-construction photo at the bottom of page 67).

Dry-fit, Then Glue

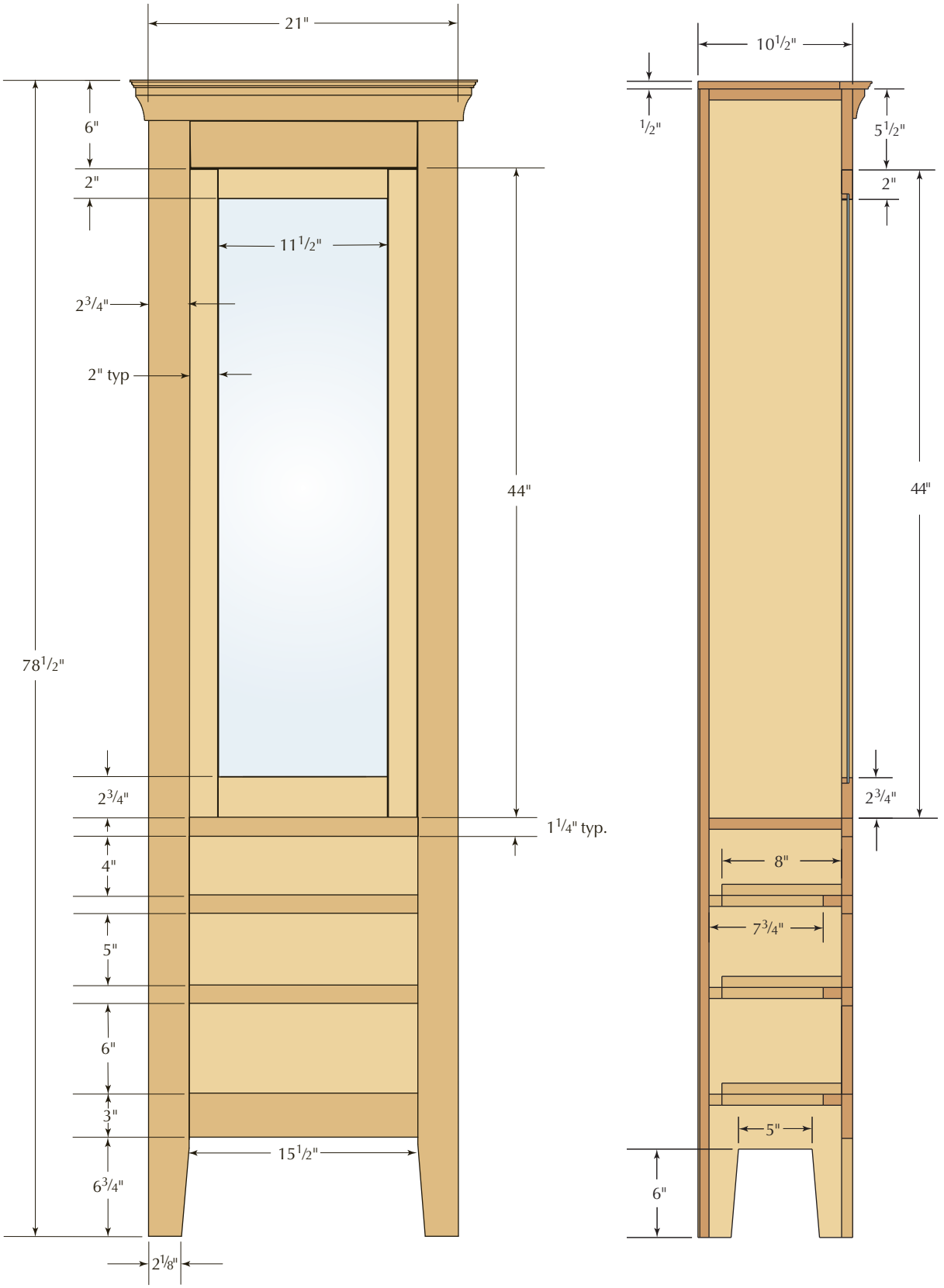
Now dry-fit the frame together, and when everything looks good, take it back apart and squeeze glue into the mortises of all stiles, using an acid brush to coat all the surfaces. Then spread a thin layer of glue on the face of each tenon and mate the two. Remember: you left a little wiggle room on the mortise from top to bottom, so you can knock it one way or the other as necessary so that all your openings are square. Now do the same on the other side, check all the openings for square, and clamp it together to dry.

How much glue? Glen suggests that you look for a little bit of squeeze-out, so you know you've got enough. You can clean it up after it dries with a chisel or card scraper, or wipe it off

Chimney Cupboard

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	Face frame stiles	3/4	2 3/4	78	Maple	
❑	1	Top face frame rail	3/4	5 1/2	18	Maple	1 1/4 TBE*
❑	1	Bottom face frame rail	3/4	3	18	Maple	1 1/4 TBE
❑	3	Face frame drawer dividers	3/4	1 1/4	18	Maple	1 1/4 TBE
❑	2	Sides	3/4	9 3/4	78	Maple	
❑	1	Top	3/4	9	20	Maple	
❑	1	Fixed shelf	3/4	9	20	Maple	
❑	3	Drawer extensions	3/4	1 1/4	19 1/2	Maple	
❑	6	Drawer runners	3/4	2 3/4	7 3/4	Maple	1/2 TOE*
❑	6	Drawer guides	3/4	3/4	8	Maple	
❑	1	Nailing strip for backboards	3/4	2 3/4	19 1/2	Maple	
❑	2	Door stiles	3/4	2	44	Maple	
❑	1	Top door rail	3/4	2 1/4	14	Maple	1 1/4 TBE
❑	1	Bottom door rail	3/4	2 3/4	14	Maple	1 1/4 TBE
❑		Back	5/8	20 1/2	78	Maple	
❑	1	Top drawer front	7/8	4	15 3/8	Maple	
❑	1	Middle drawer front	7/8	5	15 3/8	Maple	
❑	1	Bottom drawer front	7/8	6	15 3/8	Maple	
❑	1	Top frame front	1/2	2 1/8	23 3/4	Maple	45° ABE*
❑	2	Top frame sides	1/2	2 1/8	11 7/8	Maple	45° AOE*
❑	1	Top frame back	1/2	2 7/8	19 1/2	Maple	
❑	1	Front crown	13/16	2	22 5/8	Maple	
❑	2	Side crowns	13/16	2	11 5/16	Maple	
❑	2	Long retainer strips	5/16	5/16	39 3/4	Maple	
❑	2	Short retainer strips	5/16	5/16	11 3/8	Maple	

* TBE, Tenon both ends; TOE, Tenon one end; AOE, Angle both ends; AOE, Angle one end



ELEVATION

SECTION

while wet with a rag and warm water (though there is some argument that this could give you finishing problems later).

Side Panels

Because the side panels have to be glued up from two pieces (unless you're lucky enough to find wide stock), it's important to take a close look at the pieces you're using, and work with any grain patterns and color variation to get the best-looking panels possible. I wanted the panel seam to be dead center, so I ripped from both edges of my surfaced boards to get the best look, and took the final passes for the glue line at the jointer. We then glued the panels and set them aside to dry.

With the panels dry, we lined up the top edges and marked the dado location at the top drawer divider (behind which is a 3/4" solid shelf) then routed a 3/4"-wide x 1/4"-deep dado in each side panel using a shopmade straight-edge guide for the router. We also routed a rabbet of the same size at the top end of the side panels to accept the top.We then moved to the table saw to cut a 3/4" x 7/16" two-step rabbet at the back edge of each side panel, to later receive shiplapped backboards. The 3/4" flat cut is made first. I used a featherboard to help support and secure the second cut; for me, it's hard to hold a 9 3/4" piece of stock steady though a 78" long cut without it moving.

Before gluing the sides to the face frame, we used a plywood jig we made at the drill press to drill 1/2" deep x 1/4" holes for shelf pins to hold the three glass adjustable shelves (you could instead buy a plastic shelf-pin jig, or use peg board as a template.)

Dry fit, then glue. *With everything squared up and fitting, add glue and clamp your face frame together and set it aside to dry.*

Then, we stuck a 3/4" offcut into the dado, both to check the fit and to use it as a guide to line up the dado location with the top drawer divider, ran a bead of glue along the edge of the side panel, then clamped the panel and face frame flush. After it was dry, we did the same on the opposite side. We then made a template for the side cutouts, clamped it to the bottom edge of the side panel, and used a 1/4" top-bearing router bit to cut out the shape on both sides after trimming it with a jigsaw.

Next, we cut and fit the shelf and case top into the side/face frame assembly. The shelf is held with 1 1/4" brads installed from below the shelf, into the side panels; the top is attached with brads coming in from the top.

Next up were the drawer extensions, the runners and the drawer guides. Cut the exten-

Shelf groove. *Set up a straightedge jig to guide your router through your shelf-groove cut.*

Two-step. *This two-step rabbet cut is made more secure and safe by using a featherboard to help hold the workpiece.*

Cheap and easy. *Chucking an offcut into the shelf dado makes it easy to line up the face frame with the sides.*

Taking sides. *Make sure everything is lined up flush before tightening down the clamps. Secure the ends first, then adjust as necessary through the middle to compensate for any slight bowing.*

sions according to the cut sheet and fit each to the case directly behind the top edge of the dividers. Before they are glued in place you'll need to create the 1/4" x 2 1/4" x 1/2" mortises to accept the runners. These mortises begin a 1/4" from the end of the extension.

The runners are milled to size and a tenon is created on one end of each runner. I elected to notch the back edge of each runner so I could use a 1 1/2" cut nail to hold the rear portion of the runner in place. The notch is 7/8" x 1 3/4". Add glue to the mortise and tenon, then add the nail to complete the installation of the runners.

