13" PORTABLE PLANER TEST – WE REVEAL THE BEST

JIM TOLPIN'S RIP-FENCE JIG: SIMPLE, ACCURATE & VERSATILE

FEBRUARY 2004
ISSUE #139

Popular Woodworking

14 MUST-KNOW ROUTER JOINTS

The Best Techniques, The Ultimate Jig

Upgrade Your Workbench

10 Tweaks Make Everything Easier

PLUS

- Why Wax is a Poor Finish
- Eames-style Coffee Table
- Finally! Affordable Rip Dozukis

popwood.com
$4.99 U.S. $7.99 CAN
02>
0 71486 01355 6

Grizzly Industrial

NO DEALERS, NO MIDDLEMEN • BUY DIRECT & SAVE!

2 HP DUST COLLECTOR

- Motor: 2 HP, 220V, single-phase, 3450 RPM
- Air suction capacity: 1550 CFM
- Static pressure: 11"
- 6" inlet has removable "Y" fitting w/ two 4" openings
- Standard bag filtration: 30 microns
- Height with bag inflated: 78"
- Approx. shipping weight: 123 lbs.

FREE cyclone separator with purchase of G1029

G1029 ~~$279.95~~

$55 shipping anywhere in lower 48 states

ONLY $249.95

THE ULTIMATE 10" CONTRACTOR-STYLE TABLE SAW

- Motor: 2 HP, 220V, single-phase
- Precision ground cast iron table w/wings measures: 27" x 39⅝"
- Arbor: ⅝" • Rip capacity: 30"
- Cutting capacity: 3⅛" @ 90°, 2⅛" @ 45°
- Shop Fox® Aluma-Classic™ Fence
- Approx. shipping weight: 298 lbs.

New!

Made in an ISO 9001 factory!

T-Series

Precision-ground table & wings for a mirror-like finish & the ultimate in accuracy!

G0444Z

Introductory price

$75 shipping anywhere in lower 48 states

ONLY $525.00

10" TILTING ARBOR SUPER HEAVY-DUTY TABLE SAW

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table
- Table size w/ wings attached: 27" x 40"
- Arbor diameter: ⅝" (accepts dado blades up to 13/16")
- Cutting capacity: 8" left & 26" right of blade
- Approx. shipping weight: 420 lbs.

Includes Shop Fox® Classic Fence

G1023S ~~$895.00~~

$75 shipping anywhere in lower 48 states

ONLY $825.00

POWER FEEDERS

½ HP POWER FEEDER

- Motor: ½ HP, 220V, single-phase, 4 amp
- Number of speeds: 4
- Feed speeds: 9.5, 15, 25 & 38 FPM
- Rotation: forward & reverse
- Rollers: 3 synthetic rubber
- Roller size: 2" W x 4" dia.
- Approx. shipping weight: 107 lbs.

G4179

$55 shipping anywhere in lower 48 states

ONLY $599.95

¼ HP POWER FEEDER

Our most popular feeder!

- Motor: ¼ HP, 110V, single-phase, 1.8 amp
- Number of speeds: 4
- Speed range: 20, 26, 33 & 43 FPM
- Rotation: forward & reverse
- Approx. shipping weight: 80 lbs.

$40 shipping anywhere in lower 48 states

G4176 ONLY $399.95

1½ HP SHAPER

(SHOWN WITH OPTIONAL WING G1706)

- Motor: 1½ HP, 110V/220V, single-phase
- Precision ground cast iron table
- Table size: 20¼" x 18"
- 2 interchangeable spindles: ½" & ¾"
- Spindle travel: 3"
- Spindle openings: 1¼", 3½", & 5"
- 2 spindle speeds: 7000 & 10,000 RPM
- Max. cutter diameter: 5"
- Approx. shipping weight: 220 lbs.

Includes miter gauge & fence

G1035

ONLY $425.00

$55 shipping anywhere in lower 48 states

3 HP SHAPER

- Heavy-duty 3 HP, 220V, single-phase motor w/reversing switch
- Precision ground cast iron table
- Table size with standard wing attached: 30½" x 28¼"
- 3 interchangeable spindles: ½", ¾" & 1"
- 2 spindle speeds: 7,000 & 10,000 RPM
- Spindle travel: 3"
- Spindle openings: 1⅜", 2¾", 4", and 5½"
- Approx. shipping weight: 357 lbs.

Hottest shaper in the USA!

Includes miter gauge & fence w/ hold-down springs

G1026

ONLY $835.00

$75 shipping anywhere in lower 48 states

6" X 47" JOINTER w/ HANDWHEELS

- Motor: 1 HP, 110V/220V, single-phase
- Precision ground cast iron table
- Cutterhead: 3 HSS knives
- Maximum depth of cut: ½"
- Rabbeting capacity :½"
- Handwheels for table height adjustment
- Heavy-duty center mounted fence
- Approx. shipping weight: 225 lbs.

FREE PAIR OF SAFETY PUSH BLOCKS

G1182HW

$55 shipping anywhere in lower 48 states

ONLY $325.00

6" x 60" ANNIVERSARY EDITION JOINTER w/ SPIRAL CUTTERHEAD

- Motor: 1½ HP, 110V/220V, single-phase
- Precision ground cast iron table
- Table size: 7¼" x 60"
- Cutterhead speed: 4800 RPM
- Maximum depth of cut: ⅛"
- Heavy-duty center mounted fence
- Approx. shipping weight: 280 lbs.

New!

FREE PAIR OF SAFETY PUSH BLOCKS

G0526

Introductory price

ONLY $850.00

$55 shipping anywhere in lower 48 states

8" X 75" JOINTER w/ SPIRAL CUTTERHEAD

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table
- Table size: 8" x 75" includes two 5" extensions
- Spiral cutterhead reduces tear-out
- Cutterhead speed: 5500 RPM
- Maximum depth of cut: ½"
- Heavy-duty center mounted fence
- Approx. shipping weight: 484 lbs.

New!

G0543

Introductory price

ONLY $1195.00

$75 shipping anywhere in lower 48 states

FREE PAIR OF SAFETY PUSH BLOCKS

5667

MEDIA CODE AD2005

LEASE FINANCING AVAILABLE Call for Details

1-800-523-4777

Customer Service: 570-546-9663 csr@grizzly.com FAX: 1-800-438-5901

3 SHOWROOM LOCATIONS:
BELLINGHAM, WA
SPRINGFIELD, MO
MUNCY, PA

CIRCLE NO. 125 ON FREE INFORMATION CARD.

PURVEYORS OF FINE MACHINERY®

- OVER 830,000 SQUARE FEET PACKED TO THE RAFTERS WITH MACHINERY & TOOLS
- 2 OVERSEAS QUALITY CONTROL OFFICES STAFFED WITH QUALIFIED GRIZZLY ENGINEERS
- HUGE PARTS FACILITY WITH OVER 1 MILLION PARTS IN STOCK AT ALL TIMES
- TRAINED SERVICE TECHNICIANS AT EACH LOCATION • MOST ORDERS SHIPPED THE SAME DAY

THE NEW GRIZZLY 2004 CATALOG!
516 FULL-COLOR PAGES OF HIGH QUALITY MACHINES, TOOLS & ACCESSORIES!
AVAILABLE JAN. 1, 2004.
CALL FOR YOUR FREE COPY!

THE ULTIMATE 14" BANDSAW

- Motor: 1 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table
- Table tilt: 45° right, 10° left
- Floor to table height: 43 5/16"
- Deluxe extruded aluminum fence
- Cutting capacity/throat: 13½"
- Maximum cutting height: 6"
- Blade size: 92½" - 93½" long (⅛" – ¾" wide)
- 2 blade speeds: 1500 & 3200 FPM
- 4" dust port
- Approx. shipping weight: 198 lbs.

BEST NEW TOOL

MADE IN ISO 9001 FACTORY

G0555

$55 shipping ANYWHERE IN LOWER 48 STATES

ONLY $375.00

17" HEAVY-DUTY BANDSAW

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table
- Table tilt: 45° right, 10° left
- Floor to table height: 37½"
- Cutting capacity/throat: 16¼"
- Maximum cutting height: 12"
- Blade size: 131½" long (⅛" - 1" wide)
- 2 blade speeds: 1600 & 3300 FPM
- Two 4" dust ports
- Approx. shipping weight: 342 lbs.

CAST IRON FENCE, MITER GAUGE & ½" BLADE INCLUDED

MADE IN ISO 9001 FACTORY

G0513

$75 shipping ANYWHERE IN LOWER 48 STATES

ONLY $750.00

19" HEAVY-DUTY BANDSAW

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table
- Cutting capacity/throat: 18¼"
- Max. cutting height: 12"
- Blade size: 143" long (⅛" - 1¼" wide)
- 2 blade speeds: 1700 & 3500 FPM
- Two 4" dust ports
- Approx. shipping weight: 385 lbs.

CAST IRON FENCE, MITER GAUGE & ¾" BLADE INCLUDED

MADE IN ISO 9001 FACTORY

G0514

$75 shipping ANYWHERE IN LOWER 48 STATES

ONLY $950.00

12½" LEAN & MEAN PORTABLE PLANER

- Motor: 2 HP, 110V, single-phase
- Max. cutting width: 12½"
- Max. cutting depth: 3/32"
- Max. cutting height: 6"
- Min. board thickness: 13/64"
- 2 double edged HSS knives
- Feed rate: 32 FPM
- On/off toggle switch
- Cutterhead speed: 10,000 RPM
- Cuts per inch: 52
- Approx. shipping weight: 78 lbs.

HOT!

$35 shipping ANYWHERE IN LOWER 48 STATES

G0505

ONLY $195.00

15" PLANER w/ CLOSED STAND

- Motor: 3 HP, 220V, single-phase
- Max. cutting width: 14⅞"
- Max. cutting depth: ⅛"
- Max. cutting height: 6½"
- Min. board thickness: ¼"
- 3 HSS knives
- Feed rate: 16 & 20 FPM
- Cutterhead speed: 5000 RPM
- Cuts per minute: 15,000
- Approx. shipping weight: 560 lbs.

New!

ROLLER EXTENSION TABLES FEATURE 3 ADJUSTABLE ROLLERS

G0551

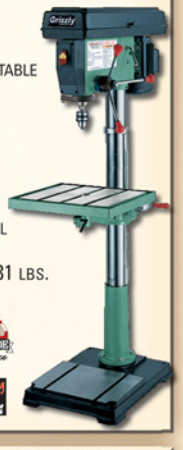
INTRODUCTORY PRICE

ONLY $675.00

$125 shipping ANYWHERE IN LOWER 48 STATES

12 SPEED 20" FLOOR DRILL PRESS

- Motor: 1½ HP 110V/220V, single-phase
- Precision ground cast iron table
- Table size: 18¾" x 16¾"
- Spindle taper: MT#4
- Spindle travel: 4¾"
- Swing: 20"
- Drill chuck: ⅝"
- 12 Speeds: 210 - 3300 RPM
- Drilling capacity: 1¼" steel
- Overall height: 70"
- Approx. shipping weight: 331 lbs.



NICE MACHINE!

TOOL BUYING GUIDE Editor's Choice

G7948

ONLY $425.00

$75 shipping ANYWHERE IN LOWER 48 STATES

OSCILLATING SPINDLE/ 12" DISC SANDER

- Motor: 1 HP, 110V, TEFC
- Cast iron 14½" square oscillating sander table
- Cast iron 17½" x 10" disc sander table
- Four spindle sizes: ¼", ⅝", 1½" & 2"
- Spindle speed: 1725 RPM
- Spindle oscillations: 60 SPM
- Stroke length: 1"
- 2 – 2" dust ports
- Approximate shipping weight: 180 lbs.

New!

$55 shipping ANYWHERE IN LOWER 48 STATES

G0529

INTRODUCTORY PRICE

ONLY $395.00

24" DRUM SANDER W/ VARIABLE SPEED

- Drum motor: 5 HP, 220V, single-phase
- Conveyor motor: ¼ HP, variable speed
- Sanding drums: 2 computer balanced aluminum
- Max. stock size: 23½" x 4¼" thick
- Hook & loop sandpaper
- Control panel w/ amp load meter
- Dust ports: Two 4"
- Approx. shipping weight: 489 lbs.

VARIABLE SPEED!

Z SERIES

$75 shipping ANYWHERE IN LOWER 48 STATES

G1066Z

ONLY $1595.00

15" WIDE-BELT SANDER (OPEN END)

- Sanding drum motor: 5 HP, 220V, single-phase
- Feed belt motor: ¼ HP
- Conveyor speed: 13.1 & 16.4 FPM
- Amp meter
- Pneumatic belt tensioning & tracking
- Disc brake for emergency stops
- Includes extended support bar for wide boards
- Approx. shipping weight: 908 lbs.

$150 shipping ANYWHERE IN LOWER 48 STATES

G9983

ONLY $2795.00

VISIT OUR WEBSITE FOR INFORMATION ON CURRENT SPECIALS & COMING EVENTS!

grizzly.com

VISA MasterCard AMERICAN EXPRESS DISCOVER NOVUS

1 FULL YEAR WARRANTY GRIZZLY Power Tools & Machinery

CIRCLE NO. 125 ON FREE INFORMATION CARD.

TWO GREAT BRANDS.
TWO ~~ONE~~ GREAT DEALS

708663DXK left-tilt
708715DXK right-tilt

Buy the best-selling JET XACTA® SAW and get a BOSCH Router FREE.

Priced at just $1,699, the 10" XACTA® SAW, with a powerful 3HP motor, and packaged with the XACTA® LIFT with a deluxe router fence, is a great deal. And now it's even better! Because if you buy this XACTA® SAW package now, we'll upgrade your purchase to include our new Premier MicroAdjust Fence...that's a $100 value!

But that's not all. You'll also get a Bosch Router...**absolutely free**. Valued at $189, the Bosch 2-1/4HP electronic, variable-speed router is the top choice. **This complete package saves you a total of $289!**

708663MBK left-tilt
708715MBK right-tilt

And now we have a second XACTA® SAW package to offer you! This saw features the Premier MicroAdjust Fence upgrade, plus a **free** mobile base and extension kit, **a package valued at $229!**

For more details on either one of these great XACTA® SAW specials, visit your local dealer, www.jettools.com, www.bosch.com, or call 1-800-274-6848.

JET®

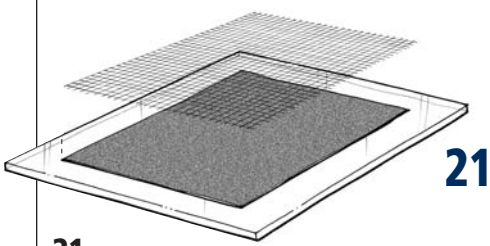
Offer valid September 1, 2003 through April 30, 2004.
CIRCLE NO. 128 ON FREE INFORMATION CARD.

Powermatic, Performax and JET. A Family of Brands.