Each runner needs a drawer guide. The guides are set square to the case front and flush with the face-frame edge.

Door Construction

The door is also constructed of 3/4" stock, and it's the same mortise-and-tenon process and setup as was used on the face frame.

Once the door was glued, clamped square and the glue was dry, we fit it to the door opening in the frame using a nickel to gauge the offset on all four sides, and took passes at the jointer (one for one on each side) until the fit was perfect.

And here's Glen's hint to avoid tear-out along the top or bottom of the door frame: Because you'll be taking jointer passes off the end grain of the stiles, there's a very good chance that you'll splinter the outer edge of the stile. To avoid that, make a short cut from what will be the trailing end of the cut, then reverse the work and make the full cut. Because the material at the end is already gone, you won't have any tear-out.

Drawer Construction

I wanted inset drawers, which I was told (after the fact) are a little trickier to make than lipped drawers, because the fit has to be perfect or they won't look right. Because the fronts involved half-blind dovetails, we milled maple to 7/8" thick (you can go as thin as 3/4", but the extra thickness provides a more antique look).

Careful now. *Cut the remaining waste on the tenon at the band saw, being careful not to overshoot your mark. If you do, the resulting kerf will show on the front of the door.*

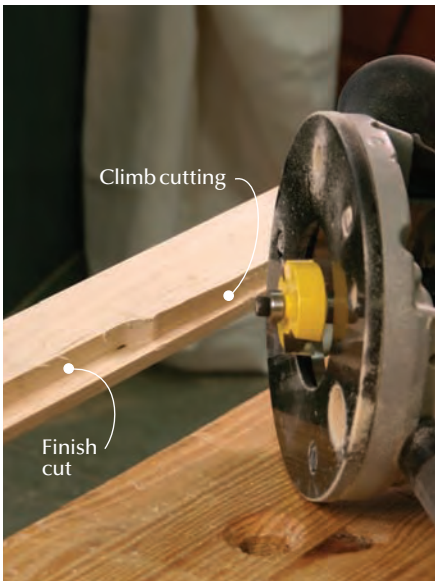
The drawers are graduated in size, from 4" - 6" in height, all are 15 3/8" wide. (I just hope that bottom one will be deep enough to hold my hair dryer). First, we carefully examined the surfaced stock to select the best faces for the drawers, then crosscut each front to length before ripping each front to width, making the fit very snug. We then pared each front to finished width, taking thin passes at the jointer on each edge until we had a penny-thickness offset on all four sides of each.

We milled the 1/2" drawer sides and backs out of poplar and cut them to size; I then hand cut half-blind dovetails for the front, and through dovetails at the back. (For a video on sizing drawer parts, and step-by-step instruction in cutting both through and half-blind dovetails, go to popularwoodworking.com/feb08.)

After dry-fitting each drawer then knocking them apart, it was back to the table saw to cut a 1/4"-wide x 1/4"-deep groove 1/2" up from the bottom edge of each of the six side pieces, and on the three drawer fronts, for the drawer bottom. Add glue to your tails and pins, knock the drawers together and check for square, then set them aside to let them dry.

Next, mill poplar (or whatever secondary wood you choose) to 5/8" for the drawer bottoms, and cut them to size. What you're about

Stacked. *Here, the finished drawers are stacked and waiting for drawer bottoms and the finish.*



Rout a rabbet. *To rout the rabbet for the glass, you'll be making some climb cuts, To avoid tear-out, first make a shallow climb cut with the router, then go back and cut to full depth.*

Square your corners. *Use a 6" rule to extend the line of the rabbet, then clean the corner square with a chisel.*

to make is basically a country-style raised panel. At the table saw, set the fence to 3/16", angle your blade to 12° and raise it so the blade exits cleanly through your workpiece.

Check the fit of the panels in your drawer grooves, mark a line where the inside edge of the drawer backs and the bottom panels meet. Pull the bottoms out and measure to find the center of each bottom (if, like me, you're anal-retentive … Glen prefers to eyeball it) and cut a saw slot set to the height of the line. Insert the bottoms into each drawer (you'll have an overhang at the back of 1/4"), drill a pilot hole into the drawer back, then drive a cut nail through the slot in the drawer bottom, into the drawer back. This provides support for the bottom while allowing for seasonal movement. (In wider drawers that require more support, space two slots across the back.) Glen admits that you could simply eschew the slot and nail straight through the drawer bottom, but the slot more easily accommodates seasonal movement in the drawer bottoms.

Supplies

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

- 2 ■ Hinges
  #PB-407B; satin nickel
- 3 ■ Bin pulls
  #BN-2; satin nickel
- 1 ■ Door latch
  #SL-4; satin nickel
- 1 ■ Clout nails
  #N-7; 1/4 pound (53 nails)

Back to the Door

Now we need to rout a 3/8" x 1/2" rabbet for the glass (or mirror, if you prefer) for the door. Set up your router with a rabbeting bit, set the depth to 1/2", then clamp your door face-down on your bench (you'll have to change the workpiece setup several times while routing the rabbet so you don't cut into your bench). Cutting the rabbet involves some climb cutting, so make sure you have a good grip on the router, and are holding it tightly and flat against your workpiece (a D-handle router makes this a little easier). To avoid ugly tear-out on the finish cut, first climb cut a shallow pass to waste out just some of the material. Then reverse directions (regular routing operation) and remove the rest, working your way around the interior of the door.

With the rabbet routed, you need to square the corners with a chisel. Press a rule against the inside of the rabbet, and extend the lines at each corner with a pencil to mark the area to be chiseled. First, make sure your chisel is sharp, then pare your way down 1/2" to the bottom of the existing rabbet.

Measure from side to side and top to bottom, and give your glass purveyor a call for both the panel glass and adjustable glass shelves. We ordered 1/16"-thick glass for the door, and 3/8"-thick glass for the shelves.

Now it's time to cut mortises for the hinges. While you could set up a router for this operation, with only two hinges to install, I opted for hand tools: two marking gauges, a chisel and mallet, and a small router plane to clean up the finished depth (which could be accomplished with a wide chisel, and a little more care). For step-by-step instruction on cutting a hinge mortise by hand, see popularwoodworking/feb08.

Drill pilot holes for the hinge screws, and seat two screws in each hinge to make sure the fit is correct then transfer the hinge locations to the face frame, and remove the hinges from the door (you'll need them to mark around on the face frame). Cut your hinge mortises on the face frame, drill pilot holes for the screws, then install the hinges on the door. Hint: Put a smidge of paste wax on the screw, and it will seat more easily.

Now grab a buddy and have him or her hold the hinges in place on the frame as you install the door to ensure it fits. You'll then have to take it off and remove the hardware before finishing.

Building a Top Hat

The top frame and cove moulding completes the construction for the case. Mill the material to thickness and size according to the cut sheet.

The top frame houses another of our joints, the biscuit. The biscuit joint is used to join the

Hinge mortise. *I cut the hinge mortises by hand using two marking gauges, a wide chisel and a router plane. If you don't have a router plane, use a chisel to pare the flat bottom.*

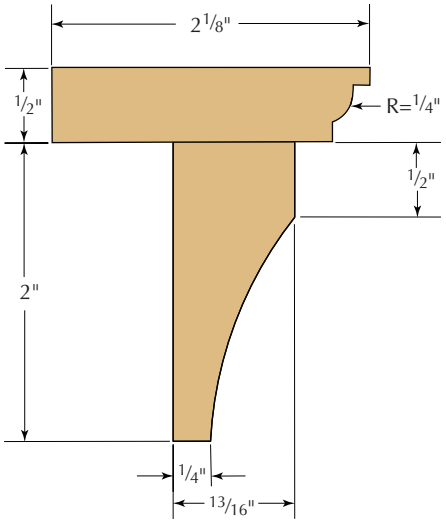
two front mitered corners as well as the rear frame piece to the sides of the frame.

Cut the 45° miters at the miter saw, locate the center of the angled cut and use the plate joiner to create the slot for the biscuits. The wider rear frame has the slot centered on the ends with matching slots on the inside edge of the frame sides.

Assemble the rear frame to the sides with glue and biscuits, then clamp. Next, add glue into the remaining slots and assemble the frame. The trick to getting a square glue-up is to add another clamp across the front with one clamp along each side. Then, tighten the clamps so the mitered joints align.

Once the glue has dried, sand the frame to #180 grit and profile the edges at the router table. We used the new Freud Quadra-Cut beading bit to profile the top frame.

Attach the frame to the case using #8 x 1¼" wood screws ensuring the frame is centered on the case and flush with the back.



COVE MOULDING PROFILE

The cove moulding is created with a raised panel bit at the router table. Use the full profile taking shallow passes until the top of the cove just touches the panel; there's no reveal.

Next, cut the mitered corners of the moulding, sand the profile smooth using #180-grit sandpaper and add the pieces to the case with 1" brads applied both to the case and into the top frame.

A raised panel. *To angle the drawer bottoms so they'll fit in the ⅝" groove, you're basically making a raised panel on the table saw. Angle your blade to 12° and raise it so the angled blade exits cleanly through your workpiece.*

Backboards

I built a shiplapped back with three evenly spaced boards (a plywood panel would work, too). We ran two-step rabbets at the table saw, and I used a block plane to chamfer the edges that would show on the inside. Before installing the backboards, I painted the interior display area for some contrast with the clear finish on the outside, and to tie it in with the rest of the bathroom woodwork. Using the same template as for the side cutouts, we marked the back and made the cuts with a jigsaw.

Next, install a nailing strip at the bottom to which to attach the backboards. The piece is screwed to the bottom of the bottom drawer runners with two #8 x 1¼" wood screws.

To install the backboards so that they'll accommodate seasonal movement, the idea is to use as few nails as possible. Two of the boards have only three nails: one at the top, one at the fixed shelf and one into a nailing strip at the bottom edge. The third board, because it has no lap to secure it flat, has two nails at either edge, in the same locations.

Online EXTRAS

For step-by-step instruction on cutting through and half-blind dovetails, and cutting hinge mortises by hand, as well as a video on sizing drawer pieces and SketchUp drawings, go to:

popularwoodworking.com/feb08

Finishing Touches

For the finish, we simply used a coat of sanding sealer and a coat of lacquer (sanding between coats) then wax.

Finally, you're ready to install the glass. It's held in the door with simple retaining strips pulled from the scrap bin and tacked in place with ½" headless pins (make sure you shoot the pins at an angle, wood to wood, so you don't hit and break your glass). Now install the catch for the door; we simply put it where we thought it looked good. For the final step, center the drawer pulls in each drawer, drill pilot holes then screw the pulls in place. **PW**

Megan is managing editor of Popular Woodworking *magazine and* Woodworking Magazine. *Contact her at 513-531-2690 x1348. Glen is a senior editor at* Popular Woodworking *magazine and* Woodworking Magazine. Contact him at 513-531-2690 x1293.

Honing guides are not a one-size-fits-all affair. We examine the weaknesses and strengths of four popular models.

Understand Honing Guides

BY CHRISTOPHER SCHWARZ

With the exception of your two hands, there is no such thing as the perfect honing guide for every shape and size of woodworking tool.

Some guides are great for short tools. Some are great for chisels. Others excel at gripping odd-shaped tools. But none of the guides handle all the tools all the time.

During the last decade, I've taught a lot of people to sharpen chisels and plane irons, so I've gotten to use many of the student's honing guides. Some of these guides I've purchased for our shop at *Popular Woodworking*. Other guides haven't impressed me much.

The honing guides in this article are four models that I've found to be useful and commonly available. Now, I don't think you need to buy four honing guides to get your tools sharp. Depending on your work, you might need one or maybe two.

Many sizes and shapes. *Here are some of the tools I sharpened (or attempted to sharpen) with the four honing guides. From the left: plane irons for a block plane, spokeshave, bevel-up smoothing plane, bevel-down smoothing plane and shoulder plane. The chisels include: a dovetail, fishtail, Japanese, bevel-edge, skew and mortising tool.*

Or, perhaps if your hands are willing, you might not need any of these guides at all.

The Case for Guides

More often than not, I use a honing guide when sharpening. Though I can (and do) sharpen without them, I find them to be brilliant at providing repeatable and quick results. And when I teach sharpening, I like to show students how to use a guide. Many woodworkers sharpen infrequently and have difficulty training their hands to do what they want every single time.

I'm not hostile to hand-sharpening. If you like the process and your results, please don't change. But I also bristle when hand-sharpeners run down people who use guides. The act of sharpening already causes enough anxiety among woodworkers.

About the Dull Tools

Hand tools come in a wide variety of sizes and shapes, so I selected a broad range of shapes that have been both easy and difficult for me to secure in honing guides.

Some of the tools are common and are (usually) easy to secure in guides, such as 2"- and $2\frac{1}{4}$"-wide plane irons, a $\frac{1}{2}$"-wide bevel-edge chisel and a 1"-wide Japanese chisel.

Other tools are tricky because of their shapes, such as a short spokeshave iron, a T-shaped shoulder-plane iron, a fishtail-shaped bench chisel and a skew chisel.

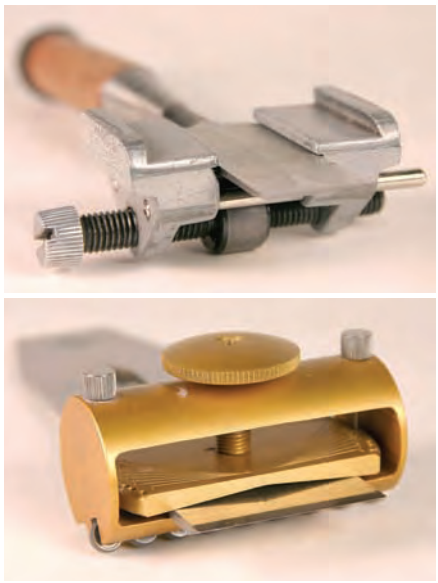
PHOTOS BY THE AUTHOR

Guidance on guides. *Some woodworkers have drawers that are filled with honing guides that have disappointed them. We explore four guides that we use in our shop and explain their pros and cons.*

Online EXTRAS

The gold-colored SharpSkate is the most unusual honing guide in the test. To see its inventor demonstrate it, go to:

popularwoodworking.com/feb08



From the sides or from above? *Honing guides can clamp the work from the sides of the tool (above) or from above and below (below). Neither tool-holding system is perfect.*

And I threw in one tool, a traditional English mortising chisel by Ray Iles, that gives almost all the honing guides a fit.

About the Guides

Honing guides have, in general, two ways of going about their job of holding the work. Some guides clamp a tool on its sides; the others clamp a tool from above and below.

Neither system is superior in all cases. The side-clamping guides excel at grabbing most common woodworking tools and holding them square, no matter how aggressively you work. But these jigs fail when trying to hold tools with an unusual shape or size.

The top-and-bottom clamping guides are best at holding the weird stuff that's thick, tapered or odd-shaped. These jigs aren't as good at holding the tool square as you work. The work can shift out of square, especially if you are removing a lot of metal or correcting an edge that isn't square – your finger pressure will force the tool to shift in the guide.

Let's take a look at each of the four guides and their weaknesses and strengths.

The Side-clamp Guide

When I started sharpening woodworking tools, the first guide I bought (and the one I still use the most) is the common-as-dirt side-clamp honing guide. This is sometimes called the Eclipse guide after the name of a popular English brand. The guide is rugged, common and inexpensive (less than $20).

It grabs wide tools (up to 3 1/4" wide) using the two lips at the top of the guide, and it is designed to clamp bevel-edge chisels (up to 2" wide) in the dovetailed channels below.

This guide is great if you don't have a lot of unusual tools. It's my first choice for clamping my 2"-wide smoothing plane irons, block plane irons and (as long as they aren't too narrow) most chisels.

The guide's narrow, 1/2"-wide roller gives you lots of control over the shape of your cutting edge. If you apply uniform pressure on the tool's bevel, your cutting edges will be straight. If you want a slightly curved cutting edge, you can shift your finger pressure exactly where you want to remove metal, and you'll end up with a cambered cutting edge for a smoothing plane or other bench plane.

Where this jig fails is with tools that have sides that are some other shape than a straight line. A fishtail-shaped chisel is a nightmare with this jig, as are skew chisels.

The tool also doesn't like thick chisels without bevels on the sides – such as mortising or firmer chisels. The chisel's thick flanks won't nest in the guide's dovetailed ways.

It also doesn't like narrow block-plane blades. Once a tool is skinnier than 1 3/8", then you can't (easily) grip it with the lips on the top of the guide. And good luck getting much of anything unusual into the dovetailed-shaped channel below. The guide doesn't like tools thicker than 3/16" down there.

You can fiddle with the jig to get it to hold most spokeshave blades, some shoulder plane irons and some scraper plane irons (which have to be honed at a high angle).

What else do you need to know about this guide? These jigs can be poorly made. I've seen more than 100 of these in my career, and I'm amazed at how some are perfect and others are covered in globs of paint. Use a triangular-shaped file to remove excess paint in the guide's dovetail channel. And keep the jig's wheel oiled. It's easy for the wheel to get clogged and stop turning. When that happens, you end up sharpening a flat spot on your wheel and the jig is worthless.

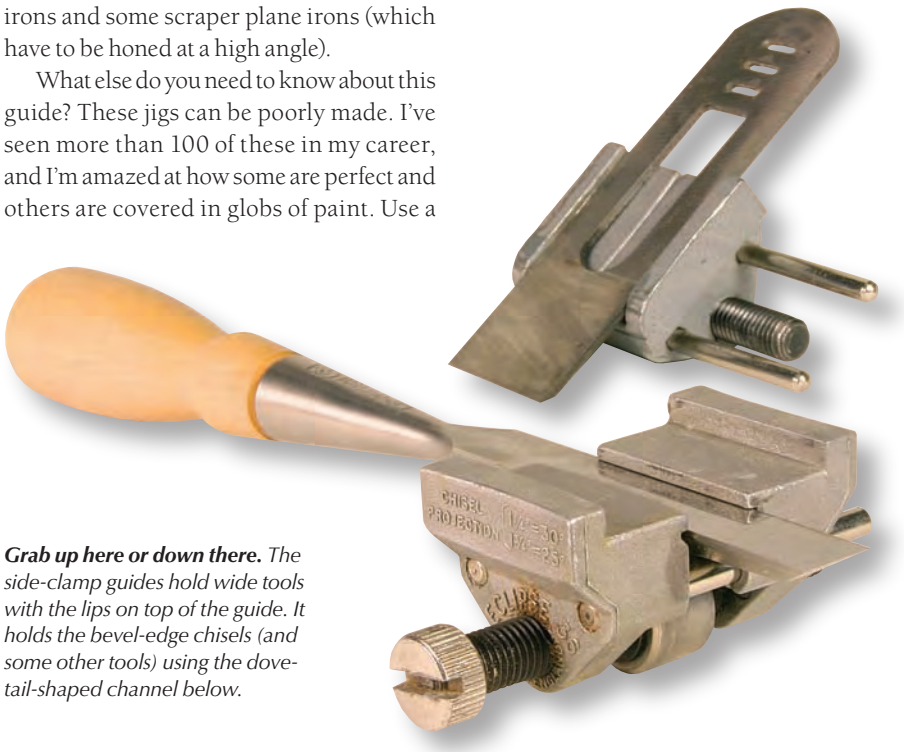
And finally, I recommend you always secure your work in this guide using a screwdriver. Hand pressure alone isn't enough to prevent your tools from slipping.