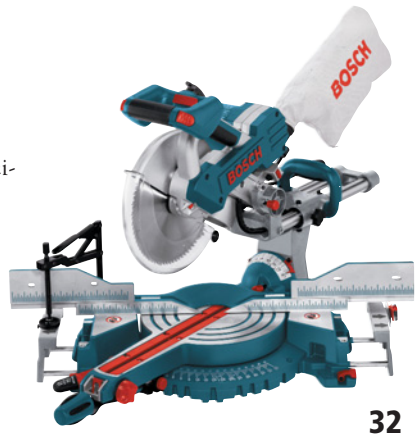
contents

Popular Woodworking

IN EVERY ISSUE



21



32

34

38

92

100

Popular Woodworking (ISSN 0884-8823, USPS 752-250) is published seven times a year in February, April, June, August, October, November and December by F&W Publications Inc. Editorial and advertising offices are located at 4700 E. Galbraith Road., Cincinnati, Ohio 45236; tel.: 513-531-2222. Unsolicited manuscripts, photographs and artwork should include ample postage on a self-addressed, stamped envelope (SASE); otherwise they will not be returned. Subscription rates: A year's subscription (7 issues) is $28; outside of U.S. add $7/year ▪ Canada Publications Mail Agreement No. 40025316. Canadian return address: 2744 Edna St., Windsor, ON N8Y 1V2 ▪

Periodicals postage paid at Cincinnati, Ohio, and additional mailing offices. Postmaster: Send all address changes to Popular Woodworking, P.O. Box 5369, Harlan, IA 51593 Canada GST Reg. # R122594716 ▪ Produced and printed in the U.S.A.

Wh Tool JET AD Spread
Pg. 4 T/K

Wh Tool JET AD Spread
Pg. 5 T/K

ON THE COVER

In this issue we pay homage to the king of the joint-cutting power tools: the router. Check out Nick Engler's Joint Maker jig (page 77), Bill Hylton's "Power-tool Joinery" column (page 38) and, of course, our special section on the router (page 49) that's devoted to router joinery.

Cover photo by Al Parrish

DEPARTMENTS

PROJECTS, TOOLS AND TECHNIQUES

WITH THE RIGHT TOOLS YOU CAN MAKE JUST ABOUT ANYTHING. INCLUDING A GREAT DEAL.

For a limited time, JET tools are being offered at incredible prices, with savings of $30 to $150. So first you get a great deal. And then you get to make a project to be proud of. Choose from eight quality tools – from mini lathes to variable speed mini lathes, from dust collectors and sanders to bandsaws. No matter which one you pick, you'll get a great price.

Plus an exclusive, limited lifetime warranty that you only get from JET. So make your way to your JET distributor, jettools.com, or call 800-274-6848.

Savings based on average retail prices.

Only the JET Family of Brands offers you a Limited Lifetime Warranty.

JET

Powermatic, Performax and JET.
A Family of Brands.

CIRCLE NO. 129 ON FREE INFORMATION CARD.

Popular Woodworking®

February 2004, Vol. 24 No. 1

popwood.com

Editorial Offices 513-531-2690

Editor & Publisher **Steve Shanesy**
ext. 1238 • steve.shanesy@fwpubs.com

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

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

Senior Editor **David Thiel**
ext. 1255 • david.thiel@fwpubs.com

Associate Editor **Kara Gebhart**
ext. 1348 • kara.gebhart@fwpubs.com

Associate Editor **Michael A. Rabkin**
ext. 1327 • michael.rabkin@fwpubs.com

Project Illustrator **John Hutchinson**

Photographer **Al Parrish**

Contributing Editors
Nick Engler, Bob Flexner, Glen Huey, Don McConnell, Troy Sexton

Magazine Group Head **David Hoguet**
Executive Vice President Magazine Advertising
Jim Gleim

CIRCULATION
Mark Fleetwood, *Group Circulation Manager*

PRODUCTION
Barbara Schmitz, *Vice President*
Vicki Whitford, *Production Supervisor*

ADVERTISING
Don Schroder, *Advertising Director*
331 N. Arch St., Allentown, PA 18104
Tel. 610-821-4425; Fax 610-821-7884
d.schroder@verizon.net

Marketplace/Classified Advertising Sales
Barbara J. Gasper
6552 Kings Highway S., Zionsville, PA 18092
Tel./Fax 610-967-1330
bjgasper@entermail.net

Advertising Production Coordinator
Debbie Thomas, Tel. 513-531-2690 ext. 1219
debbie.thomas@fwpubs.com

SUBSCRIPTION SERVICES: Subscription inquiries, orders and address changes can be made at popwood.com (click on "Customer Service FAQs"). Or by mail: Popular Woodworking, P.O. Box 420235, Palm Coast, FL 32142-0235. Or call 877-860-9140 or 386-246-3369. Include your address with all inquiries. Allow 6 to 8 weeks for delivery.

NEWSSTAND DISTRIBUTION: Curtis Circulation Co., 730 River Rd., New Milford, NJ 07646

ATTENTION RETAILERS:
To carry *Popular Woodworking* in your store, call Steve Hudziak at 800-894-4656 or write Magazine Retail Sales, Steve Hudziak, P.O. Box 5014, Iola, WI 54945-5014.

Back issues are available for $7 ($9 Canada; $11 other foreign). Send check or money order to: *Popular Woodworking* Back Issues, F&W Publications Products, 700 E. State St., Iola, WI 54990. Or call 800-258-0929. Please specify publication, month and year.

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

A Stacked Dado Set With No Shims Needed?

SD608
Dial-A-Width Dado Set

Introducing Freud's New Dial-A-Width Stacked Dado Set

U.S. Patent No. 5,368,079

Choose Freud's Dial-A-Width Stacked Dado Set, which is a must for fast, easy, and accurate flat-bottom dado cuts.

No More Shims

For a perfect fit every time, all you need to do is dial. Freud's SD608 Dial-A-Width Dado set performs like an ordinary stacked dado set, but the shims have been replaced with a patented dial system, which allows you to adjust the width via an exclusive dial hub capable of micro adjustments. Each "click" of the dial adjusts the blade by .004"– that's thinner than a sheet of paper. The adjustable width range for the dial is 1/4" to 29/32".

Easy and Accurate

Freud's innovative adjustable-hub design not only eliminates the need for shims, but allows you to fine tune the width of the dado without ever removing the dado cutter from your table saw. No more wasted time making adjustments and re-adjustments. A simple click of the dial ensures accuracy the first time.

Flawless Finish

The SD608 features the same premium materials and quality as all of Freud products. The blade bodies are laser cut for extreme accuracy, and the precision-ground arbor holes ensure precise blade alignment on any table saw. The MicroGrain carbide is manufactured specifically by Freud for splinter-free, flat-bottom grooves in all materials—including problem materials like veneered plywood or melamine.

Choose the dado set that produces the best finish and highest-quality cuts of any dado set today– choose Freud. Whether you're a production shop, custom woodworker, or serious woodworker, Freud makes it easy for you to endlessly create dadoes with flawless flat-bottom grooves.

For Freud's full line of high quality dado sets, go to: www.freudtools.com

CIRCLE NO. 120 ON FREE INFORMATION CARD.

Cuts Clean Flat-Bottom Dadoes in:

freud®
The Psychology of Woodworking

(U.S.) 1-800-472-7307
(CANADA) 1-800-263-7016

Join the Club or Get Some Class

One drawback to woodworking is that it tends to be a solitary activity. Don't get me wrong, I enjoy my time alone in the shop, away from all the stress of my "other world." And to some degree, this solitude may attract some people to woodworking.

But life has taught me that reaching outside my world almost always brings back benefits I couldn't have imagined.

There are several ways to get out of the shop and still develop your woodworking skills and knowledge. Here's a short list of ideas to consider for the coming year.

• Join a club focused on the aspect of woodworking that you enjoy most. There are clubs for general woodworking, woodturning, carving, scrollsawing and instrument making (who are known as luthiers). A quick survey of the Internet turned up more than 125 general woodworking clubs, about 250 carving clubs and close to 200 turning clubs scattered throughout the United States and Canada.

Woodworking clubs are a great place to meet nice people who share your interest, and you'll learn a lot, too. Just about every club meeting includes some time dedicated to building knowledge and skills. Sometimes club members make presentations; other times experts from outside the club speak.

You can learn a lot just by listening. Better yet, you can ask questions about problems you might be experiencing in your shop. And don't overlook the possibility that you might have the answer to a problem that a club member is experiencing. You don't have to be a charter member to know something.

• Sign up for a woodworking class or attend a woodworking school. There are classes and schools for every aspect of working in every state and province.

Many schools have opened in the past several years and most are doing well, a testament to the positive experience attendees are having. Many schools offer five-day classes or weekend classes. Woodworking stores, such as Woodcraft and Rockler, also offer evening and weekend classes. In fact, Woodcraft is vastly expanding its education program with the establishment of Woodcraft University, where you can earn college credits for certain woodworking programs.

At the "sleepover" schools, where your class lasts a week or so, you'll focus on advancing your skills exponentially. Most schools offer small classes, which means lots of individual attention from instructors. Many attendees see their week at school not as work, but more as a mini-vacation!

• Attend a woodworking show. There are numerous shows around the country and they offer a lot. Of course you can check out the newest tools and sometimes buy equipment at a discount, but many shows also offer excellent demonstrations by some of the country's leading woodworkers.

No matter what you do I bet you'll see that woodworkers and people associated with the craft are a really nice group of folks. I've found this to be the case with our readers, contributors, people at shows, equipment manufacturers and even editors at competing woodworking magazines. The point is that meeting up with any group of woodworkers is bound to be a pleasant experience.

Make a New Year's resolution to expand your woodworking horizons by getting out of the shop and into a club, school or woodworking show. You'll learn a lot and meet some wonderful woodworkers. And like a box of Cracker Jack, you'll discover that unexpected surprise that happens every time you take the initiative and do something new – you become better. **PW**

Steve Shanesy
Editor & Publisher

CONTRIBUTORS

JIM TOLPIN

A professional woodworker for more than 30 years, Jim Tolpin has spent his career doing finish carpentry, cabinetmaking and building boats and English gypsy caravans. While running his own custom cabinet shop, Tolpin wrote a manual for his new employees to read. That manual turned into his first book, "Working at Woodworking" (Taunton Press). Today, Tolpin is the author of 12 books, including the second edition of "Jim Tolpin's Table Saw Magic," in bookstores now. Aside from drawknives and spokeshaves, the table saw is his favorite woodworking tool, one that he still uses with extreme caution. (Tolpin has seen a table saw turn on all by itself – the switch was caked with sawdust.) To learn how to build Tolpin's universal fence fixture for the table saw, see page 84.

BILL HYLTON

You'd think that a joinery expert would have a favorite joint to use in his personal projects. But for Bill Hylton, the fun part of writing our "Power-tool Joinery" column (on page 38) is learning something new: "Here's a joint. How many different ways can it be cut?" This is how he has learned so much in his 25 years of woodworking. After taking some classes at a vo-tech school, most of Hylton's education came on the job. As a writer and editor for Rodale Press, he helped produce the company's first woodworking books. Hylton picked the projects, gave them to the woodworkers and watched them the whole time. What's his favorite project? "The next one. ... I get excited about working out the design, the joinery and the construction process."

More power. More torque. More jealousy on the job site.

www.ridgid.com

Introducing a whole new line of over 30 professional-grade power tools from RIDGID® that'll seriously outperform what you're using now. These tools are packed with the features you want. Like Exactline™ laser precision. Motors that last up to five times longer. A dual-port battery charger that gets you to full power in half the time. And the best warranty in the business. Need we say more?

RIDGID®

Powerful. Durable. Professional.

CIRCLE NO. 151 ON FREE INFORMATION CARD.

THE HOME DEPOT®

Available at The Home Depot®

'Poop' was Promised, But Never Delivered

Reader Still Wondering Why Certain Hand Planes are So Pricey

In reading your response to "Why are Some Planes So Expensive?" (Q&A, November 2003) I was amazed at how good a job you did at not answering the question. I bet the person asking for the "straight poop on hand planes" was disappointed, too. In my experience, any hand plane needs to be tuned up whether it is new or used, regardless of price. By touching on some relevant points, such as body material (either cast or ductile iron), blade material (A2 tool steel or cryogenically treated), blade thickness and overall design, you could have enlightened us as to why some planes truly are so expensive, thus giving him (and us) some "straight poop."

Cody J. Niendorf
Ashton, Idaho

Editor's Note: While I didn't specifically mention ductile iron or A2 tool steel, I did say the premium planes are "better-made, better-machined and work extremely well." For a detailed discussion of the differences between low-cost and expensive planes, see our review of metal-bodied jack planes in the April 2002 issue (available for sale online). We examined materials and machining tolerances for a variety of inexpensive, mid-range and premium brands.

– Christopher Schwarz, executive editor

Hand-plane Connoisseur Curious About Endurance Test Statement

I have been a hand-plane user and collector for the past 29 years. Since the mid-1980s, my collection of Lie-Nielsen planes has multiplied in my shop like rabbits!

So I was puzzled why, in your tribute to the Lie-Nielsen low-angle jack plane (Endurance Test, November 2003) you suggest grinding the blade at 90°. Doing so does not make a scraper – it makes a blunt instrument. There are so many purpose-built scrapers available, ranging from a few dollars to hundreds, any of which produce a fine shaving instead of pulverized dust, that I found this suggestion a bit of a stretch. It's hard to imagine why anyone would buy a $40 replacement blade and grind it off square!

Peter R. Presnell
Kneeland, California

Editor's Note: Grinding the edge at 90° to make a scraper plane is something that works for me. I got the tip from Brian Boggs, a chairmaker in Berea, Ky., and have demonstrated it many times. I don't argue that a purpose-built scraper would be better, but you're going to spend more than $40 for a good one.

– Christopher Schwarz, executive editor

Table Saw Article Serves as Impetus For Reader to Fix His Own Machine

I usually adjust my saws and equipment every so often, but I haven't had time lately to check the saw I recently purchased. Reading "Table Saw Tune-up" (November 2003) gave me an incentive to see how far off it was. I knew it was off a little, but was surprised to learn just how far off it was. Thanks.

George A. Ulrick Jr.
DeWitt, Nebraska

continued on page 14

WRITE TO US

Popular Woodworking welcomes letters from readers with comments about the magazine or woodworking in general. We try to respond to all correspondence. Published letters may be edited for length or style. All letters become the property of *Popular Woodworking*. How to send your letter:

- E-mail: popwood@fwpubs.com
- Fax: 513-891-7196
- Mail carrier:
  Letters • *Popular Woodworking*
  4700 E. Galbraith Road
  Cincinnati, OH 45236

what can take your passion and turn it into perfection?

PERGULA LIGNARIUS

WOODCRAFT®
UNIVERSITY

There's nothing better than hands-on learning with a highly skilled mentor to really enhance your woodworking craft. For years, Woodcraft has brought you the finest class instruction, woodworking books, and videos - now we're introducing the most complete woodworking tool of all - Woodcraft University.

Each of the University Colleges - Turning, Carving, Sharpening, Joinery, Router, Power Tools, and Finishing can help turn your woodworking passion into perfection. No matter what your skill level, in Woodcraft University classes, you'll learn turning with master turners, sharpening with experts, power tool techniques from recognized artisans, and much more.

Start with 100 Level Turning Classes - Beginning Lathe, Turning A Classic Pen, or Making Wooden Spoons, then move up to intermediate or advanced skill level classes. Woodcraft University offers you more opportunities to learn in classes certified for continuing education credit.

Your local Woodcraft store or Woodworkers Club has all the class schedules and details to get you started in woodworking education from Woodcraft University.

Experience the finest in woodworking tools, power tools, and education from our catalog, online at www.woodcraft.com, and at your local Woodcraft store.

WOODCRAFT®
Helping You Make Wood Work®

CIRCLE NO. 164 ON FREE INFORMATION CARD.

Letters

continued from page 12

Actually, Art and Craft are Different

In regards to "Congratulations! You're an Artist" (November 2003): Don't be "MAD" at the newly named Museum of Arts and Design. There is a difference between art and craft, and it's easy to explain:

An artist creates designs, while a craftsman does the work to turn those designs into solid reality. You may be an artist and a craftsman at the same time (sequentially, actually): You're an artist when designing the piece and a craftsman when making it.

Steve Henigson
Eastsound, Washington

Editor's Note: Your definition of art versus craft is adequate if taking a narrow view. In the larger context, some of the best thinkers since the Middle Ages have written volumes exploring the subject, and it's still not settled.

– Steve Shanesy, editor and publisher

Lumber Lusting in Canada

I got a kick out of "Lusting for Lumber" (August 2003). In my shop almost all the wood I use is "found" stuff.

I've recently completed building a harvest table made from two 2" x 10" pine planks that were originally scaffolding. I left those planks sitting uncovered but stickered for eight years behind my shop before I brought them in and planed off the surface scruff. Underneath, the wood was gorgeous, complete with worm and nail holes. The lady who bought the table is delighted with both the piece and the story behind it. **PW**

John Milne
North Bay, Ontario

CORRECTION

A caption in the November 2003 "Woodworking Essentials" was incorrect. In "Jig Journal," the distance from the hole to the nearest edge of the router bit is the radius.

MORE LETTERS ONLINE

We received many letters commenting on "The Truth About 240V" (November 2003). Because space doesn't permit them here, we have posted many online at popwood.com – click on "Magazine Extras" to see what your fellow readers say and how co-author Greg Hyland, a professional electrician, responds.

1 of 4 FREE TOOLS

UP TO $500 IN ACCESSORIES

FIVE YEAR 5 WARRANTY

OVER $2000 IN SAVINGS

X5

INTRODUCING DELTA X5 TOOLS

IF YOU'VE BEEN DREAMING OF A DELTA THIS DEAL IS YOUR WAKE UP CALL.

When you buy one of our new X5 tools, it's almost like putting money back in your pocket. Because all X5 tools come with your choice of one of 4 free tools or a cash rebate. You'll also get over $2000 in savings with Delta's X-treme Savings Book, up to $500 in free accessories and a best in class 5-year warranty. And with a deal this good, your dream can become a reality. Call 1-800-438-2486 (US) or 1-800-463-3582 (Canada).

Just look for the Delta tools specially marked with X5.
VISIT DELTAMACHINERY.COM FOR A FREE X5 CATALOG.

DELTA
Your achievement. Our tools.

CIRCLE NO. 109 ON FREE INFORMATION CARD.

High Performance Power Tools Need the *BEST* Abrasives!

NORTON **3X** **• 3 Times Total Performance**

We've "X"-panded our high performance technology into power tool abrasives. Outstanding cut rate and life with superior total sanding performance in random orbit discs and portable belts versus conventional abrasives.

NORTON®

THE MUSCLE BEHIND THE MACHINE™

CIRCLE NO. 143 ON FREE INFORMATION CARD.

Norton D-I-Y/Contractor Market • www.nortonabrasives.com

MDF is Inexpensive, But it's Not Sturdy

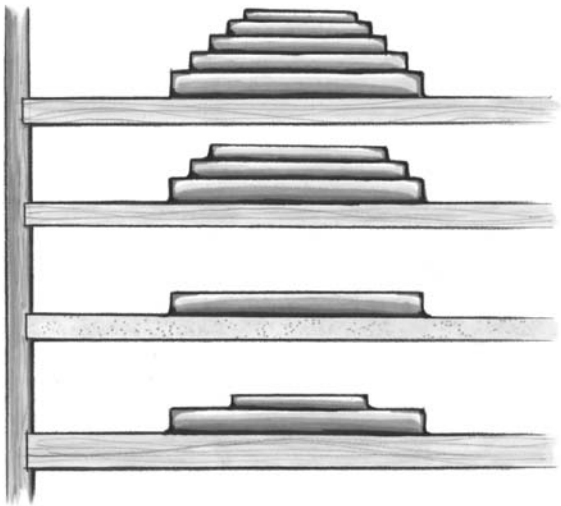


Illustration by Hayes Shanesy

Is MDF Strong Enough to Prevent My Shelves from Sagging?

I am getting ready to make some inexpensive garage cabinets and I was considering using ¾" medium-density fiberboard (MDF) for the case sides and shelves.

The shelves will be 18"-24" deep and about 36" long. I am planning to use dados in the case sides to support the ends of the shelves; and I'll reinforce the shelf with a piece of 1"-wide hardwood along the front attached with biscuits. Will the dados in the sides be strong enough to support the shelf ends? Will the shelf sag over time? Would I be better off with birch plywood?

Jeremy Graham
Bend, Oregon

While the dados will be OK, 36" is a mighty long span for MDF, even with the "dropped edge" detail that you plan to add. The maximum span for MDF without a dropped edge is 32". With the addition of a ¾" dropped edge, a 36"-long MDF shelf will sag unacceptably with only 90 pounds on it – that's not much for a garage cabinet. Yellow poplar – even without a dropped edge – won't sag until you put 284 pounds on it; yellow birch sags at 348 pounds.

MDF's weakness is that it doesn't have a grain structure like solid wood or plywood. Save the MDF for shorter spans and stick to birch plywood or solid wood for your shelves.

— Christopher Schwarz, executive editor

Why is the Blade of My Shoulder Plane Wider Than the Tool's Body?

I recently purchased a Stanley No. 92 shoulder plane. The blade is precisely ¾" wide.

continued on page 19

WRITE TO US

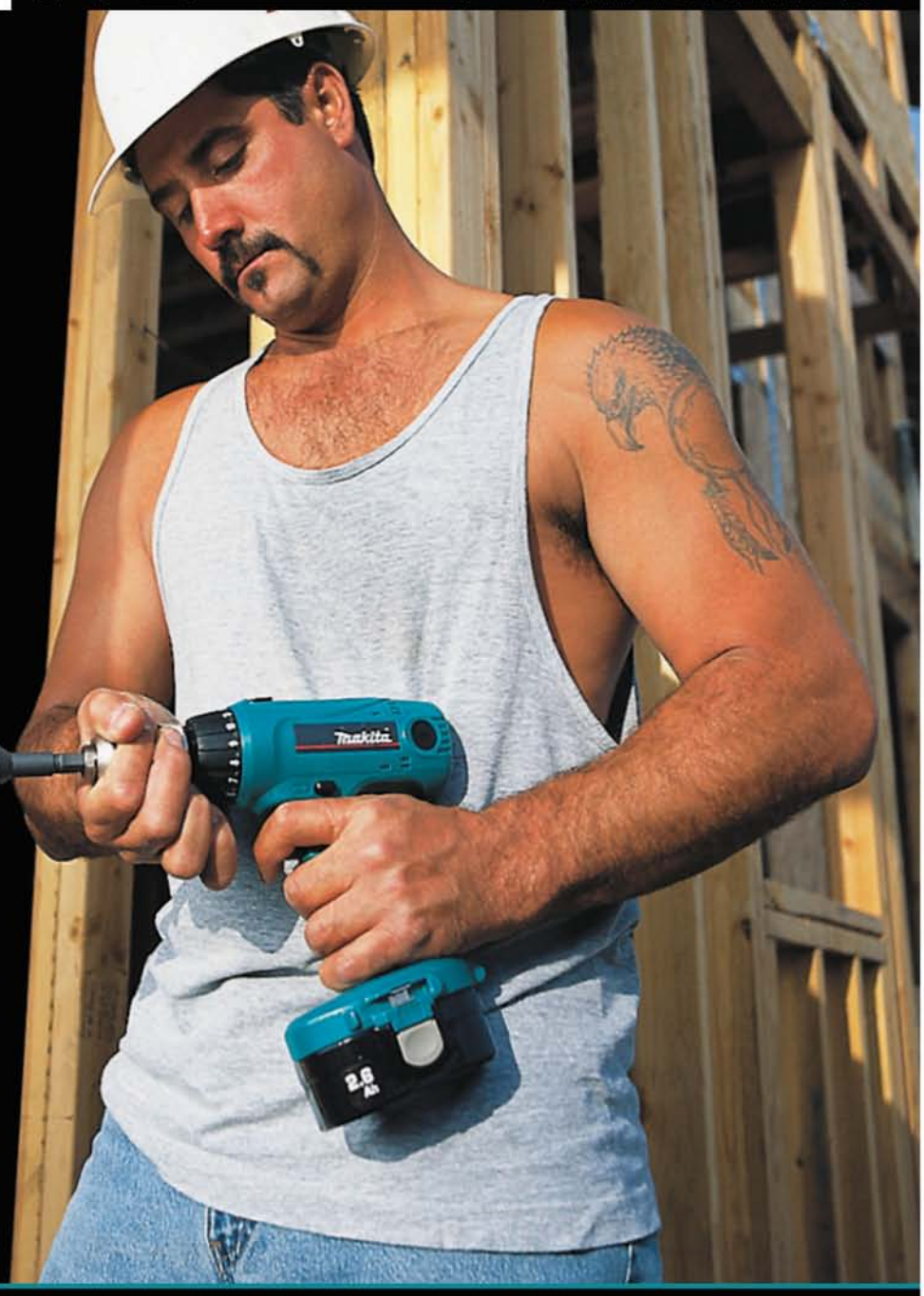
Every day we get questions from readers on all subjects about their woodworking. Some are letters; many are e-mail messages. We are more than happy to share our woodworking experience with you by answering your questions or adding some clarity to whatever aspect of your craft you are unsure about. In addition to the hundreds we answer privately every month, we want to share the best questions here with readers.

Send your questions via e-mail to popwood@fwpubs.com. Or send a note by mail to: *Popular Woodworking*, Q&A, 4700 E. Galbraith Road, Cincinnati, OH 45236.

Makita®

MFORCE™ SL SHIFT LOCK CORDLESS DRILL SERIES

SHIFT TO FULL POWER.™



MAIL-IN REBATE

BUY 12V GET ▶ $20 Rebate

BUY 14.4V GET ▶ $30 Rebate

BUY 18V GET ▶ $40 Rebate

BUY 18V Combo Kit GET ▶ $50 Rebate

MFORCE™ DRILL SERIES
18V, 14.4V, 12V

1-800-4MAKITA
MAKITATOOLS.COM

PERFORMANCE

Two-Piece D-31 motor with dual ball bearings for longer motor life

DURABILITY

All metal gear transmission creates efficient power

POWER

Shift-Lock™ Drive System instantly shifts from "drill" to "driver"

RUN TIME

2.6Ah (Ni-MH) batteries outlast Ni-Cd with no memory effect

continued from page 17

The width of the plane's body is 1/64" less than the blade. The blade fits flush with the right side of the plane, but it protrudes the extra 1/64" on the left side. Is there a purpose for this or should I just grind down the left side of the blade so it fits flush with the plane?

James Brimm
Cookeville, Tennessee

The extra width allows you to fudge the blade left or right if it isn't ground square. But 1/64" is more than you need. Grind the edges of the blade so it's .006" to .010" wider than the plane's body. That will be all the adjustment you'll require. When you trim a shoulder using the right side of the tool, move the blade so it's flush on the right side. When you trim a shoulder using the left side, flush the blade with the left side.

— Christopher Schwarz, executive editor

How Can I Determine if a Species Of Wood is Toxic to Humans?

I'm developing a product that is made using mango wood (a cutting board with a lemon oil finish) and I need to know if mango wood is food-safe. Can you help me?

James Pettingill
Concord, Massachusetts

The leaves and twigs are indeed toxic; ingesting the leaves or twigs is fatal to cattle. The sap is a skin irritant much like poison ivy. The wood should never be burned. Whether enough of the sap could ever contaminate food might be a matter of some debate, but why risk it when there are so many other species of wood available?

Whenever we have a question about the toxicity of a particular species, the first place we consult is an online list from the Musical Instrument Makers Forum (mimf.com/archives/toxic.htm). Though mango isn't here, the list is always a good jumping-off place for your research.

— Christopher Schwarz, executive editor

Can I Use Hardboard for Splines?

I read with interest the Power-tool Joinery column in the October 2003 issue titled "Splined Joints." I was surprised you didn't suggest using 1/8" hardboard for splines. I have been using hardboard because all the cabinetmakers I know also use hardboard. It's stable, takes glue well and is consistent in size so you can make a pass through the table saw with a 1/8" kerf and the hardboard will fit in its groove every time. It always fits, holds well and is easy to use.

Bob Mesenbring
Grand Marais, Minnesota

You're right. Hardboard is cheap, accurate in thickness, stable and very easy to use. If you intend for your spline to be solely an alignment device, it is a good option and I probably should have mentioned that. However, if you want your spline to also serve as reinforcement for the joint, you shouldn't use hardboard. Hardboard has no grain, so it can't be said to reinforce the joint, while plywood, solid wood and biscuits all have grain that can help you here.

— Bill Hylton, PW contributor

How Do I Scrape Small Mouldings?

I wanted to get your advice on scrapers. I'm building a bed out of curly cherry with 50 narrow slats. Each slat planes or scrapes very nicely, but I want to put an 1/8" radius on each of them, which is done most easily with a router table. This routed detail has a rougher surface that needs sanding to get it as smooth as the flat planed surfaces.

I'm a huge fan of the depth of finish you get from planing, but I don't know how to get that level of finish on these cherry slats without resorting to sandpaper.

I've tried a cornering tool to cut the radius but I have a hard time with the curly cherry tearing out, so I'm at a loss. Is there a radius scraper? Is having a partly sanded/partly scraped piece noticeable?

Mark Paulek
Golden Valley, Minnesota

A commercial gooseneck scraper can do the job. Or you can make your own scraper to clean up that roundover by grinding or filing the shape you want on an old scraper or saw blade. Stone the curved edge as best you can and then turn a burr. It does take practice, but it can be done.

If, after trying this on a few spindles, it still doesn't yield good results, there's no shame in resorting to sandpaper. I routinely sand mouldings that are router-cut. I've found that the surface area of the moulding is usually so small that it's not going to leap out at you anyway. It's the large flat surfaces, especially tabletops and door panels, that benefit most from hand planing and scraping. **PW**

— Christopher Schwarz, executive editor

CIRCLE NO. 103 ON FREE INFORMATION CARD.

CIRCLE NO. 106 ON FREE INFORMATION CARD.