Richard Kell's No. 1 Honing Guide

Recently I've become enamored with this side-clamping jig because it handles some difficult tools with great aplomb. Plus, it's a beautifully made tool and rolls smoothly in use on its Ertalite TX low-friction wheels.

Richard Kell makes two versions of this guide. The No. 1, which handles tools up to 1 1/4" wide, and the No. 2, which handles tools up to 2 5/8". The large guide isn't ideal for shops that sharpen on 3"-wide sharpening stones. That's because when you clamp a wide plane iron into the large guide, the wheels are pushed out so far that it's difficult (or impossible) to keep the jig and iron on your stone. You could build a sort of platform around your stone (or you could sharpen with sandpaper stuck to glass), but building a platform is more work than is reasonable in my opinion.

The smaller Kell guide, however, is ideal for narrow and unusual tools, and it is the only tool that easily holds the Ray Iles mortising chisel. The secret to the jig is, I think,



Grab up here or down there. *The side-clamp guides hold wide tools with the lips on top of the guide. It holds the bevel-edge chisels (and some other tools) using the dovetail-shaped channel below.*

Good and straight. *The Kell jig is great for short tools that need straight edges, such as plow plane irons or this dovetail chisel. It's a versatile jib because you can also clamp things below the jig's guide bars, as shown.*

the plastic washers that do the actual clamping. These clear plastic washers are tough but grippy, so they can hold a tool that has a slight irregular shape, such as a handmade Japanese chisel.

The other brilliant part of the Kell jig is that you can clamp your work either above or below its stainless steel guide bars. That makes gripping unusual shoulder-plane irons and dovetail chisels an easy proposition.

So where are the warts? The small Kell won't clamp fishtail-shaped chisels or sharpen skew chisels. The small Kell guide also won't hold a standard spokeshave, smoothing-plane or block plane blade.

Also, it will not allow you to create a blade with a curved cutting edge. The jig forces your edges to be straight, like it or not. The upside to this is that if your only hand tools are chisels (or you have mortising chisels that give you sharpening fits), the Kell is an excellent choice.

One final note: I'm also quite fond of the way you secure tools in the Kell. Unlike the other side-clamping honing guide, you don't need a screwdriver to torque the Kell down. Here, finger pressure is enough.

Veritas Mk. II Honing Guide

The second honing guide I bought was actually Veritas's ancestor to this jig. I bought that older jig – which also clamped tools from above and below – to handle my odd-shaped tools. That jig served me well, but tools would shift around more than I liked.

This improved version of that older guide is more complex, but the changes added accuracy, versatility and clamping power.

The Veritas is the only jig that allows you to set the sharpening angle with an included blade-registration jig.

You select the angle you want to sharpen at, then set that angle on the included blade-registration jig. Clip the jig to the front of your guide then insert your tool between the jig's two clamping bars (up to $2^{7}/_{8}$" wide). The blade-registration guide sets the sharpening angle and holds the tool square while you clamp it in place using two thumbscrews. Then you remove the blade-registration jig and start sharpening.

It's remarkable what tools the Veritas will hold. With the exception of the Ray Iles mortising chisel, the Veritas grabbed every tool securely without complaint.

And it's amazing the wide range of sharpening angles the jig can be used to achieve. Because it is so adjustable, you can use it to sharpen weird angles (such as 20° back bevels on handplane irons) that advanced sharpeners sometimes require.

What are the downsides to the jig? They are minor. The base model from the factory will sharpen your tools straight across only. Making a curved edge with this jig is nigh on impossible without modifying the jig – thanks to the $2^{1}/_{8}$"-long straight roller. Veritas makes a Camber Roller Accessory ($19.50) that replaces your straight roller with one that has a slight cigar shape. That allows you to camber your cutting edges with finger pressure – just like the side-clamp honing guide.

Veritas also makes a Skew-registration Jig ($26.50) that allows you to set all sorts of oddly skewed tools in the honing guide.

Like all honing guides that clamp from above and below, there is always the slight chance that your tool will shift in the guide, especially if the tool is narrow, if you are working aggressively or if you are fixing an out-of-square cutting edge. And this is something to be careful of with the Veritas.

One way to help prevent this is to take care when securing your tools. The two thumbscrews that control the jig's clamping bar should be advanced so each one is applying the same amount of pressure. If one of the thumbscrews is doing most of the work, the tool is more likely to shift.

The other thing to watch for on this jig is the position of its roller. The jig allows you to tweak the roller down a couple degrees so you can create a secondary bevel on your tools. You need to remember to return this roller to its highest position when you are done sharpening, or you will introduce some minor errors to your tools that can add some sharpening time later on to fix. It's a minor point, but it is something to which to pay attention.

Pick an angle, any angle. *The Veritas Mk. II honing guide sets your sharpening angle with an included blade-registration jig. The clamping bars allow you to grip a variety of shapes.*

Supplies

Woodcraft
800-225-1153 or
woodcraft.com

- Side-clamp honing guide #03A21, $11.99

Tools for Working Wood
800-426-4613 or
toolsforworkingwood.com

- Richard Kell No. 1 honing guide #EE-HGRK, $56.86

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

- Veritas Mk. II honing guide #05M09.01, $54.50

JapaneseTools.com
877-692-3624 or
getsharper.com

- SharpSkate honing guide $149.95

Prices correct at time of publication.

The SharpSkate

The newest honing guide is the SharpSkate, which was developed by sharpening guru Harrelson Stanley of JapaneseTools.com. Like the Veritas, the SharpSkate clamps blades from above and below. But other than that, the SharpSkate is different than all the other honing guides in this article.

Every other honing guide that I've used pushes the tool's cutting edge forward and back on the stone, like a snowplow. The SharpSkate works the edge side to side, more like a rollerblade. The jig rolls on nine 3/8"-diameter steel wheels.

The SharpSkate's blade-clamping mechanism is also unusual. It's a serrated V-shaped clamping pad. The serrations grab your tools (up to 2 7/16" wide) and squares them in the jig. The V-shape of the pad allows you to flex the pad slightly to generate serious clamping pressure.

This pad also can be rotated to grip skew tools of any angle and has three detents (left and right) for common skew angles.

The SharpSkate is the only honing guide that could grip all the tools in the test well enough to hone them reliably and repeatedly, though its hold on the fishtail chisel and mortising chisel weren't ideal.

The advantage of sharpening side-to-side (as opposed to forward-and-back) is that you can easily sharpen on all points of your stone to spread out the wear and reduce your stone-flattening chores. It takes a little practice, but you'll be an expert in less than an hour.

Roll with it. *The SharpSkate hones your tools side-to-side, which allows you to work all the corners of your stones, even to work off the stone if you like.*

There are some quirks to the jig you should be aware of. I recommend you use a hex-head wrench to secure and release your blades. Hand pressure is not always enough to prevent the tool from shifting slightly.

Also, you need to watch where you put your finger pressure with the SharpSkate. One of the advantages of this jig is that you can use finger pressure to create a cambered cutting edge. But that finger pressure can work against you when you don't want to create a cambered or skewed shape to your cutting edge.

Speaking of cambers, one of the great advantages to the jig is you can hold small blades at a variety of angles. The downside comes when sharpening at really steep angles for smoothing planes in bevel-up tools. As you get into the really high angles (more than 40°), it's difficult to get your fingers where they need to be to create the camber with pressure.

Also, just as with the Veritas, you need to take care that the tool doesn't shift slightly out of square when working. Though the serrations on its clamping pad work well, you can still move the tool a bit when working aggressively or correcting an edge.

One final note: Be sure to keep the nine wheels clean. There's some potential for sharpening grit to accumulate near the wheels. A quick spray of water keeps everything tidy.

Conclusions

The jig or jigs you choose should match your set of tools today and what you might buy tomorrow. If you're a chisel-and-block-plane woodworker (and always will be), the side-clamping honing guide might be all you need.

The Kell is ideal for people with small-scale tools with straight edges, or it is an excellent second guide.

The Veritas is an excellent guide for beginning and advanced sharpeners because it allows you to hold a wide variety of tools and accurately set them at the right angle every time you pick up the jig.

The SharpSkate is also a good guide for people with tools of varied shapes. It might be the best guide for woodworkers who want to graduate to hand sharpening some day. The inventor rightly points out that his guide is a good set of training wheels for some kinds of hand sharpening.

For my work, I like having two guides. One that clamps tools on the sides so I can get a straight edge when I need it. And a second guide that clamps above and below so I can sharpen odd-shaped tools that I own now (and those I might own in the future). Exactly which guide or guides you purchase is up to your tools and your pocketbook. **PW**

Holding Power of Four Honing Guides

TOOL	VERITAS	SHARPSKATE	SIDE-CLAMP	NO. 1 KELL
Chisels				
1" Japanese	Excellent	Excellent	Excellent	Excellent
11/16" fishtail	OK	OK [4]	Poor	Poor
1/4" dovetail	Excellent	Excellent	Excellent	Excellent
1/2" bevel edge	Excellent	Excellent	Excellent	Excellent
1/4" mortising	Poor [1]	OK [1]	Poor	Excellent
3/8" skew chisel	Excellent	Excellent	No	No
Plane irons				
2 1/4" bevel-up	Excellent	OK [2]	Excellent	No
2" bevel-down	Excellent	Excellent	Excellent	No
1 1/4" block plane	Excellent	Excellent	Poor [3]	Excellent
3/4" shoulder plane	Excellent	OK [4]	OK	Excellent
2 1/8" spokeshave	Excellent	Excellent	OK	No

Notes:

[1] Chisel repeatedly shifted out of square on tool's rounded surface.

[2] A steep position of tool in jig left little room for finger pressure for cambering edge.

[3] Iron had to be sharpened in chisel notch, which had a poor fit.

[4] Fit in guide with some fiddling.

Chris is the editor of Popular Woodworking *magazine and the author of the new book "Workbenches: From Design & Theory to Construction & Use" (Popular Woodworking Books). You can buy the book through his web site: lostartpress.com.*

The rise of power tools, safety razors and pencil sharpeners years ago took away the average person's need to develop sharpening skills. Woodworkers, too, have lost the connection between sharp tools and a simple, readily called upon skill.

In my experience, many woodworkers don't use good sharpening techniques and may not have ever seen a truly super-sharp edge. Not surprisingly, honing guides offer an appealing solution for woodworkers who have underdeveloped sharpening skills. It's a quicker fix than training one's hands how to hold a tool, and all the responsibility and blame can be laid at the doorstep to a mechanical device.

Because I own Tools for Working Wood, I have a vested interest in hawking woodworking tools and aids, but the truth is that for me, woodworking is about developing hand skills. Training hands to sharpen easily and reflexively gives you confidence and makes other woodworking skills easier to acquire and then master.

When people tell me they have tried freehand sharpening but the results weren't as good as using a jig, I always probe further and have generally found bad technique, insufficient practice, or folks not trusting their own abilities.

I was lucky. I was taught woodworking by Maurice Fraser. Typically in the first class, after a 40-minute demonstration and a 40-minute hands-on session, Fraser had a group of brand-new students (it was the first class, after all) sharpen a dull chisel to razor sharpness without much trouble.

To get good at it took practice, but after that first class it wasn't anything anyone thought twice about – except maybe to reread their notes and practice some more. You can read about the way he taught sharpening at www.antiquetools.com/sharp. And a few years ago I did a video on Fraser's method for Norton Abrasives.

Why? It seems the common feeling these days is that sharpening is something that needs years of practice and only "experts" can do it freehand.

This simply is not true.

Sharpening was something that you learned quickly as a first-day apprentice, or you found another line of work. Woodworking is about learning dexterity. Training your hands to sharpen is the first step in training your hands to cut straight, chisel to a line and (in general) to not drop tools on your toe.

I disagree with a lot of teachers in the field on the subject of honing guides – teachers whom I respect – so it bothers me that I disagree with them. A lot of them say if they show sharpening using a jig, students will get sharp tools right away. Students won't be discouraged and will be able to go on to building a project. Maybe there's some truth to this, but I think students would end up with sharp tools and the ability to progress if they were instructed that freehand sharpening is a basic skill they could easily master.

'When people tell me that they tried freehand sharpening but the results weren't as good as using a jig, I always probe further and have generally found bad technique, insufficient practice, or folks not trusting their own ability.'

Freehand sharpening the way we teach it is faster and more repeatable than using a guide because you don't have to continually build secondary bevels. You can trivially sharpen and also include a true micro-bevel that can easily be erased with each sharpening (which improves overall chisel performance, not just edge strength). And of course you can sharpen any tool, because the technique for one tool is the same for others.

You can also sharpen a lot of tools at the same time without having to run each one though all the stages before attaching the jig to a new tool. When I teach people good hand technique and they practice, most of them find the experience liberating. And with their newfound skills they're able to trust their hands for more and more complicated work earlier on in their training.

If you don't believe this is possible, take a look at some early woodworking and woodcarving books. Beginner projects were far more involved in days past, and honing guides weren't really on the market in the 19th century. And by the way, if anyone tells you that the people back then weren't as efficient at sharpening as we are now with some honing guide, tell them to look at the furniture made back then. I think the tools were plenty sharp enough.

We and many other tool dealers stock the short inexpensive DVDs that I mentioned above. There are two versions showing the same technique but with different technology. You can find links to them at popularwoodworking.com/feb08.

So here's my challenge: Drop by our new showroom in Brooklyn with a chisel. If I can't teach you to sharpen it properly by hand, I'll give you a free honing guide. (I do reserve the right to first grind the chisel to a nice hollow grind on a powered grinder.)

Hopefully you'll see that you don't need the guide. — JM

Joel is a woodworker, tool collector and the owner of toolsforworkingwood.com, which sells hand and power equipment (even honing guides).

The ultimate honing guide. *You can learn to sharpen your tools without the aid of jigs without too much practice or difficulty.*

Perfect

BY CARL BILDERBACK

A long-time carpenter shares a repair trick to hide the mistakes made by ham-handed apprentices.

For more than 30 years I was a traveling carpenter foreman in charge of installation of top-quality architectural woodwork and cabinetry. My job assignments were sometimes small, requiring only eight or 10 carpenters, and sometimes 40 or more men.

This was the good part of the job because it was never the same old thing!

However, with each new job there was a new location. This was bad. Every job required a new group of carpenters, many of whom were not experienced at the skill level needed. You guessed it – as a result of the inexperience of some of the workers there were lots of mistakes made, including drilling the holes for door hardware in the wrong place.

The normal way to make repairs in the field is to plug the damaged area with some wood and then have a wood finisher from the shop apply fake grain to the patch and touch up the repaired area with his "magic brush." This looks just fine for a period of time, but as the repaired wood panel or door lightens or darkens due to exposure to the sun's rays, the repaired area does not change at the same rate; this causes the touch-up to stand out.

And this can make some customers unhappy every time they have to open that door with the obvious and ugly repair.

The repair technique shown here was developed by me and other carpenters and finishers in an effort to improve on the more traditional "magic brush"- type repairs.

Each repair situation calls for its own unique solution, but there are some basic rules that can be followed to achieve success.

Eight Steps to Fix a Flub

Step 1: Use a soft pencil to outline an area around the damage. The trick is to make an irregular-shaped patch. The way to do that is to follow the natural figure in the board and always try to terminate the repair in a dark portion of the board, such as the grain lines in a cathedral. Also, as a rule, I always spread a repair out over a wider area than where the actual damage has occurred. That's because I believe the human eye will focus more readily on a small repair than on one that is spread out.

Step 2: Select a donor board of the same species of wood that matches the color of the board you are repairing. This section of donor board should have as little figure as possible so that it does not clash with the figure in the board being repaired.

Step 3: Transfer the shape of the planned repair to waxed paper or tracing paper. I use waxed paper because it is always available from the kitchen.

Step 4: Lay the waxed paper over the color-matched board and "engrave" the design onto the board with a hard lead pencil (I use a pencil with No. 3 lead) using heavy pressure.

Step 5: Darken the pattern shape with a soft lead pencil. Now reduce the thickness of the donor board to 1/4" to 1/8". Using a scroll saw, remove the section of the board that has the needed shape marked out on the surface.

Step 6: Affix the cutout to the damaged area with cloth-backed double-faced tape and carefully cut around it with a sharp knife. Remove the patch and make a relief cut on the waste side of the wood.

Step 7: Excavate the wood to a depth that will leave the repair piece slightly proud of the wood surrounding it.

Step 8: Glue the patch into the recess and sand or plane it flush.

Note: The first time you try this repair procedure, I recommend you try it out on a scrap piece, as shown in the photos accompanying this article. While there is nothing terribly difficult about the process, a practice session will greatly improve your odds for success on a piece of critical work.

And I'd also like to add that this repair process might be able to be improved upon, as well. It was developed by several carpenters working during several years and it has room to evolve, I'm sure.

Carl is a long-time professional carpenter (he says he's retired but don't believe it). He's also an avid collector of old tools, particularly saws, and is active in the Mid-West Tool Collectors Association (mwtca.org). Carl's shop is in LaPorte, Ind.

PHOTOS BY CHRISTOPHER SCHWARZ

Patching

1 ***Right hole, wrong place.*** *Here's the defect we need to remove. We've drilled the hole in the wrong place and we need to put a patch in. A simple plug would be obvious to the eye, so it's best to patch a wider area.*

2 ***Follow the grain lines.*** *Darken the shape of the piece you want to remove with a soft lead pencil (this is in preparation for the waxed paper that follows). Be sure to follow the grain lines as best you can.*

3 ***The blander, the better.*** *When choosing a donor board for your patch, pick something that has the proper color and grain characteristics. It's best to pick a section of donor board that has few pronounced grain lines. You don't want the donor to have figure that is noticeably different from what you are excavating.*

4 ***Wax on.*** *Tape waxed paper over the area you want to excavate and trace over the dark lines you drew to transfer that shape to the waxed paper.*

5 ***Wax off.*** *Remove the waxed paper and you can see the shape we now want to cut from the donor board.*

6 ***Emboss the shape.*** *Tape the waxed paper on the donor board. With a hard lead pencil, trace over the shape you want to remove. Use a No. 3 pencil – this will emboss the pattern onto the board below. Work with the pencil at an angle (not straight up and down) so you don't rip the waxed paper.*

7 ***Trace your patch.*** *Go back to a soft lead pencil to fill in the lines embossed on the donor board.*

8 ***Cut close to the line.*** *After reducing the thickness of the board, I use a fine-tooth blade in a scrollsaw to remove the patch from the surrounding material.*

9 ***File to fit.*** *Undercut by a couple degrees the edges of the donor piece with a rasp. I use a rasp designed for aluminum, but a Nicholson No. 49 or 50 would be a good choice. You want a fairly fine rasp.*