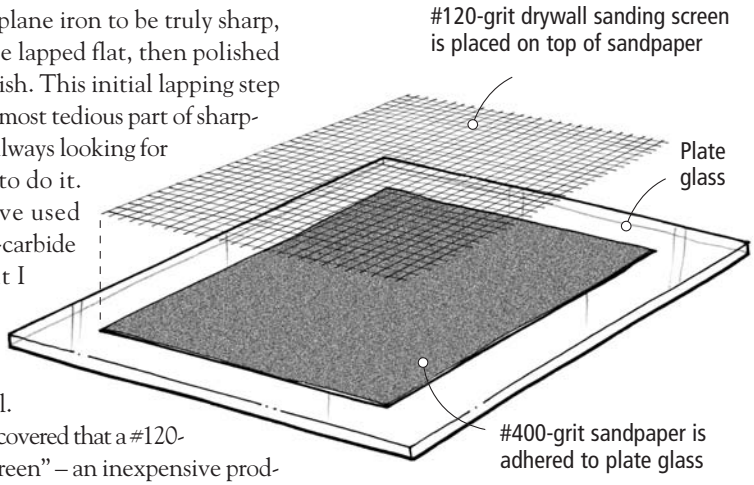
CIRCLE NO. 119 ON FREE INFORMATION CARD.

Compiled by Paul Anthony
Illustrations by Matt Bantly

Sanding Screen Speeds Sharpening

THE WINNER:

For a chisel or plane iron to be truly sharp, its back must be lapped flat, then polished to a smooth finish. This initial lapping step tends to be the most tedious part of sharpening and I'm always looking for a quicker way to do it. In the past, I've used wet/dry silicon-carbide sandpaper, but I found that it tends to slightly round the back of the tool.



I recently discovered that a #120-grit "sanding screen" – an inexpensive product used for smoothing drywall – works great for the process. Available at home supply stores, the screen cuts very aggressively and the openings allow the honing "swarf" to fall through without building up on the surface. I place the screen on top of a piece of #400-grit wet/dry sandpaper that I adhered to a sheet of plate glass using spray adhesive. After lapping the tool on the screen, I use the #400-grit sandpaper underneath as the next honing surface in a sequence that continues up through finer grits until I have a finely polished surface on the tool.

Tod Herrli
Marion, Indiana

continued on page 22

CASH AND PRIZES FOR YOUR TRICKS AND TIPS!

Each issue we publish useful woodworking tips from our readers. Next issue's winner receives a **Freud SD608 Dial-A-Width Dado** set. The Dial-A-Width dado cuts splinter-free, flat-bottomed dados without using shims to adjust for your perfect width. In fact, you can sneak up on the exact setting (in .004" increments) without taking the stack off the table saw! This dado set is a $270 value.

freud®

Runners-up each receive a check for $75. When submitting a trick (either by mail or e-mail) you must include your complete mailing address and a daytime phone number. If your trick is selected for publication, an editor will need to contact you. All entries become the property of *Popular Woodworking*. You can send your trick by e-mail to popwoodtricks@fwpubs.com, or mail it to Tricks of the Trade, *Popular Woodworking*, 4700 E. Galbraith Road, Cincinnati, OH 45236.

continued from page 21

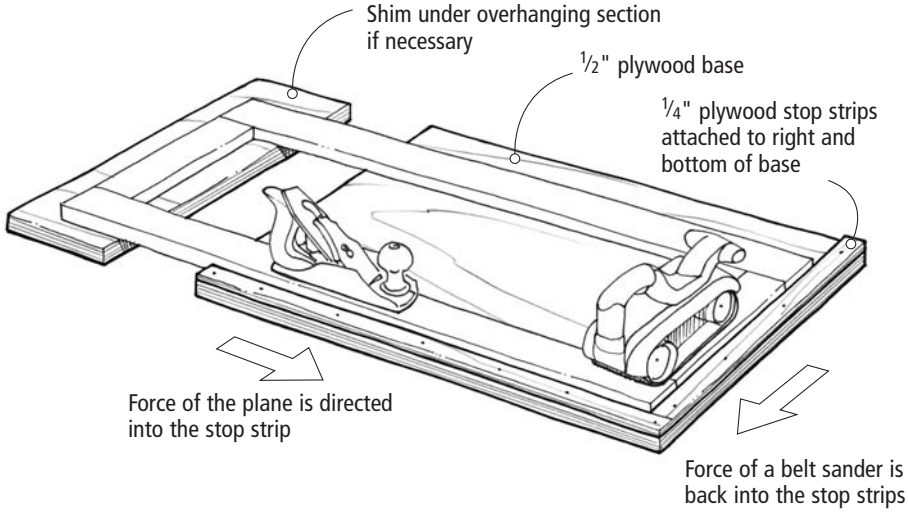
Clamp-free Belt Sanding and Hand Planing

When belt sanding, you must restrain frames and panels from being thrown backward from the force of the belt's rotation. This can be a problem if your workbench isn't fitted with dogs to secure the panel. You can clamp the workpiece to the bench, of course, but then the clamp heads impede the sander.

A better approach is to make a sanding platform from ½"-thick hardwood plywood with stop strips fastened to two adjacent edges. I make the strips ¼" thick to allow for sanding of thin panels. The platform can be clamped or screwed to the bench, with the workpiece simply butted against the stop strips. If the workpiece extends beyond the panel, just shim under the overhanging section with scraps of ½"-thick plywood.

The platform works well for holding pieces when hand planing as well as belt sanding. Whatever operation you're performing, just make sure the force of the tool is directed toward the stop strips.

Richard James
Sonoma, California



Soda-can Mixing Tray

I often need to mix small amounts of two-part epoxy and have found that the bottom of a 12-ounce soda can serves as a great portable, disposable mixing tray. The dished surface is clean, non-absorbent and prevents dripping. Placing the up-ended can in a foam drink cooler provides stability to the can during mixing and using.

Mike Still
Kempner, Texas

continued on page 24

INTRODUCING A NEW WAY TO LOOK AT ROUTERS.

ABOVE THE TABLE AND BELOW, THE NEW 890 IS A ROUTER UNLIKE ANY OTHER. Replace bits and adjust heights without reaching under the table. Shut down from any grip. Change speeds for any project. What's more, the 2¼ HP soft-start motor moves effortlessly between fixed, plunge, even model 690 bases. In other words, it's the most versatile router on the market. Looks like someone has turned the router world on its head. For the nearest dealer, call 1-800-4US-TOOL [US], 1-800-463-3582 [CANADA], or visit porter-cable.com. **SMOOTH TRANSITIONS AT YOUR FINGERTIPS.**

PORTER✦CABLE

REDEFINING PERFORMANCE™

CIRCLE NO. 150 ON FREE INFORMATION CARD.

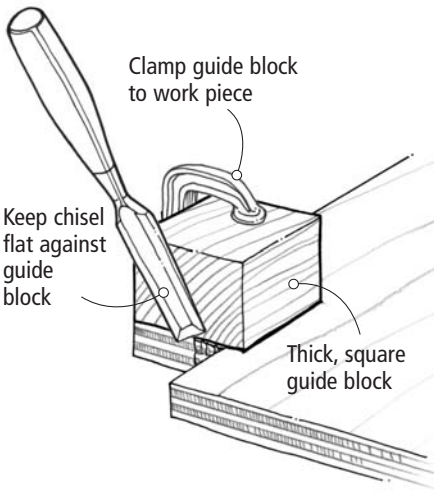
continued from page 22

Paring With Confidence

I made a table with a plywood panel that fit between the legs. After laying out the notches at the panel's corners, I cut them out with a jigsaw. To be safe, I undercut them and had to pare them a bit to fit.

After a couple of attempts at careful freehand paring, I realized that I needed help. So I clamped a thick, square block of wood to the panel, aligning its edge with my cutline. This provided a straight, flat reference surface for the back of the chisel, and it yielded the fine, straight cut that I was after.

Jim Stith
Beulah, Missouri



Measure Without Markings

Many of the common measurements that we use to lay out joints, offsets, overhangs, etc., are easily found in the width of layout tools. For example, the blade on a typical combination square is 1" wide. Many 6" rulers are ¾" wide. A framing square usually has one leg that is 1½" wide and one leg that is 2" wide. When gauging lines and laying out joints, you can often simply use the width of these tools rather than their markings.

Sue Lawless
Billings, Montana

Don't Get Left Holding the Bag

I recently bought a portable dust collector for my shop. While detaching the bag was easy, reinstalling it was a challenge. The problem was getting the bag to temporarily hang in place on its flange while wrapping it with the band clamp. I was about to get my wife to help me when I noticed the rare earth magnets stuck to my table saw. I used four of them to hold the bag in place at four different spots on the metal flange while I installed the band clamp.

Rare earth magnets are available from various mail-order houses, but I get mine from discarded computer hard drives. The magnets usually are attached to brackets that hold the arms that read the data. It's fairly easy to disassemble a hard-drive case to get to the magnets, although you may need a Torx screwdriver for some.

Bill Reid
Audubon, Pennsylvania

continued on page 26

THE FESTOOL SYSTEM
ATF 55

What was your first time like?

When was the first time you cut a perfectly straight, clean cut with a circular saw, without getting bogged down with clamping or improvised jigs?

Many of our users say that the Festool ATF 55 Plunge Saw is the first one that lets them cut straight, clean lines right out of the box. It comes complete with our multipurpose Guide Rail. Simply align the Guide Rail, place the saw on it, and cut. The Guide Rail stays put without clamping or taping, and it won't mar the surface. An integrated chip guard gives a clean cut edge. The blade moves flush against the Guide Rail edge, so all you so is line it up and go.

A host of ergonomic and safety features make the ATF 55 easy to work with. The blade stays covered, and an extraction port lets you connect a dust extractor for a clean worksite.

It all means you can saw better, straighter and cleaner – first time and every time. See for yourself. Call us or go online to find your nearest Festool dealer.

Hook up to the system with our CT Dust Extractors

FESTOOL

888-337-8600
www.festool-usa.com

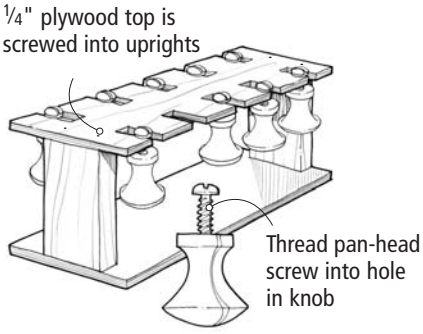
CIRCLE NO. 115 ON FREE INFORMATION CARD.

continued from page 24

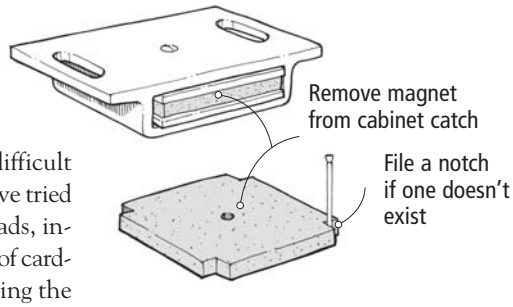
A Knob-drying Rack

I needed to come up with a way to easily stain wooden knobs and set them aside to dry, so I came up with the rack you see here. It's nothing more than a piece of ¼"-thick plywood attached to two vertical uprights that are screwed to a base. To hang the knobs, I cut a series of slots in the plywood to hold the knobs by pan-head screws driven into them. To stain each knob, I dip it in the stain while holding it by the screw head. After wiping it, I hang it on the rack to dry.

Zachary Swope
Slippery Rock, Pennsylvania



Holding Brads – Here's the Catch



I have big, fat fingers that make it difficult to hold small brads for hammering. I've tried various methods for holding the brads, including needle-nose pliers or a piece of cardboard, which pulls away before driving the brad home. None were convenient.

Recently, I was digging through my collection of cabinet catches and came across a broken magnetic catch – the type that has a rectangular, flat magnet sandwiched between two metal plates. I noticed that the corners of the magnet were notched, and I found that placing a brad in the corner of the notch holds it upright for those first few hammer blows. If you can't find a similar catch to disassemble, you simply can file a notch into any flat, thick magnet.

Neal Mesmer
Boise, Idaho

Centering Solid-wood Panels

When fitting solid-wood panels into their frames, it's important to allow room for the panel to expand and contract. The problem is that a loose-fitting panel can rattle around in the frame. To prevent this and to keep the panel centered, I install foam weather stripping in the grooves.

Available at most home centers, I use the 3/16"-thick material with a sticky back. Cut strips of an appropriate width into short lengths and place them into the stile grooves with the adhesive side against the groove's bottom.

Robert Barron
Madison, Alabama

continued on page 28

FASTEST GROWING MACHINERY LINE IN THE U.S.A.

SHOP FOX® WOODSTOCK INTERNATIONAL

INNOVATIVE PRODUCTS
DESIGNED FOR PRACTICAL USE

WE DESIGN OUR MACHINES TO THE MOST STRINGENT STANDARDS, TRIPLE CHECK EACH ONE FOR QUALITY ASSURANCE AND BACK EVERY MACHINE WITH A FULL TWO-YEAR WARRANTY!

2 YEAR WARRANTY

CONVENIENT PEDESTAL MOUNTED CONTROLS!

6" JOINTER

This outstanding machine combines excellent features with time-tested favorites to give the discriminating woodworker all the quality, convenience & performance standards he demands. Here are just a few of the outstanding features that put our 6" Jointer in a class of its own:

- 1 HP, 110V motor
- Precision ground cast iron tables
- Extra large cast iron fence
- Simple fence adjustment
- Post mounted control switch
- Silky-smooth handwheel table adjustment
- Powder coated paint
- Approx. shipping weight: 300 lbs.

2 HP SHAPER

We designed this shaper for maximum performance. With 25% more power and 40% more weight than other shapers in its price range, you can use larger cutters or stack multiple cutters to save time. By stacking multiple cutters you simply raise or lower the spindle for the next profile, greatly reducing time for tooling changes. Combine this with the features listed below & you have the best shaper value on the market!

Shown with D2057 Adjustable Mobile Base (not included)

- 2 HP, 110/220V, single-phase motor
- Large precision ground cast iron table: 24"W x 21"D
- All ball bearing construction
- Heavy-duty miter gauge
- ½" and ¾" spindles included
- 3" spindle travel
- Cabinet stand w/ powder coated paint
- Approx. shipping weight: 270 lbs.

14" BANDSAW

We have taken the most popular size bandsaw & added many features found only on much larger & more expensive saws. Features such as upper & lower ball bearing guides, enclosed cabinet stand, hinged wheel covers, cast iron wheels, 4" dust port and cast iron frame & table make this bandsaw a reliable shop fixture.

- 1 HP, 110V/220V, single-phase, TEFC motor
- Blade size: 93½" (⅛" to ¾" wide)
- Cutting capacity/throat: 13½"
- Max. cutting height: 6" *(Height extension kit available)*
- Table tilt: 45° right, 10° left
- Blade speeds: 1500 & 3200 FPM
- Precision ground cast iron table
- Quick change blade release/tensioning
- Approx. shipping weight: 256 lbs.

INCLUDES ⅜" BLADE, DELUXE EXTRUDED ALUMINUM FENCE & MITER GAUGE

15" PLANER w/ CABINET STAND

We are now offering this most popular planer size with all the features serious woodworkers demand, including a one-piece stand, pedestal mounted magnetic switch control, top mounted return rollers, 4 column support, extension beds & rollers, adjustable bed rollers, large handwheel, two speed gear box and triple belt drive. This is the planer you've dreamed about!

- 3 HP, 220V, single-phase motor
- Table size w/ extension tables: 15⅝" x 14"
- 2 positive table locks
- One adjustable roller w/ chrome extension
- 3 HSS knives
- Cutterhead speed: 5000 RPM
- Cutterhead diameter: 3"
- Max. depth of cut: ⅛"
- Max. height of cut: 6⅛"
- Feed rate: 16 FPM & 20 FPM
- Approx. shipping weight: 550 lbs.

INCLUDES JACK SCREW & SPRING LOADED KNIFE SETTING KIT

5777

SHOP FOX® is a registered trademark of Woodstock International, Inc.

sales@shopfox.biz

TO SEE OUR INNOVATIVE MACHINES AT AN AUTHORIZED DEALER, PLEASE *CALL FOR THE LOCATION OF A DEALER NEAR YOU!*

SHOPFOX.BIZ ✦ 1-800-840-8420

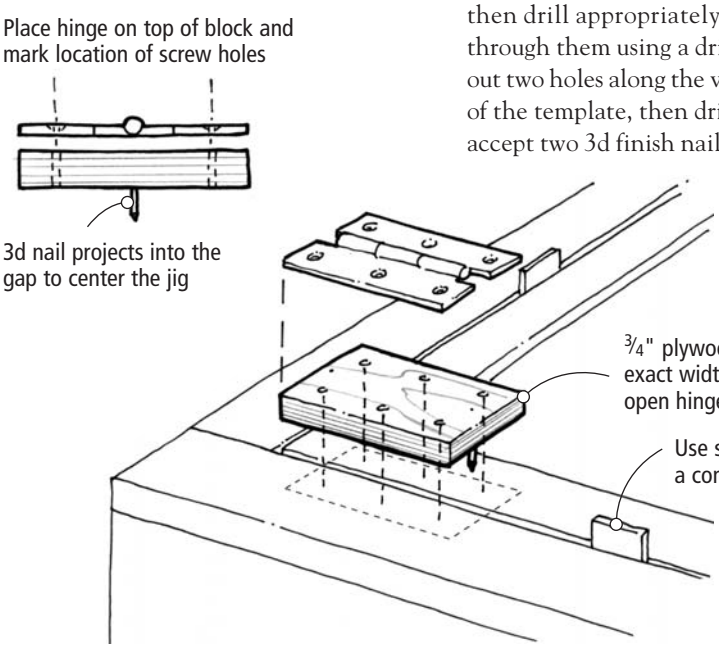
WOODSTOCK INTERNATIONAL INC.

CIRCLE NO. 167 ON FREE INFORMATION CARD.

continued from page 26

A Hinge-drilling Template

When installing surface-mount hinges on cabinet doors, I've found that I can increase accuracy and efficiency by using a shop-made template to drill the holes. I make the template from ¾"-thick plywood that I've cut to the exact length and width of the open hinge. Laying the hinge on the template, I mark the location of the screw holes, then drill appropriately sized pilot holes through them using a drill press. I also lay out two holes along the vertical centerline of the template, then drill them to snugly accept two 3d finish nails.



To use the template, I first fit my door into its opening, shimming around the perimeter with cardboard shims to create a 1/16" gap all around the door. I then position the template at each of the hinge locations with the centerline 3d nails projecting into the gap to align the template. All that's left to do is to drill the hinge holes through the template into the cabinet and door. It works perfectly every time.

Roger Amrol
Columbia, South Carolina

Wrenches as Calipers

When turning parts for chairs and other furniture, I often have to turn tenons on the ends of spindles. Rather than setting up a caliper for each size of tenon, I raid my mechanics tool box and find the appropriate size open-end wrench to use as a gauge. **PW**

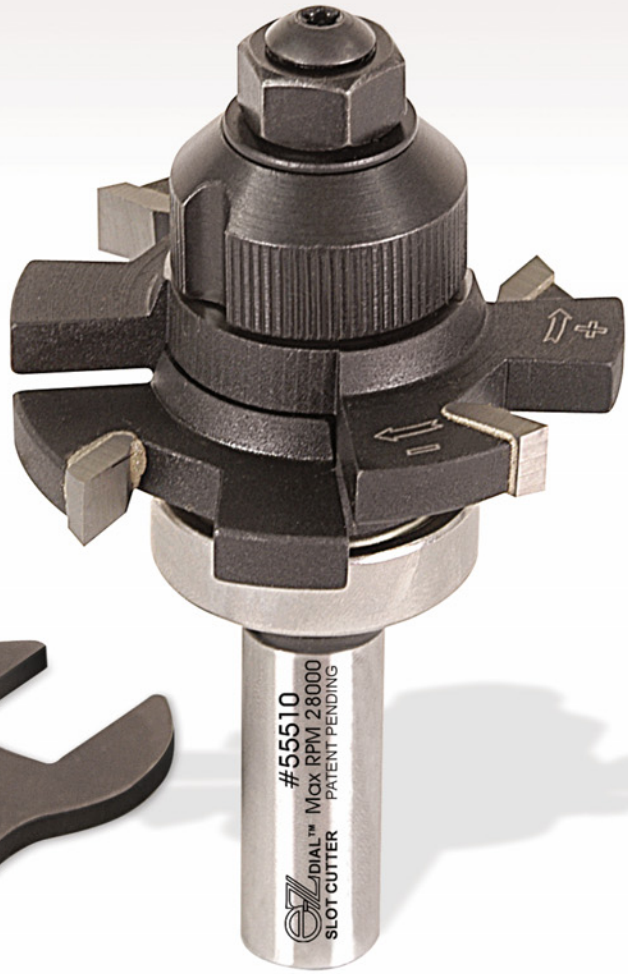
Sam Gribbly
Catskill, New York

SHIM-FREE
& ADJUSTABLE

eZ DIAL™ SLOT CUTTER

IF YOU CAN TURN THE KNOB ON A RADIO, YOU CAN ADJUST AMANA TOOL'S® NEW:

- Finally, a slot cutter with nothing to lose. No shims, no spacers.
- Nothing to take apart, just dial it, lock it, cut it.
- Easily makes perfect grooves for today's undersized plywood.
- Perfect for edge ("T") molding installation.
- Available in two sizes:
  - **#55500** - For 1/8"-1/4" wide slots, 1/2" deep
  - **#55510** - For 1/4"-1/2" wide slots, 1/2" deep
- Carbide tipped for long life.

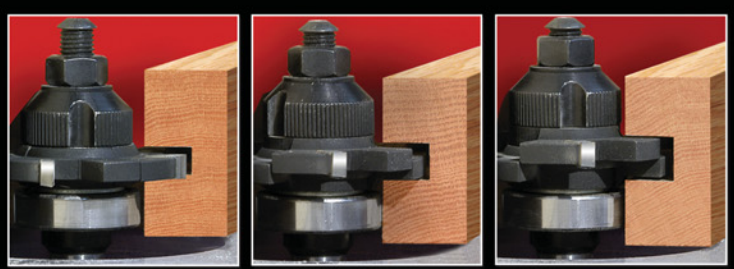


Special Introductory Price

List price ~~$149.95~~

$99.95 ea.

Patent Pending



Amana Tool®
High Performance Cutting Tools

For Our New Catalog or a Dealer Nearest You
CALL 1-800-445-0077
Visit our website at
www.amanatool.com

CIRCLE NO. 102 ON FREE INFORMATION CARD.

More power. More capacity.

TurboIII Dust Extractor

Introducing the NEW FEIN Turbo III Portable Vac.

The new 9-77-25 makes dust-free sanding and wet/dry cleanup easy and practical. The perfect size for big jobs, the Turbo III features 14.5 gallon capacity, an automatic on-off switch and a three-second hose-cleaning delay. The powerful two-stage motor offers bypass cooling to prevent electrical damage and prolong the life of the motor. And with 10% more suction power than the Turbo II, it can run two 6" or one 8" Random Orbit Sander.

For more information and the name of a local dealer, visit us at **www.feinus.com** or call **1-800 441-9878**.

Finishing is just the beginning.

Fein Power Tools, Inc. 1030 Alcon Street Pittsburgh, PA 15220

Fein

CIRCLE NO. 114 ON FREE INFORMATION CARD.

Bosch 4410 10" Miter Saw: The Next Generation of Sliders

Last year Bosch introduced a 12" double-bevel sliding compound miter saw with so many handy features we were overwhelmed. However, the $700 price tag and the 12" size (not our recommendation for home woodworking) kept us from sharing the news in print. This year, Bosch took all the great features of that 12" saw and put them on a 10" model. And we couldn't be happier.

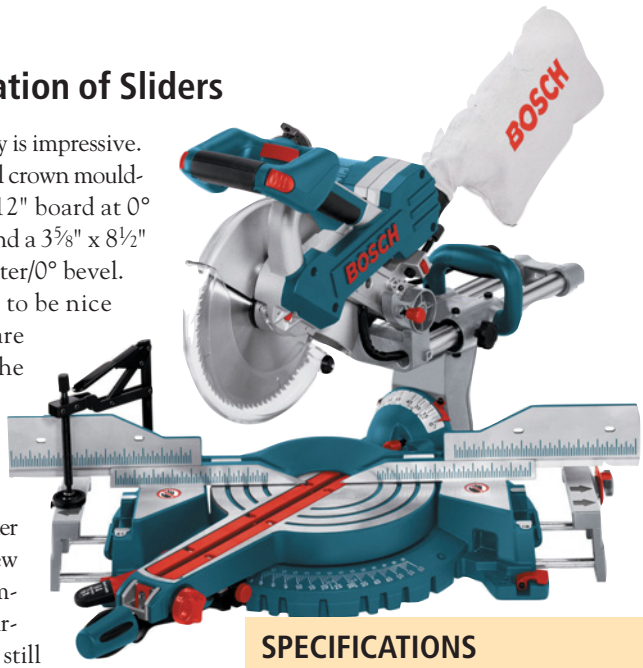
The 4410 model has all the standard items you'd expect from a professional sliding compound saw: 10 positive miter stops; 4⅛"-high x 10⅛"-wide adjustable fences; a powerful 15-amp motor producing 4,600 rpm; and a 72-tooth thin-kerf carbide blade.

Then there are the new features: A "D"-shaped handle with four positions to suit every user; micro-fine miter adjustment to let you tweak your settings in tiny increments; two built-in 7" extension wings with a built-in stop on the right wing; up-front controls for dual-beveling (47° left and 46° right) and mitering adjustments; and on-board storage for all the adjustment tools.

The 4410's capacity is impressive. It will handle 10¼"-tall crown molding lying flat, a 2" x 12" board at 0° miter/45° left bevel and a 3⅝" x 8½" (4x8) board at 45° miter/0° bevel.

We found the cut to be nice and all the features are very user friendly. The micro-adjustment for the miter setting is unique in the category (and it works very well). And this miter saw is one of the very few dual-bevel sliding compound saws on the market today. The price is still pretty high ($560) and unfortunately Bosch still has some work to do to achieve efficient dust collection when using the included bag. But other than that, this is the most feature-laden high-quality miter saw available. – *David Thiel*

For more information, circle #175 on Free Information Card.



SPECIFICATIONS

Bosch 4410 Miter Saw

Street price: $560
Motor: 15 amp
Performance: ●●●●●
Price range: $$$$$
Bosch Tools: 877-267-2499 or boschtools.com

Festool Cordless Drill is Exotic and Expensive – but Worth it

Woodworkers seem to have two philosophies when it comes to cordless drills. Either we buy whatever is on sale and throw it away in a couple years or we spend some serious money on a professional tool.

The Festool CDD 12 FX is for woodworkers who are firmly in the second category. Priced at $395 for the basic 12-volt drill, charger and two batteries, this tool is a long-term investment. But after six months of hard use in our shop, I can say that my skepticism has been replaced by a healthy respect for this pint-sized tank.

Everything about this drill oozes with quality German construction. The switches operate with authority, the body (which has survived several nasty falls) is balanced in your hand and the metal one-handed chuck seizes everything and holds on tight.

The small size of the drill (about 7¼" long x 8¾" high) allows you to get into tight places other drills won't. And with the tool's right-angle chuck installed (a $70 accessory) you can sneak in almost anywhere – there's no need to buy a separate right-angle drill.

I found the 12V batteries and motor provide more than enough torque for a wide variety of woodworking tasks – you'll never want for power. Even during demanding drilling and driving, the tool keeps up with you because the 2 amp-hour batteries charge in just 15 minutes.

And while all that is nice, what really won me over is the way it feels while in use. Unlike any other cordless drill that has passed through our shop, this one's like an extension of my arm. For woodworkers who use their drills a lot, that's just enough reason to make them open their checkbooks a little wider. OK, a lot wider.

— *Christopher Schwarz*

For more information, circle #176 on Free Information Card.

SPECIFICATIONS

Festool CDD 12 FX

Street price: $395
Chuck capacity: ½"
Weight: 4 pounds
Speeds: low: 0 to 380 rpm; high: 0 to 1,100 rpm
Performance: ●●●●●
Price range: $$$$$
Festool USA: 888-337-8600 or festool-usa.com

FastCap TriTape Includes Notepad and Sharpener

When you check something with a tape measure, your next action is most likely writing down a dimension. For that you need a sharp pencil and a notepad. The TriTapes from FastCap make this routine easy.

Available in 16' and 25' lengths, each of the TriTapes has a built-in pencil sharpener and an erasable notepad on the side of the tool. All you supply is the pencil. Far from being a gimmick, the tapes are well-made with a 1"-wide blade that stands out to 8' without kinking. The case has a soft overmold grip and a brake that makes it simple to stop the tape during retraction with slight pressure. The belt clip is even improved to release easily with slight thumb pressure, but it holds strong when required.

And best of all, the scale on the PS (Pad Standard, shown at right) blade is easy to read and marked in 1/32" for the first 12". FastCap also offers a PSS-R model that has left- and right-reading scales for ambidextrous use. These are nice tapes in their own right (though they may be a little chunky for some), they're priced very well against the competition and the added features honestly have value. — *DT*

For more information, circle #177 on Free Information Card.

SPECIFICATIONS

FastCap TriTapes
Street price: $6.50 for 16'
$9.50 for 25'
Performance: ●●●◐○
Price range: $$
FastCap: 888-443-3748 or fastcap.com

DeWalt DC500 Cordless Vacuum

Let's say this right up front: Unless you need a wet/dry vacuum that is cordless there are more affordable options than the new DeWalt DC500. However, if you need ultimate portability without a cord, DeWalt has put everything in a tidy package.

The DC500 will run on either AC or battery power and has a number of handy tools to make job-site clean-up a whole lot easier. The wet/dry filter from GORE (the same company that makes GORE-TEX fabric) offers dust collection up to 99.7 percent efficiency (according to DeWalt). Stored on the vacuum is a 5' positive-lock rubber hose with 1¼" opening that can also be attached to the exhaust side of the tool to turn the DC500 into a blower.

Other useful tools include a wide nozzle and crevice tool. The suction produced is adequate for most light-duty jobs, and can be used as an at-the-tool dust collector for smaller woodworking tools. Be aware that the DC500 does not come with a battery or charger – but it will run on 12-, 14.4- or 18-volt DeWalt batteries you may already own. Cabinet and kitchen installers are going to love this tool and will be willing to pay for the cordless convenience. — *DT*

For more information, circle #178 on Free Information Card.