10 ***A close match.*** *Here you can see how closely I've matched the shape of the patch to the defective area.*

11 ***Tape and trace.*** *Stick the patch down with cloth-backed double-stick tape. Trace around the undercut edge with a utility knife. Remember that you don't want the patch to be too thin. A thin patch will get torn up when you remove it.*

12 ***Relieve your knife line.*** *Use a utility knife to make a relief cut all around the defective area in the scrap side.*

13 ***Chop and pare.*** *Chop out the waste with a chisel. The size of the repair dictates the width of the chisel. Use a 1/8" chisel in the tight corners. At tight points, lay the chisel on its side and use the point to remove material.*

14 ***Hog out the waste.*** *I use a butt-mortise plane (above) and a little router plane (right) to remove the bulk of the waste. The cutter on the router plane is about 1/4" wide.*

15 ***Almost done.*** *Show the patch to the excavation. Fuss and fit until it will go in. Glue it in with yellow glue. Use a hard block of wood and mallet to drive the patch in (no need for clamps). When dry, flush the patch with a plane or sandpaper.* **PW**

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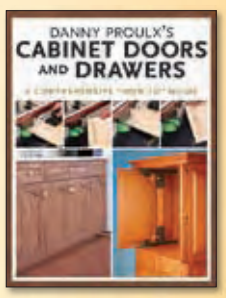

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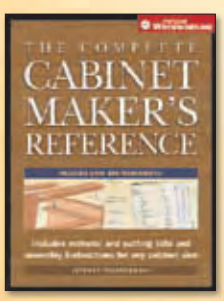

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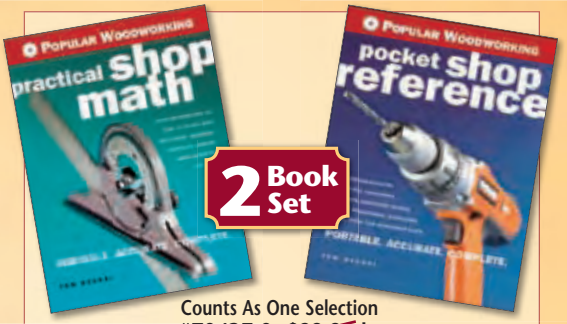

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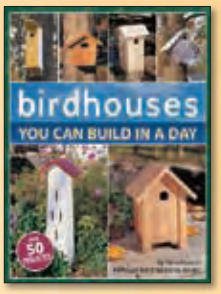

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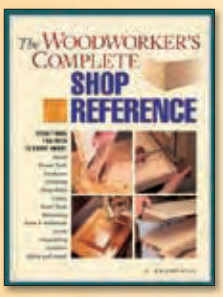

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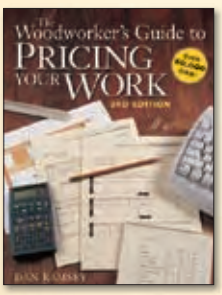

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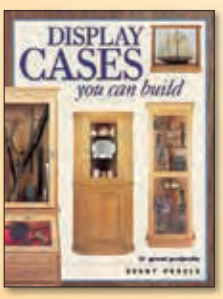

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BY GEOFFREY AMES

Sliding-head Scratch Stock

Two fences allow you to position the cutter and keep the bead's quirk in line.

Detail work. *Intricate details with small profiles can be easily produced with a scratch stock. This two-headed version is made from a length of dowel rod, an old hacksaw blade, scrap wood and two machine screws. You can make the jig quickly then make profiles that would be challenging for any router.*

If you have ever attempted to scratch a profile onto a chair leg or other curved piece, you probably noted that a scratch tool with a single fence is difficult to keep in line, and you run the risk of ruining the profile with one slip. To avoid possible mishaps, the double fence on this version makes the process a no-brainer.

The scratch stock shown here has a round section as the tool holder. The flat cutter is slipped into a slot in the tool holder, and secured by a screw in each of the movable heads. The round shape allows you to scrape a profile from either direction so you can counter changes in grain direction. The tool is simple to make, simple to use and can be adapted to myriad shapes that you can make using an old hacksaw or band-saw blade.

I use scratch stocks or beaders to make the combination corner beaded/ogee profile of Chippendale-style chairs and sofas. It is difficult to find router bits with an appropriately sized (tiny) quirk to form these shapes. You can obtain beading cutters with fine quirks from either Lie-Nielsen or Lee Valley Tools, or you can easily make your own.

Quick profiles. *Intricate detailed profiles can be cut quickly with a scratch stock, after the shape is formed.*

Scratch tools, scratch stocks or beaders are usually used in combination with work from the shaper, router or table saw, where the work is first shaped to a rough profile then scraped to the final profile. If, for example, you are making a block-front chest, you will need to form the drawer dividers following a template, then bead the dividers on both edges. You'll need a tool that will allow you to get into the low spots, and a small hand tool is a rewarding way to form the beads.

Simple to Use, Easy to Make

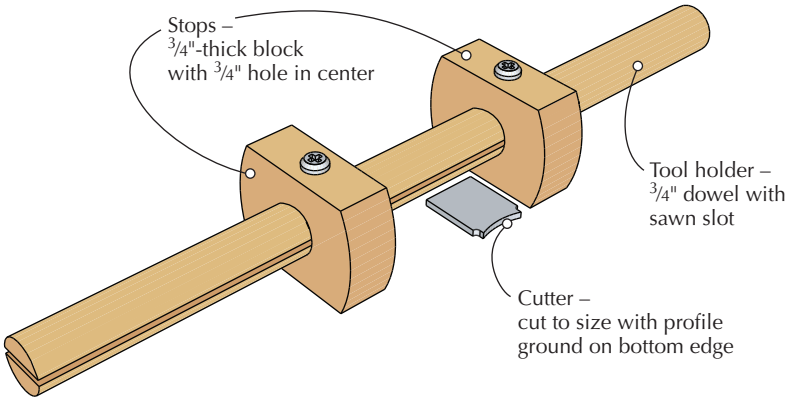
The first beader I ever used was made using a simple marking gauge with an extra head. The evolution from that tool is the basis for the sliding-head scratch tool shown here. You'll note that the tool can be made from readily available materials, and the process of making one is straightforward.

The sliding-head scratch tool is composed of a slotted $^{3}/_{4}$" dowel, two moving heads, a cutter, some threaded inserts and machine screws. The length of the dowel should be between 10"-12", and it is partially ripped on the band saw using a V-block as shown in the top right photo on the facing page. Stop the rip at about three-fourths of the length.

The two sliding heads are made from scrap wood, about $1^{1}/_{2}$"- $1^{3}/_{4}$" wide by 2"-$2^{1}/_{4}$" long. Rounding off the edges will make the tool more user-friendly. Drill a $^{3}/_{4}$"-diameter hole in the center of the face, and a $^{5}/_{16}$"-diameter hole drilled through the side and into the larger hole. This hole is then tapped for a $^{3}/_{8}$"-16 machine screw. The $^{3}/_{8}$"-16 machine screws act as set screws to hold the heads to the bar.

These work well if the tool is for one-time use, or is only used occasionally. I recom-

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



EXPLODED VIEW

Slot in the center. *A V-shaped fixture on the band-saw table holds the dowel in position to cut a slot down the middle.*

mend that you use threaded inserts for 1/4"-20 machine screws if you plan to use the tool often. The wood parts are easy to make, but adjusting these tools can be time consuming. If you are going to use different profiles, I'd recommend that you make several scratch stocks and leave them set up.

Buy the Cutter, or Make Your Own

For the cutting tools you can use pieces of old handsaws or band-saw blades, or scrapers. You can also buy commercial cutters from Lee Valley (800-871-8158 or leevalley.com) or Lie-Nielsen (800-327-2520 or lie-nielsen.com). To shape the cutters all you need is a grinder, various triangular, flat or round mill files, and a profile sketch. Because this tool makes a scraping cut and will be used in both directions, the edges don't need to be super sharp. Dress the edge with a fine file and you will be good to go.

Place the cutter in the slot in the tool holder, and slide a head on each end. Align the set screws so they pinch the cutter between the two halves of the dowel. Adjust the position of the heads to fit the width of the stock to be beaded. The heads need to slide freely, but not sloppy enough to distort the profile.

When Push Comes to Shave

The cutter should extend just enough to complete the profile cut. The first few cuts won't cut the entire profile, but the last few will. This will take a bit of experimenting on test pieces, but once the tool is set, you shouldn't need any further adjustments. Cuts are made by either pushing or pulling the tool, and if you are working on a curved surface, you will need to cut some areas in one direction and and other areas in the opposite direction.

Start with the cutter at about a 45° angle to the surface. Tilt the cutter toward or away from you until it produces a nice shaving. You'll be surprised at how well this works, and how quickly you can produce a detailed profile that you couldn't make with a router. **PW**

Geoffrey builds 18th-century period furniture and teaches at the Homestead Woodworking School in New Market, N.H.

Find the magic angle. *Start with the cutter at about a 45° angle and push or pull to produce a shaving. On curved work, you will need to reverse direction often to work with the grain.*

Faster than you think. *Generating a profile doesn't take long because you aren't removing much material at a time.*

BY JUDY DITMER

Lathe Tool Holder

Convenient tool storage for efficient turning.

Like many people, when I began turning, my biggest concern was trying to understand and remember the many things I had to do all at once just to achieve the most basic results. There were so many things to learn; efficiency just wasn't something I thought about for awhile.

But as my skills developed – or perhaps because they did – I noticed more and more one particular thing that was hugely annoying. There just wasn't any good place on the lathe to put the tools.