SPECIFICATIONS

DeWalt DC500 Vacuum
Street price: $99
Power: 12-, 14.4- or 18-volt battery packs
Capacity: 2 gallons
Weight: Under 10 pounds with battery
Performance: ●●●○○
Price range: $$$$$
DeWalt: 800-433-9258 or dewalt.com

RYOBI'S 3-BASE ROUTER

The RE1803BK kit offers a variable-speed 9.5-amp motor with three bases and is a good buy at $180 for the occasional user. And it's all wrapped up in a cool canvas carrying bag. The motor has a nice soft-start feature, good power, low vibration and reasonably low motor noise. Along with the fixed, plunge and D-handle bases, the kit includes an edge guide and a five-piece template guide bushing set.

For the more experienced user, there are some things that will be disappointing. The D-handle and fixed-base releases are awkward, requiring the motor be extended to maximum height to be released. The adjustment ring used for this process is set for fine adjustments, but it makes changing the base too much work. The motor buckle lock holds the motor tight, but it doesn't come to a positive stop, causing the user to question whether the buckle is securely locked. The plunge base action also is less than perfect, with a rough plunging motion that, with just a little sideways pressure, can be stopped.

As long as the user understands there are some trade-offs for the savings, this kit is an acceptable bargain. — *DT*

Street price: $179
Motor: 9.5 amp
Speed: Variable (15,000-25,000)
Collet: ¼" & ½"
Performance: ●●●○○
Price range: $$$
Ryobi: 800-525-2579 or www.ryobitools.com

TOOL RATINGS

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

— David Thiel, senior editor

Carving for CEOs

Visit the 3 shops of David Monhollen, who shed a successful career in sales to carve wildlife for executives.

Photos by Al Parrish

Monhollen was inspired to carve this female, red-tailed hawk after visiting his daughter in Colorado. He paints his carvings with acrylics when a client requests it, although he'd rather highlight natural wood with lighting.

David Monhollen has three woodshops. His first shop is decidedly bigger than yours. His second shop (his so-called "working" shop) is in his house. And the Crittenden, Ky., carver's third shop (what he calls his "dirty" shop) is in his garage. It's in this dirty shop where he performs the grungy parts of carving – the slamming and banging parts of carving – that give this shop its name.

Although he shares the garage with a car, gardening tools, workbench and canoe, the majority of the floor space is filled with stacks of linden, walnut and cherry. But he doesn't think of this cache as lumber. Rather, he refers to wood as souls of trees. Here, he says, is where they wait for him to create.

Most of his work is done by hand. The few power tools he owns are stored on metal shelves in the corner of this shop. They include a Craftsman belt sander, a Porter-Cable miter saw, a router and a couple of drills.

The Working Shop

Monhollen's second shop, what he calls his "working" shop, is in the back of his home. Walking into the shop, which is also a studio and office, you first notice a carving of a female red-tailed hawk (shown here and on page 35). It's so realistic that your fingertips half-expect to encounter a body of soft feathers instead of the wood.

All of Monhollen's carvings relate to nature, and he spends hours researching his subjects to authenticate his work. For example, a few years ago he carved dozens of wildflowers, songbirds and butterflies into a 6½"-thick, almost 4'-diameter piece of linden. To accurately depict the flowers, he dug some up, studied them and then replanted them when he was done.

He painted the project, but only because he was asked. "My personal preference," he says, "is [to] let the wood be."

Some carvings are on display in his studio. Most were commissioned and are waiting to be taken to their new homes. Except for pieces he gives to his wife, Monhollen keeps nothing. His attachment to a piece isn't in the owning, but in the creating.

by Kara Gebhart

Comments or questions? Contact Kara at 513-531-2690 ext. 1348 or kara.gebhart@fwpubs.com.

Monhollen's hand-pegged, cherry workbench sits next to the studio area, in front of a double window. Outside the window is a spring. He enjoys, along with Native American music, listening to the water tumble over rocks. He illuminates his bench with fluorescent and low-wattage bulbs, although he says sunlight filtered through trees is best.

Behind the workbench is a simple oak tool cabinet. Tucked inside are his tools – gouges, chisels, V-tools and carving knives.

Pulling out Pfeil's Swiss Made tools and some carving tools purchased from Japan Woodworker, he says Japanese and Swiss tools feature the sharpest and toughest steels.

To keep these tools sharp, Monhollen

uses Japanese waterstones. He starts with #800 grit, then moves to #1,200 and a finishing stone. For curved tools, he uses a leather barber's strop loaded with jeweler's rouge.

He also has a leather sharpening wheel that he chucks into a drill. The vise on his bench holds his drill steady, and the leather gives his tools a razor-like edge.

Monhollen used to use oil stones. But 20 years ago he read an article about Japanese waterstones by George Nakashima, a man whose furniture and writings have influenced Monhollen greatly. Monhollen purchased some waterstones and has been using them ever since. He says there's no comparison.

Also in the oak cabinet is a tool Monhollen has owned since he was 9 – his Cub Scout pocket knife. When first given it, he says he had a riveting thought: He could create. For him, that was magic, he says.

As a boy, Monhollen carved constantly. One day in the third grade, his teacher caught him carving during class. Instead of scolding him, she asked the other students to bring in a block of soap and a knife, and the next day Monhollen gave a carving lesson to his class. When he finished, the teacher explained that the students could continue to carve, but only on their own time.

And Monhollen did. His passion led him through high school, college and Vietnam. During the war, Monhollen served in the Army. While there, he carved birds for Vietnamese children, and the children gave him a nickname: "The Carver."

Today Monhollen carves not for children, but for clients – mostly high-profile corporate executives who will come to visit him. So in his working shop is a sitting area where Monhollen sits with clients and tries to discern the topic of a commission. When talking to executives, the words "a bird" don't cut it – he wants to know more.

Monhollen, who has a degree in business from the University of Cincinnati and a career in sales, will sometimes sit with clients for hours, pulling out the history of the company and what the carving is meant to represent. He strives for his work to intimately reflect his clients' companies.

For example, birds resting on a base pyramid might represent a company built on a solid foundation. A beautiful slab of walnut with a defect in it, whether caused by lightning or insects, might represent the company's challenges. Six birds carved out of six species of wood might represent the diversity of the company's owners.

Past this reflecting pond is a gazebo that overlooks an apple orchard and small garden. Monhollen doesn't eat his apples; rather, he grows them for possums and raccoons. Similarly, his berry bushes are for the birds.

The Shop Outside

When you arrive at Monhollen's gray farmhouse tucked into the woods, you expect to be first led into the studio to view his work. But instead he insists on taking visitors to a shop that's bigger than yours – a place he goes to every morning – his back yard.

In many ways, this eight-acre "shop" is his most important because it's here where he draws inspiration. The trails that wind through the woods are covered with chips – remnants of past carvings.

A wooden arch crosses one of the trails with the words "Be Peace" carved into one side and "Be Love" carved into the other. Monhollen has planted many of the trees – one of his many ways of giving back. The trails lead you to a hammock, a gift from his two grown children, Perrin and Kyle. It's situated so that when lying on it you are graced with a spectacular view of the underside of several pine trees. Monhollen says this spot sparks much of his creativity.

Every morning he walks these trails regardless of weather. On some days you can find him carving out here, too.

Once a carving is completed in the other shops, it goes back to the "dirty" shop for sanding and polishing. On hardwood, Monhollen uses Tru-Oil Gun Stock finish, which he rubs on by hand. After building three coats he uses the finest steel wool he can find to buff it out. Then he applies two

A close-up of Monhollen's female, red-tailed hawk exemplifies the detail. He plans to use this carving as a sample of his work when talking to clients.

to three coats of Johnson's paste wax. For painted pieces, he uses acrylics.

The Business of Carving

Monhollen enjoys the fact that he doesn't have to punch a time clock every day. In fact, he can only estimate how long each carving takes – some take weeks, some months.

As far as income is concerned, he does well – very well. One carving can fetch anywhere from $15,000 to $60,000. Some are even in the six figures. Besides 50 years' experience and obvious talent, a previous career in sales has helped him succeed.

In the late 1970s and early '80s, Monhollen worked as a sales representative in pharmaceutical sales and then metal sales. In 1981, he was offered a promotion and transfer.

But instead of taking the promotion, Monhollen quit. While working in sales, he discovered that 60 percent of the clients he sold to were making warfare products. While in Vietnam, Monhollen says he saw war firsthand and the experience damaged him in ways he's still figuring out. But perhaps more than that, he simply wanted to carve.

"I dove in the pond, paddling like crazy," he says in describing the leap from the corporate world to carving. "It isn't always an easy paddle." But he tries to do his work as gently and with as much love as he can.

This bench was built by one of Monhollen's friends 15 years ago. The oak tool cabinet at right, which he purchased from Sam's Club, keeps his tools accessible. His pocket knife – which he has used since he was 9 – is on the bench at the far left.

Monhollen remains, as he calls it, invisible to the public. He doesn't "do" art shows and he doesn't "do" galleries. When first starting out, he cranked out songbirds and sold them to state parks. But it felt like he was working on an assembly line, he says.

Then he read Nakashima's "The Soul of a Tree." The book inspired him so much that he traveled to Pennsylvania to walk the author's property. Although he didn't get to meet Nakashima, the author's reverence for nature in his work inspired Monhollen when he returned to Kentucky to begin carving one-of-a-kind pieces for corporate executives that are inspired by nature.

For each of his birthdays Monhollen tries to do something new. On his 57th birthday, he climbed the tallest tree on his property and tied a ribbon at the top. On his 59th, he was looking into his reflecting pond and suddenly dove in. There he swam wearing his clothes and sandals – paddling like crazy – and so glad he jumped in. **PW**

In his "dirty" shop, Monhollen stores thousands of board feet of lumber along with a bench and a few tools. Here he is working a piece of wood with a chisel and 3-pound mallet.

BOOKS MONHOLLEN RECOMMENDS

In the working shop is a cherry and walnut bookshelf full of books that have inspired Monhollen. They include:

- "The Artist's Way: A Spiritual Path to Higher Creativity" by Julia Camerson (J. P. Tarcher)
- "No Nature: New and Selected Poems" by Gary Snyder (Pantheon Books)
- "Payne Hollow Journal" by Harlan Hubbard (University Press of Kentucky)
- "The Soul of a Tree" by George Nakashima (Kodansha International)
- "A Timbered Choir" by Wendell Berry (Counterpoint)

The Case for Case Miters

These joints look great. Cutting and clamping them is the real trick.

Photos by the author

Try this with a garden-variety case miter joint. The lock miter joints hold your parts together on their own, freeing both your hands to apply clamps.

What joint would you use at the corners of a case? If appearance is a consideration – when is it not? – you definitely don't want an ugly joint like a rabbet. No matter how thin, that strip of exposed end grain – the butt of the board – is unattractive.

From the standpoint of what looks best, the miter joint should be atop your list. The only surfaces visible are the attractive ones: the faces and the edges. If you are making a small chest and you have a wide, long board with killer figure, you can wrap that figure around the corners without interruption.

You may think of the case miter as being difficult in subtle ways. Well, yes, it can be. If the joinery cuts are off by a degree or two, the joint isn't going to be square no matter what you do. Gluing and clamping the parts can be an exercise in torment and despair. There's no mechanical interlock to hold the parts in alignment, and glue just enhances the natural tendency of the surfaces to creep.

Moreover, despite the fact that a miter joint has more gluing surface than a butt joint, the glued miter joint isn't that strong. The shortcoming is that the miter brings end grain to the glue-up session.

But simple solutions to these and other difficulties do exist, and the results make it a joint worth mastering.

Case Miter Varieties

Let's look first at some of the ways the joint can be shaped to reinforce it, and to make assembly and clamping easier and more effective. The most basic miter joint is made by beveling the mating edges of both parts at 45°, then butting these edges together.

Surely the easiest way to make the joint simpler to align is by using biscuits. If you have a biscuit joiner, you know it takes only a minute to set the fence and cut slots in both parts. The biscuits make alignment easy and they offer some reinforcement to the joint as well.

Lacking a biscuit joiner, you can achieve the same effect with a through or stopped spline. The details of how to cut a slot and fit a spline were covered in the October 2003 issue (available for sale online at popwood.com), so I won't repeat that here.

Another joint worth learning to master is a routed lock miter joint because it gives the appearance of a miter but introduces an interlock, expands the glue area and makes assembly and clamping foolproof. We'll come back to that in a little while.

Sawing the Bevels

Accurate 45° bevels on the mating parts are essential for the case miter. You could cut the bevels using a radial-arm saw, compound-miter saw or sliding compound-miter saw. But the capacity of the latter two saws is limited, typically less than 12", and all three saws can have some accuracy shortcomings.

You'll most likely want to cut the bevels on a table saw. Tilt the blade to 45° and, depending on the proportions of your workpiece, guide the work through the saw with the miter gauge or along the rip fence. It's pretty cut and dry, until you run into one (or more) of the problems that often come up.

First of all, be wary of kickback. If you're using the rip fence, you always want the saw blade to tilt away from it. With the blade tilted toward the fence, the offcut is trapped between the blade and the fence, and it's all but certain to fire back toward you.

If you have a left-tilt saw, the customary fence location (to the right of the blade) is the safe one for bevels. But most saws are right-tilters, and with those saws the fence will have to be moved to the left of the blade. In any event, be sure you stand to the left of the blade, clear of "Kickback Alley."

The most disheartening problem is the one that isn't evident until all the joints are cut and you start assembling them. This is

by Bill Hylton

Bill Hylton makes noise, dirt and the occasional piece of furniture in his basement workshop. His book "Chests of Drawers" (The Taunton Press) shows both his shop and his handiwork.

when you discover that the bevel angle is off a degree or two, and the joints aren't square. Maybe you didn't tilt the blade enough, but more likely the fault is hiding in the adjustment and alignment of the saw.

You should know if you can trust the scale on your saw when you tilt the blade for this cut. If you aren't absolutely certain it is accurate, use a drafting triangle to check the blade's angle. Crank the blade to its maximum height, tilt it, then check it. Make sure the triangle is flat against the saw blade's body and not against a carbide tip.

Double-check the angle by making a pair of test cuts and join the two samples. If the corner they form is square, your setup is right and you can proceed.

You won't always use the rip fence. If the edge being beveled is the short one, you'll want to use the miter gauge. This common accessory is, of course, another source of inaccuracies. If you use your miter gauge, make sure you square it to the blade with a drafting triangle before tilting the blade.

Instead of a miter gauge, a lot of us use a crosscut sled to ensure we get square cuts. The sled can be used for bevels, too.

If you make a lot of bevel cuts and think it's worth the materials and shop time, you can make a sled exclusively for bevel cuts. If you do this, you'll derive a couple of benefits. One is the unmistakable angled kerf you can use to align the workpiece. Another is the zero-clearance around the kerf, which helps minimize chipping on the underside of the workpiece. If you work with veneered or melamine-coated sheets, this is a benefit you'll really appreciate.

Finally, if you are using a contractor's saw, you may be reluctant to tilt the blade at all. Doing that can throw some saws out of alignment. Instead of tilting the blade, you can use an angle sled to deliver the work to the blade. In this case, the workpiece is tilted instead of the blade.

(*Editor's note: Plans for such a sled also were included in the October 2003 issue.*)

Aligning the work for the cut is less straightforward than you might think. If you're using the crosscut sled or a miter gauge with a backup strip, you have a kerf to use.

But there's no practical way to measure directly from the tilted blade to position the fence. Instead, you have to lay out the bevel cut on the stock and align the layout line with the blade. Then bring the fence into position. It's easy to do this with your stock on the outfeed side of the blade.

Assembly

The biggest problem you will confront when assembling a case miter is applying clamp pressure without forcing the joints out of alignment. V-blocks, lined with packing tape to shed glue, can hold the tips of the bevels together, but other strategies work, too.

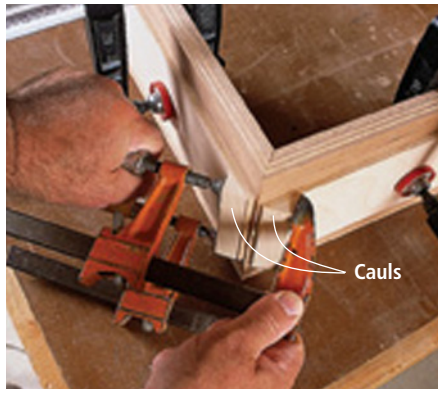
Glue tack often holds a small box together while you position pressure blocks and apply clamps. Or you can use packing tape to hold the parts while you apply the clamps. Tape the outside of the joint before adding glue.

With a chest or cabinet, the parts are larger, more cumbersome and less cooperative. In this situation, it may be practical to address one joint at a time. Glue up two joints individually, then wait for the glue to set before combining them into the box or case.

Also, adding biscuits or splines to the joint makes it easier to align and hold the pieces in place while you position the blocks and apply the clamps.

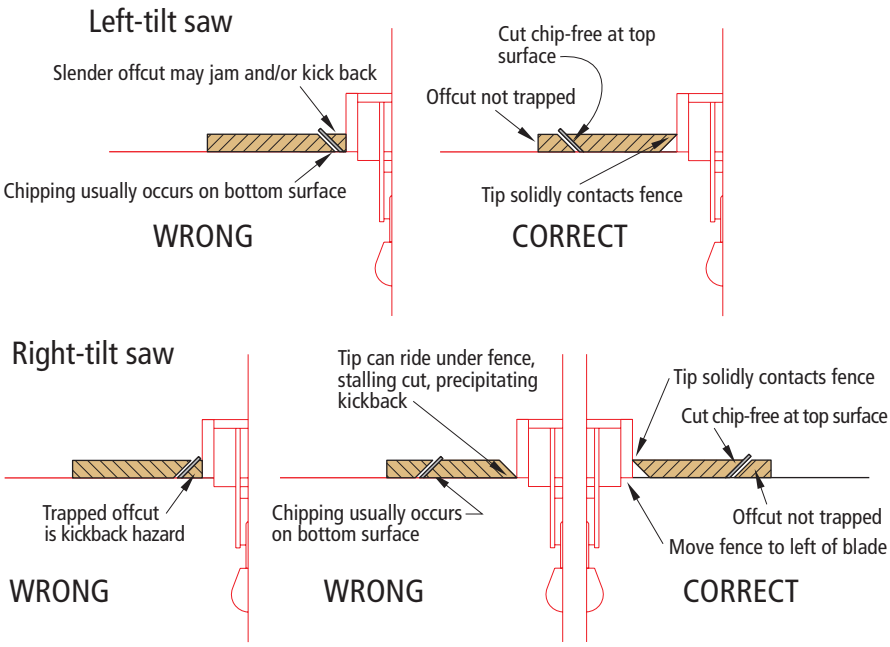
(Editor's note: For another great way to clamp up miters in casework, see "10 Tricks for Tight Joints" from our October 2003 issue.

A backup strip attached to the miter gauge aids when you are trying to locate the bevel cut. Align your layout line with the kerf in the strip.



A sure way to assemble case miters is with shop-made miter-clamping cauls. Clamp a caul to each half of the joint, then apply clamps. Do one joint at a time.

Positioning a Rip Fence for Bevel Cuts



Lock Miter Joint

The routed lock miter sets off in a very different construction direction. You get that attractive miter-joint appearance, but you use a table-mounted router and a "trick" bit to cut it. When the time comes for assembly, the joint aligns perfectly and you can apply clamps without pressure blocks.

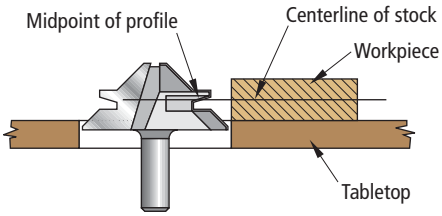
The bit's trick is that one setup suffices for cuts on both pieces you want joined. When you have the bit adjusted spot-on and the fence perfectly positioned, you're golden. Just lay one panel flat on the tabletop and slide it along the fence to rout it. Stand the mating panel upright against the fence to make the mating cut on it.

There are two parts to the setup process: setting the bit height and then setting the fence position. You have to make gross settings of both before cutting anything. Then, through a series of test cuts, you hone in on the optimum settings, first of the bit height, then of the fence position. Here's how:

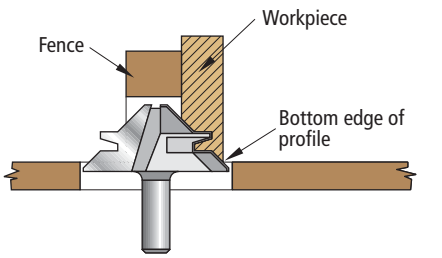
• **Setting the Bit Height:** The key is lining up the midpoint of the bit with the center of the stock. The midpoint of the bit is on the very slightly angled edge of the interlock, as shown in the illustration below.

The best thing you can do is mark the centerline on a scrap piece of the working stock, set it beside the bit, hunker down and squint across the tabletop to line them up.

Setting Up a Lock Miter Bit



1. Set bit height, aligning midpoint of the profile with the centerline of stock



2. Set the fence back from the bottom of the profile by the thickness of the working stock

Half of each lock miter joint is cut with the work flat on the top of the router table. Using a push block helps you hold the workpiece down while you advance it across the bit.

Maybe you'll nail the alignment, but it'll probably take a test cut and an adjustment (or two) to get it just right.

Having set an approximate bit height, move the fence into position to guide your first test cut. I stand a piece of the working stock "behind" the bit and sight along the fence to the bit. My objective is to have the stock aligned with the profile's bottom edge.

Make a test cut with the sample flat on the table. Cut it in half, turn one of the pieces over and join the two. If the faces are flush, the bit setting is perfect. If they are offset, an adjustment is needed, as shown below.

Use the depth-bar of a dial caliper to measure the offset between the two test pieces. Raise or lower the bit half the measurement. (Having a good depth-adjustment system on your router and table is a boon here.)

Adjust the lock miter bit up or down based on your test cuts. Halve the sample and fit the resulting two pieces together to see how they fit.

Stand the work on end flat against the fence to rout the other half of the joint. A featherboard keeps the workpiece against the fence, obviating the need for a tall fence facing.

• **Setting the Fence:** When cutting the joint, you're dealing with a 45° bevel. The exposure of the cutting edge above the table and in front of the fence must match the thickness of the working stock. Because the bit is set, it's no longer a variable. Only the fence position is in play. If the fence is set too far back, a cut will remove too much stock and alter the length or width of the workpiece. If it is too far forward, you won't get the full miter. You already have a gross setting; now you just need to refine it.

To set your fence correctly, cut a scrap piece from the working stock, feeding only a few inches into the cut.

• If the tip is square, move the fence back to expose more of the bit.

• If the cut is shortening the material, pull the fence forward so that it will be able to house more of the bit.

• If the tip comes to an acute angle whose tip is flush with the square, unrouted edge of the stock, the fence position is just right.

With the final fence position set, you can proceed to the real workpieces. **PW**

Forrest Blades

Quality Blades for America's Craftsmen

Serious woodworkers demand perfection. That's why so many of them choose Forrest saw blades.

Forrest quality is legendary. Our proprietary manufacturing process, hand straightening, and unique grade of C-4 micrograin carbide give you smooth, quiet cuts without splintering, scratching, or tearouts. In fact, independent tests rate our blades as #1 for rip cuts and crosscuts.

Forrest saw blades are simply the best that money can buy. They're made in the USA by the same family-owned business that's been producing and sharpening them for over 55 years. And they're backed by a 30-day money back guarantee. It's no wonder that serious woodworkers give them such high praise!

"Your blades are without question the best by miles, and I have tried them all."
Bob Jensen–Fridley, MN

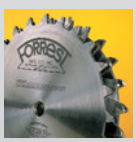
"These are the finest blades I have ever owned and you should be proud of your quality product."
Patrick T. Hankard–South Windsor, CT

"[Forrest blades] cut true, with no vibration. I was a carpenter by trade for over 60 years and continue to be an active woodworker. So, I can say with confidence that Forrest blades are the best."
Carl Stude–Burbank, CA

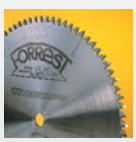
The message is clear. If you're looking for quality, performance, and value, it pays to choose Forrest blades every time.

Our Most Popular Blades:

Woodworker II – This award-winning, all purpose blade is the finest of its type. It turns big jobs into easy-to-handle ones.

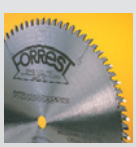


Dado-King – The world's finest multi-tooth dado set. It works effectively in all directions—with the grain or across it.



Chop Master – Produces perfect miters every time—with no bottom splinters. You get smooth edges on all types of wood.

Woodworker I – Great for table and radial saws. It trims and crosscuts all woods up to 2" and is ideal for plywood.



Duraline Hi A/T – Our best blade for birch and oak ply veneers. It also delivers a clean cut on melamine and vinyl over particle board.

Forrest blades come in a wide variety of sizes and are available for practically every application. Call or send for our complete list of products.

Three Convenient Ways To Order

We back our blades with a 30-day money back guarantee. So, choose the method most convenient for you and order today:

- **Visit one of our fine-quality dealers or retailers.**
- **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.
- **Contact our internet store:** www.stores.yahoo.com/forrestman

FORREST

The First Choice of Serious Woodworkers Since 1946

Code PW

CIRCLE NO. 118 ON FREE INFORMATION CARD.

Eames-style Table

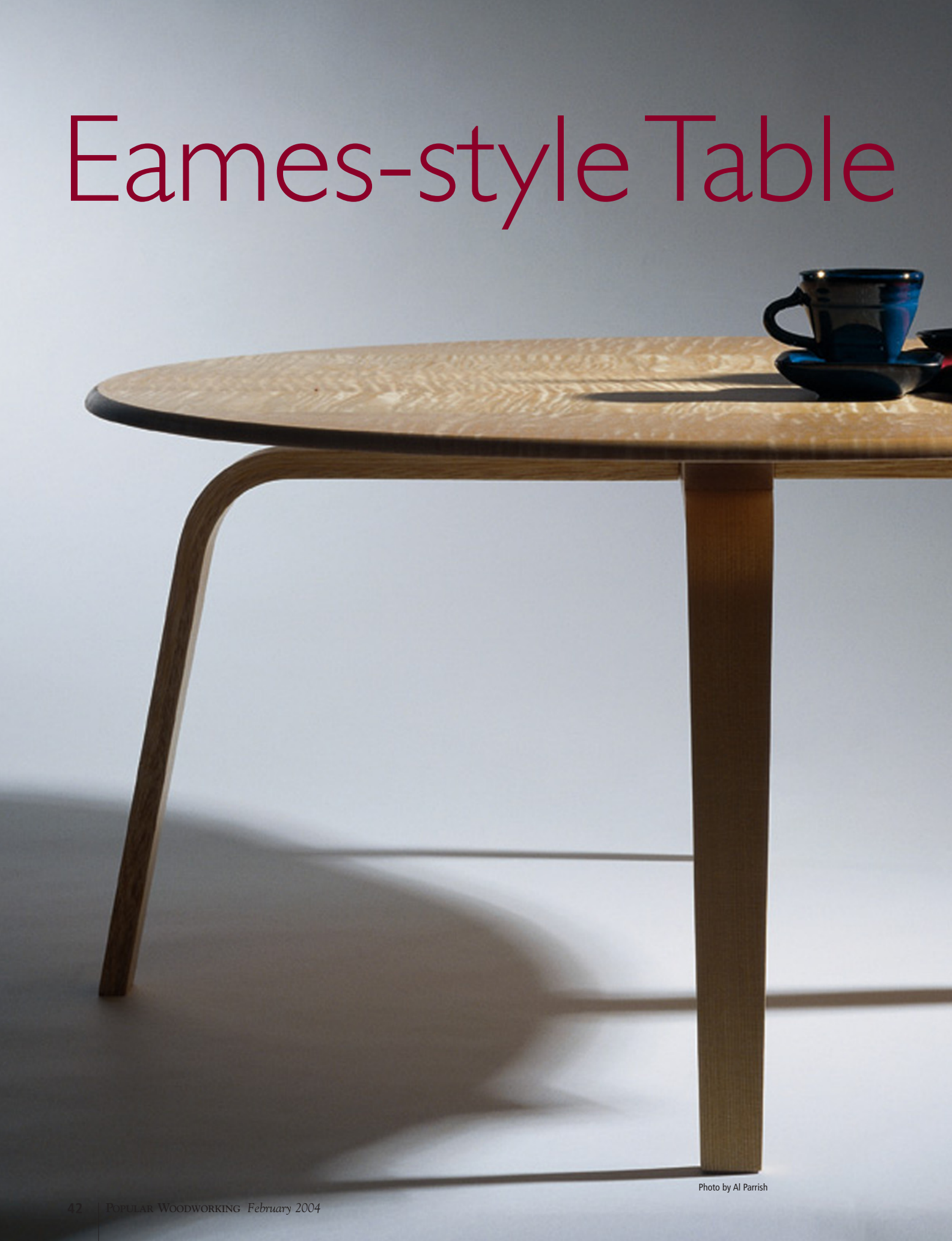


Photo by Al Parrish

A great way to try cold-bending, learn a new band-saw trick and fire up the hand-held power planer.

Almost any discussion of the legendary furniture designs of Charles and Ray Eames begins with plywood that has been formed into seemingly impossible shapes.

During World War II, this husband-and-wife team worked for the U.S. Navy to shape plywood under heat and pressure in ways that had not been done before. Their goal was to make lightweight splints, stretchers and even a shell for an experimental glider. But what they ended up with was the technology to create one of the most memorable pieces of 20th-century furniture: the Eames molded-plywood chair.