In easy reach. *This is the tool holder I nearly always use now when I turn. It sits on the far right of my lathe bed. The tools are easy to see and pick up, and they stay in place when I put them down.*

Location, Location, Location

For years (I don't like to say how many) I chased my turning tools around on a table next to the lathe, or I picked them up off the floor after they rolled off the lathe bed again and again. I often put the tools on the small shelf formed by the base of my smaller lathe, but they didn't really stay where I put them, and took up space that I wanted to use to lay out sandpaper and other items.

Also, the business ends of the tools weren't visible, so it sometimes took an extra moment or two to identify the one I was looking for. Worse, I'd occasionally bump the tip of a tool on some steel part of the lathe and have to run to the grinder to fix up the edge (also frequently necessary when the tool had been dropped on the concrete floor – somehow they always seem to hit on the edge).

When you turn for a living as I do, these things are very important. To maintain a reasonable pace in turning, especially with small production items, I need to be able to grab a tool (or anything else I need) quickly and almost without looking, and to replace it and have it stay where I put it.

Several possibilities were suggested in various sources. Here are two of them, along with why they didn't work for me: Keep a bucket of shavings next to the lathe and plant the tools in there (I couldn't see the tips, I had to bend over a lot when using small tools, and the bucket was in the way); or put them on a magnetic strip on the wall (there isn't any wall near my lathe – it's in the middle of the room).

Finally I decided I needed to figure out something that would work for the way I work. Because I was always putting the tools on the lathe bed to the right of the tailstock (even

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PHOTOS BY AL PARRISH

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though they were always falling off), clearly that was where they needed to be. It was a matter of keeping them there. That was the origin of this holder.

A Simple Solution

The base is 1/2" thick x 5 1/2" wide x 18" long (plywood would be fine; I just happened to have this nice piece of oak left over from a project). If you are using magnets to attach your holder, drill holes the depth and diameter of the magnets in the bottom of the base (use the 3/4" or 1" ones; their strength keeps the holder in place). The crosspieces begin as a piece 1 3/4" thick x 3 1/2" wide x 10" long. Drill four 1 1/2"-diameter holes evenly spaced along the center of the board; then cut it in half along the centerline. Sand the pieces to your satisfaction, and glue and screw the crosspieces to the base. Finish it if you like (mine is sprayed with lacquer), though it's not necessary. If you are using a clamp, now you can decide where it goes, and adjust it for your lathe.

The holder is quite simple to make. Measurements are approximate, and you can vary them greatly according to your situation and needs. If you do mostly large bowl work, you might want to make a much larger holder; for very small work, a smaller one. You might want a larger or smaller base, or more or fewer slots. A longer end on the base could provide a place to put finish, rags, etc. Think about your needs. You can make a holder that perfectly suits your situation, and it will make turning easier and more pleasant for you. And it will save a few trips to the grinder, as well. **PW**

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.

Supplies

For quick-release toggle clamps (several types and sizes):

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- **Woodcraft**
  800-225-1153 or woodcraft.com
- **Woodworker's Supply**
  800-645-9292 or woodworker.com

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- **Lee Valley Tools**
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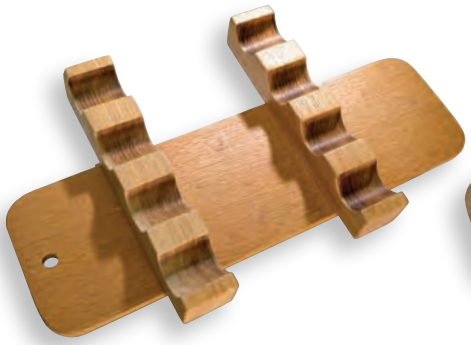

From the top. *The crosspieces are mounted toward the right so that the holder can be placed nearly at the very end of the lathe bed and not poke into the space occupied by the tailstock or by me. I chose to have four slots because a) the holder would become too unwieldy if too wide, and b) I seldom use more than four tools for any given kind of small turnings.*

From the bottom. *The rare-earth magnets are powerful and allowed me to place the tool holder in several positions. But I found I often knocked it off of the lathe bed by, say, leaning on it – so eventually I added the quick-release toggle clamp to make a more secure fastening. You'll need to select the clamp, then place and adjust it to fit your own lathe (as well as your needs for placement of the holder).*

In place. *Here is the holder in place, securely held by the toggle clamp. With the clamp (as opposed to the magnets), the holder can be placed at the end of the bed (with most of it hanging off the end) to allow more room for the tailstock to be moved.*

Two for the road. *Once I made the holder, I found it exceedingly annoying to work without it, so I made this travel version. It's really just the crosspieces, with magnets in the bottom to hold the pieces to the lathe.*

Attractive magnets. *The magnets are oriented so the pieces can be put together for storage or transport. These fit quite nicely into a suitcase.*

The travel holder in use. *Just line up the two pieces on the lathe bed. Very large, long-handled tools won't stay in place because you can't get the two pieces sufficiently far apart. But for fairly small tools, this works well. It saves my sanity on trips.*

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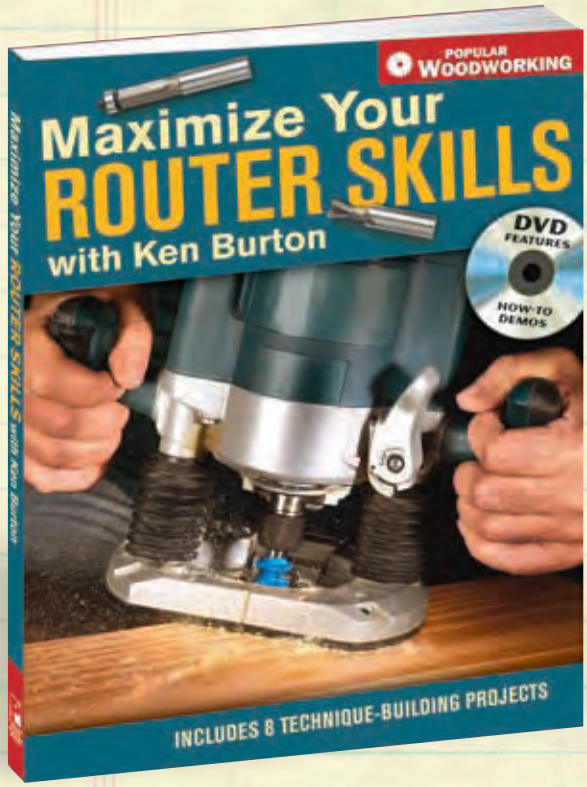

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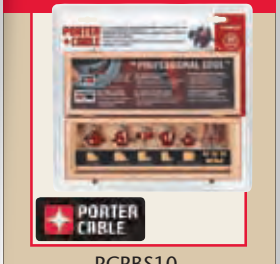

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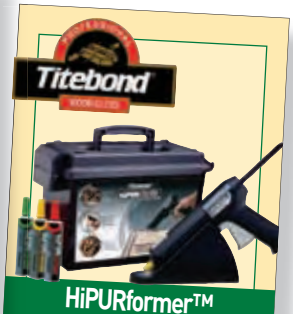

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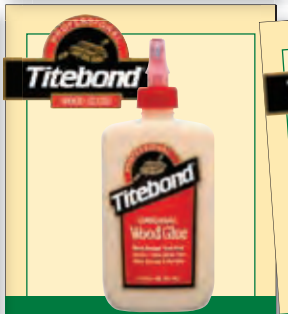

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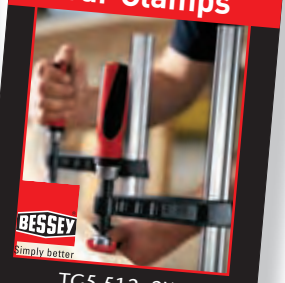

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BY BOB FLEXNER

Finish Compatibility

Discover what finishing products work well together.

I'm sure you've come across cautions in woodworking books and magazines instructing you to "use a compatible product" – stain, filler, glaze, finish – and you've wondered, "What is compatible, and what isn't?"

The phrase, "use a compatible," is a "cover-my-behind" dodge used by authors who have little understanding of finishes. If you follow their procedures and then have problems, it must be your fault for using an "incompatible" product. The burden is on you to know what is compatible and what isn't.

So what is compatible with what?

Three entirely different situations can be referred to by the word "compatible:"

- Mixing liquids with liquids;
- Applying stains, fillers, glazes and finishes; and
- Coating over an existing finished or painted surface.

As I explain each of these, you will see that the issue of compatibility has been greatly exaggerated. In most cases, it's obvious which liquids mix. Almost any finishing product can be applied over any other as long as the previous is dry. And almost any finish can be applied over almost any old surface as long as it is clean and dull.

Mixing Liquids

Most products you use in finishing (or painting) are water-based or mineral-spirits-based. All water-based mix successfully, and all mineral-spirits-based mix successfully. But the two cannot be mixed together.

Wax mixed with varnish works well only if you wipe off all the excess after each coat, just as with wax mixed with oil.

It's easy to know when two products don't mix: they separate. For this reason it's wise to use a glass jar for mixing if you have any question, so you can see what's happening.

Mixing liquids. *Just as all finishing products that thin with water can be mixed, so can all finishing products that thin with mineral spirits (paint thinner). Here I'm adding some stain of one brand to some polyurethane of another to make a "varnish stain," a stain that can be left a little thicker on the wood or over another coat of finish.*

Applying Finishes

Almost any finishing product – stain, filler, glaze, finish – can be applied successfully over any other finishing product, except wax (including residue wax from paint strippers), as long as that product is dry. This includes every finish over boiled linseed oil, and water-based finishes over oil stains. You might need to give the oil-based product several days or a week to dry in a warm room, but once dry every finish will bond fine without problems.

Think of painting a piece of furniture you finished several years earlier with oil. You wouldn't hesitate using a water-based paint.

There are several fairly uncommon exceptions to this rule.

One is brushing a product that contains the solvent for an underlying stain. For example, if you brush a water-based finish over a water-soluble dye that doesn't contain a binder, you will smear the dye and cause the coloring to be uneven. The same is true if you brush lacquer over a lacquer stain. The lacquer-thinner solvent in the lacquer will dissolve the stain and your brush will smear it.

But there's no problem spraying because no smearing can occur.

If you need to brush a water-based finish over a water-soluble stain or lacquer over a lacquer stain – to match a color, for example – you can apply a barrier coat of shellac or varnish in between. Shellac is usually the better choice.

PHOTOS BY THE AUTHOR

Another exception is applying lacquer over varnish, though I don't know why you would do this. The lacquer thinner in the lacquer may cause the varnish to blister. Spray light coats to begin with or apply a barrier coat of shellac.

Also, high-performance coatings such as conversion varnish, polyester and UV-cured finishes have special rules for application. Few readers of *Popular Woodworking* use these finishes, but if you do, be sure to follow the manufacturer's instructions.

Coating an Old Surface

Almost any paint or finish can be applied over almost any old paint or finish as long as the surface is clean and dull.

It's pretty obvious how bonding problems could occur if you apply paint or finish over a greasy or waxy surface, or over a surface that is covered with dirt (such as a deck). So the first rule is that the surface be clean.

Because there are two types of dirt, solvent-soluble and water-soluble, there are two types of cleaner: petroleum distillate (mineral spirits and naphtha) and water, or soap-and-water. Petroleum distillate won't remove dirt on a deck, and water won't remove grease or wax.

Some strong cleaners, such as household ammonia and TSP (available at paint stores), will usually remove both, however. Also, abrading the surface with sandpaper, steel wool or an abrasive pad will usually remove both types of dirt, along with the top surface of the coating – paint or finish.

The surface also has to be dull to get a good bond. Liquids don't flow out and "wet" glossy surfaces well. Think of water beading on a car or glossy tabletop.

You can dull any surface using sandpaper, steel wool or abrasive pad, and many times you can dull the surface adequately with one of the strong cleaners – a little household ammonia in a bucket of water or TSP in water. Depending on the paint or finish you're trying to dull, solvent-based "degreaser" and "liquid sandpaper" also often work. It won't hurt to try; you can always follow with an abrasive.

Besides "wetting," the reason a surface has to be dull is to create a "mechanical" bond between the new coating and the existing one. Dullness always indicates an uneven surface containing scratches, bumps or other irregularities that give the new coating something to lock into and grip. This is sometimes called "tooth."

Mixing finishes. *Almost any finishing product can be applied over any other as long as the "other" is dry and the product you're brushing doesn't dissolve and smear the existing. I applied a water-soluble dye to this mahogany. Then I applied a thin shellac "washcoat" as a barrier so the water-based paste wood filler I used wouldn't dissolve and smear the dye. After the filler dried, I brushed polyurethane. I alternated water-based, alcohol-based and mineral-spirits-based without any problems because each previous product was dry.*

Coin test. *The easy way to test the bonding of a finish is to scratch it with the edge of a coin. If you can scratch off a layer (as is the case here) rather than merely dent it, the finish isn't bonded well.*

There are three situations, however, where coating over an existing coating can be problematic.

The first is when using any finish that contains lacquer thinner. This solvent can cause any old coating, even lacquer itself, to blister. To avoid blistering, spray several light coats and let them dry thoroughly before spraying fully wet coats. Or apply a coat of shellac first and then still spray a light coat of lacquer to begin with. Brushing lacquer is always risky because you can't brush light coats.

The second is when coating over a high-performance finish that has been applied in a factory or professional shop. Bonding can be weaker even with a clean-and-dull surface.

Also, water-based finish and latex paint don't bond as well to existing coatings as do solvent-based paint and finish.

Testing for a Good Bond

So you need to know how to test for a good bond. There are two ways.

Clean and dull. *The rule for coating successfully over an old surface is that the existing surface has to be clean and dull. So before applying another coat of finish to this 25-year-old lacquered cabinet door, I washed it with household ammonia and water. Ammonia cleans kitchen grease and dulls most finishes in one step.*

Masking tape test. *A more accurate method for testing adhesion is to make a half-dozen cuts into the finish in perpendicular patterns using a razor blade, with each cut about a millimeter apart and an inch long. Then press masking tape over the cuts and lift it quickly. If the edges of the cuts remain fairly clean, as they are here, the bond is good.*

The easiest is to press the edge of a coin into the newly applied coating after it has fully dried and drag the coin a few inches. You should just dent the surface, not separate the newly applied coating.

Another method is to use a razor blade to make perpendicular cuts into the coating about a millimeter apart and an inch long. Then press masking or other sticky tape over the cuts and pull it up quickly. The cleaner the cuts remain after removing the tape, the better the bond.

Of course, you should perform both these tests on an inconspicuous area or, better, scrap wood. **PW**

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

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BY ALAN COGGINS

Don't Fiddle With Success

In some professions, innovation can sink you.

Working from home, I get to hear a lot of radio talk shows and I am invariably frustrated when the day's guest is a small-business expert giving out advice on how to succeed in your latest venture.

They always roll out phrases such as "keeping ahead of the competition," "the need for constant innovation," "investment in research and development," "a willingness to be flexible," "the importance of thinking laterally and never standing still" and so on.

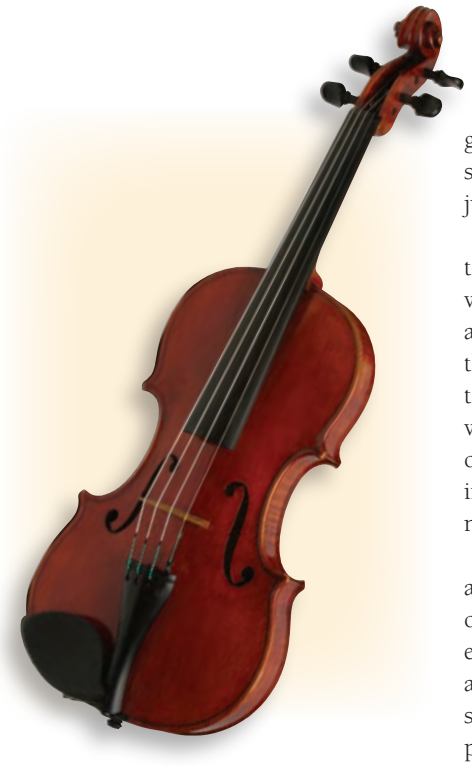
All generally useful advice, I'm sure, but completely irrelevant in my case.

I am involved in a business where my competitors have been dead for 250 years and still they outsell me. In my work, any attempt at innovation would be financial suicide; doing something radical would see most of my customers desert me, and even the slightest deviation from the norm is looked on with disdain. In fact, I am ideally expected to carry on doing things in pretty much the same way as they have been done for the past three centuries.

Most people believe that my craft was perfected by a man in Italy named Antonio Stradivari and since then it's basically been all downhill.

I am an anachronism: a violin maker working in the 21st century, when violin-making was all the go in 1700.

Today's world isn't the place for someone like me. I make a product that will not only be good for the next 300 years, but will actually improve with age – not exactly what you would call built-in obsolescence. This is a rather unusual concept at a time where computers are out of date before they are unpacked from their boxes, where to be seen in a car more than a few years old is a social disgrace and where people change their houses almost as often as they change their socks.



We also live in the age of apparent perfection. Profile routers, laser-cut edges, injection molding – modern manufacturing processes ensure that almost every object we see and handle is perfectly formed, symmetrical and flawless (at least until the warranty expires).

So the ability to produce something exact and beautiful just by working slowly and carefully with only a few simple hand tools is not particularly understood, let alone much appreciated.

Most visitors to the workshop find my painstaking approach unsettling. After about five minutes they begin to suggest faster, more efficient ways I could make a violin, usually by introducing some sort of mechanization or mass-production. It is particularly incomprehensible to them that there are actually many things about our craft that, even with 300 years of technological advances, have still never been bettered. The animal glue, for instance, that Stradivari used is still the best glue for the job. We have invented stronger glues, certainly, but they don't have the necessary qualities of reversibility combined with just the right amount of strength.

In a way, it is strangely relaxing not to have to worry about devising new and different ways to do the same job. I look with sympathy at other business owners who spend half of their time coming up with gimmicks to make their widget stand out in a crowd of similar widgets. Nor do I have to spend much time on researching developments in violin making, testing the latest materials or trying out new methods.

In fact, a violin maker's claim to fame usually depends on advertising his complete lack of invention: "Varnish as used by violin makers in Cremona circa 1700," "violas based on a model by Andrea Guarneri of 1676" and so on. On the other hand, this puts us in the position of having to prove ourselves against 300 years of competition.

Unfortunately, the current fascination for owning the newest and latest merchandise does not extend to most string players, who readily perpetuate the great myth that "old instruments are better than new." In reality it is like most things in life – some old things are wonderful and deserve great respect, while many others should be taken out and quietly given a decent burial. And modern instruments fall somewhere in between.

However, such is the aura of the older instruments that people will happily spend thousands of dollars trying to change a sow's ear into a silk purse before they would even begin to consider trying something new.

Still, it's a peaceful life – and I do get to listen to a lot of radio. **PW**

Alan is a violin maker and repairer, and author, who lives and works in the Blue Mountains, near Sydney, Australia. His web site is abcviolins.com. This article was first published in the Sydney Morning Herald *in 2002.*

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