To complement this celebrated chair, the couple designed a coffee table similar to the one shown here. The most notable difference is that the Eames table has a top with a shallow depression in the middle that is molded from five wooden layers, also known as plies. Our top is made using solid wood and is flat. (To see a photo of the original table, which is still manufactured today, visit Herman Miller's web site, hermanmiller.com.)

by Christopher Schwarz

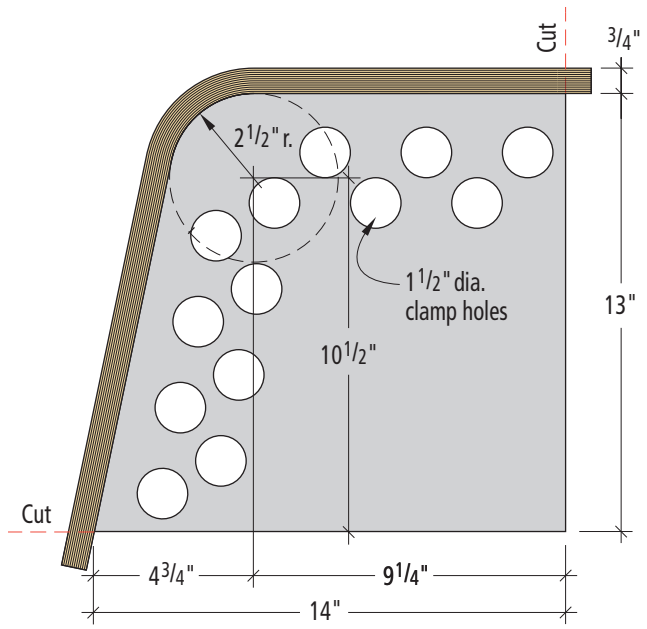
Comments or questions? Contact Christopher at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

"You usually find that what works is better than what looks good. You know, what looks good can change, but what works, works."
— Ray Eames

Because few (if any) home woodworkers have the equipment to make a molded-plywood top, we decided to focus our attention on the beautifully curved and tapered legs – which usually take a back seat to the top of this famous piece of furniture.

These legs are made by gluing thin layers of wood together over a curved plywood form. When the glue dries, the legs retain the shape of the form. This process, called "cold bending," can be intimidating for woodworkers who have never tried it. However, like many things in woodworking, the barrier is only in your mind.

This simple and easy lamination is a great project for you to give this useful and strong way of bending wood a try.



Leg bending form

A Form that Functions

Building the plywood form for the legs is simple. Using the illustration below as a guide, first make a template from ¼"-thick plywood or hardboard. Cut the curve using a band saw and smooth the edge with sandpaper.

Next, saw four pieces of ¾"-thick plywood to the same rough shape as the template and rout them each to shape. Here's how: Simply screw the ¼" template to your plywood. Chuck a pattern-cutting bit in your router (mine has a bearing that follows the pattern on the bottom of the bit) and trim them to finished shape.

With all four pieces of the form routed, glue and nail them into one big perfectly aligned sandwich. When the glue is dry, drill 1½"-diameter holes in the form to allow you to position your clamps' heads. I drilled 13 holes in my form in two rows: One row is centered 2" from the edge; the other is 3½" from the edge. The exact placement isn't critical – just space them evenly.

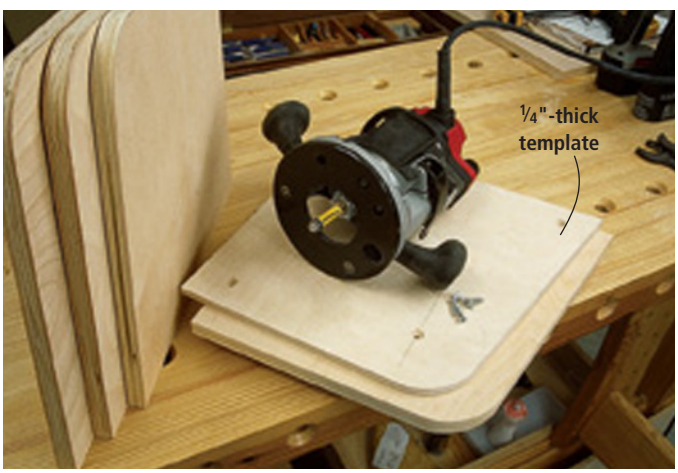
The second important part of the form is the two straight pieces of ½"-thick plywood. These pieces, which measure 3" wide x 16" long, are clamped on top of your lamination and distribute clamp pressure evenly on your leg. They're shown in action on page 46.

Cover the working surfaces of your three form pieces with a layer of duct tape. Glue won't stick to duct tape, so this prevents you from gluing a leg to the form.

Right Wood; Right Thickness

Some woods bend better than others. Ash, hickory and oak are good choices for bending stock, whereas cherry is too brittle to easily make it around this curve without shattering.

I actually ended up using quartersawn Japanese ash, sold as "senn," for my legs. I was seduced by its arrow-straight grain – and by the fact that my lumber supplier was completely out of regular ash. I bought 18 board feet of 4/4 stock, which was enough to make six legs. You definitely



Even for small jobs such as making this form, using a template to rout the individual pieces ensures an accurate bend and predictable results. After the form is assembled, smooth the finished curve with sandpaper.

The band saw wastes less wood than the table saw, but it will be more work. Be sure to set up your band saw carefully for this resawing operation. Get your guides in close and set your fence for the drift of your blade.

want enough wood to make at least one extra leg, especially if you've never done this before.

If you are planning to resaw your plies on the table saw, it's a good idea to choose a wood that is inexpensive, such as yellow pine. Because the plies are so thin, you're going to waste almost as much wood as you use when you cut these out on the table saw.

There is quite a good reason to use a table saw instead of a band saw for this operation: Table-sawn plies are ready to go into the form as soon as you cut them. A band-sawn ply has rough-cut surfaces that must be first sanded down in a drum sander – an expensive piece of equipment. We have a drum sander in our shop, so I opted to use the band saw.

The next step is to discover what is the thickest ply that will bend around your form. This varies from species to species. Start by cutting an 1/8"-thick x 3"-wide x 33"-long ply. Try to bend it over the form using finger pressure. If the wood breaks, cut a thinner ply. If it bends, but just barely, try a slightly thinner ply. The ideal thickness for my ash was 1/16", which meant I was going to have to have 12 layers of wood to create a 3/4"-thick leg. In other words, to make six legs I had to saw out 72 plies (and a few extra, to account for my inevitable mistakes). Your wood species of choice might require fewer plies.

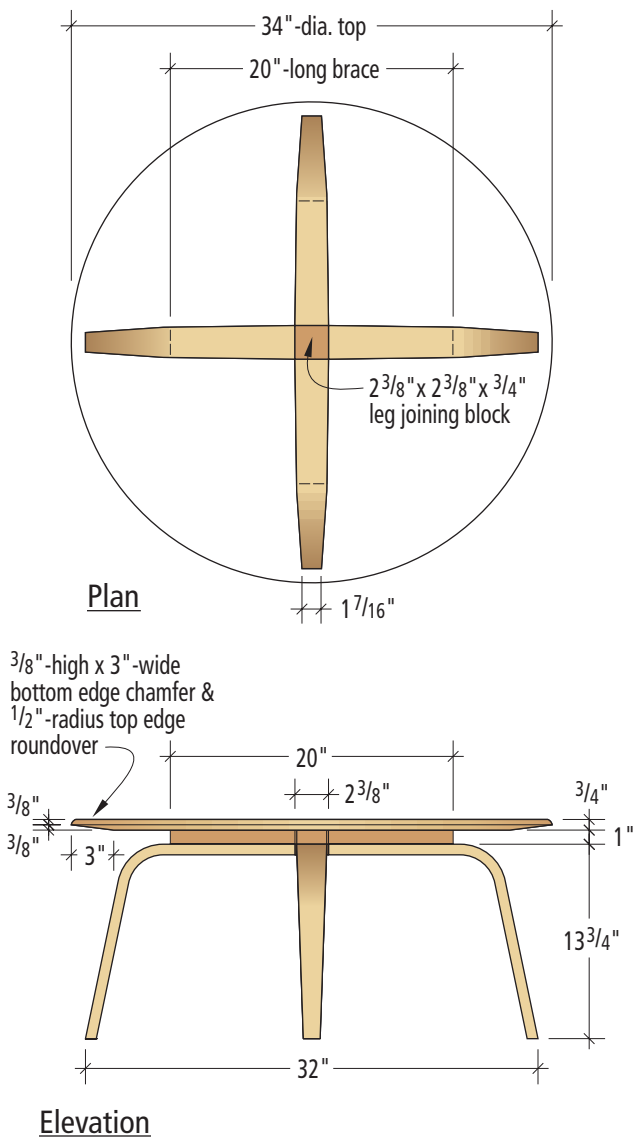
As you saw your plies, stack them in the order that they come off the saw. I marked mine on one edge so I could keep my plies together. This helps make uniform-looking legs in the end.

Get Ready to Glue

Pulling off a successful bent lamination is mostly about preparation. If you have everything ready to go and have been through a dress rehearsal, you'll find it a simple and straightforward process. If you shoot from the hip, you'll end up with a messy and worthless tangle to show for your effort.

- Make sure you own or borrow enough clamps. I needed 30 bar clamps for this lamination.
- Have the right safety equipment on hand. The best glue for this job is plastic resin glue, also known as resorcinol (see the supplies box for ordering information). You mix it from a powder with water. If you have gloves, a face mask, goggles and long sleeves, it's easy. If you lack any

This monster drum sander is a luxury. Luckily, there are consumer versions available from Performax and Delta. If you don't have one, chances are someone in your local woodworking club does. These are mighty handy machines.



of these things you're going to have irritated skin, a hacking cough and burning eyes. (Why not use yellow glue? It's flexible when it dries and will "creep" too much – the legs will lose their shape. Plastic resin glue dries harder and won't creep.)

This simple $3 plastic paint-stirring gizmo did a better job of mixing the glue than the fancy $12 paint-stirring gizmo I own. Go figure.

Don't use too much glue, or you will just make a sliding mess when the clamps go on. A thin film on both sides is enough to do the job. Dry spots on the plies are a no-no, however.

• Pull off three 12"-long strips of duct tape and stick one end of each to your bench. You're going to wrap the lamination with these before it goes on the form. Having these on hand will save you five minutes of fumbling.

• Have your gluing equipment ready. The best way to apply the glue quickly (you can have as little as 10 minutes to do the job) is to pour it into a disposable paint tray and roll it on.

• Have your plies stacked exactly the way you want them and vacuum the sanding dust off them before you begin.

Once your clamps are in a row, go through a dress rehearsal without glue. Bundle your plies with a few lengths of duct tape and clamp them in the form. Start from the top of the leg and work toward the bottom. Whatever you do, don't clamp both ends and work toward the middle bend – you'll get a big ugly gap.

Take the plies off the form and get ready to mix the glue. It's time for the real thing. Plastic resin glue is messy but strong. Your best bet is to mix it up in a small bucket using a paint-stirring attachment on your cordless drill (variable speed gives you more control). To glue up one leg, I found that 1½ cups of powder and ¾ cup of water gave me just enough for the job.

Mix the glue outside; good ventilation is key. Slowly add the water until the glue is the consistency of heavy cream. Then stir it until all the lumps are gone. If you cannot get rid of the lumps, strain the glue through a nylon stocking or paint strainer. Then pour the glue in your paint tray.

Turn off the radio, hold your calls and don't stop to chat during this part of the project. Speed and accuracy make a good lamination. This glue can set up fast.

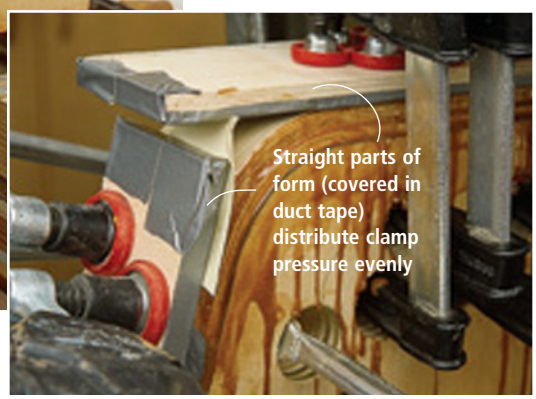
Paint the glue on in a thin but even layer on both sides of all your interior plies. Work quickly because once the glue hits the wood, the clock is ticking. Stack your plies as soon as you've applied the glue – this slows down the glue's curing time. When all the plies are stacked, take a piece of duct tape and wrap it around the end. Tape it snugly, but by no means tourniquet-tight. Wrap the other end and the center. The duct tape minimizes the tendency of the plies to creep side-to-side.

Put the lamination on your form, put the plywood piece on top and start clamping at the top. You shouldn't break your wrist when you tighten the clamps. Snug them until the gaps close on the edges. When you get to the middle bend, push your lamination down on the form and secure it with the second piece of plywood and a clamp. It should be easier to bend than in the rehearsal – the water in the glue makes things more pliable. Then add the rest of the clamps.

Wipe the edges of the lamination with a moist rag – not too wet. Look for gaps and adjust your clamp pressure. Wait 12 hours for the glue to cure. Then repeat the whole process for the other legs.

Get Your Legs in Shape

This is the second-most fun part of the project (the big fun comes



later). First you need to clean up the left edge of your lamination so you can run it through the table saw. If your jointer knives are carbide (or if they're due to be replaced), clean up one edge on your jointer. The resin glue is murder on steel knives. Otherwise, I recommend a belt sander (be wary of the dust) and then a block plane to clean up one edge.

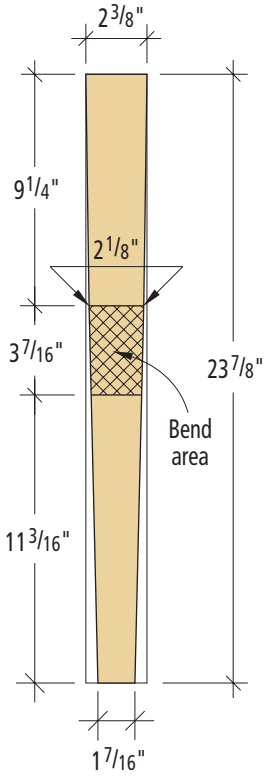
With one edge clean, you can trim the excess junk off the top and cut the angle at the foot. This is easier than you think. After trimming the excess off the top, set your table saw's fence to 13¾". Then crosscut the foot by running the leg through the saw with the top edge flush against the fence. The photo below shows it best.

Why not just calculate the angle and cut it on your miter saw? Each leg will have a slightly different amount of "springback," which is when the leg tries to bend back to its original straight shape after coming off the bending form. Because each leg is bent at a slightly different angle, the foot angle needs to be slightly different for each, too. What a pain. Do it like the photo below shows and your legs will sit flat without geometrical equations.

Next, lay out the taper on the legs. The legs start out at 2⅜" wide at the top and taper to 1 7/16" at the foot. You can use the illustration at right or download a pattern from our web site (click on "Magazine Extras" to find it) to make this process easy. Stick the pattern to the backside of the leg using a spray adhesive and cut the taper on the band saw.

"Wait a minute," you're probably saying to yourself. "How do I cut the taper on the bent part of the leg?" It's easy. Start your cut at the foot. When you get to the bend, simply tilt the leg back as shown in the photo below right. It looks nuts, but it's quite safe if you take it slow. After a couple of tapers, it's fun to do.

Clean up the band-sawn edges with a block plane, working from the top to the toe to reduce tear-out. Sand your legs to their finished grit. Start with #100 grit and work up to #220. A word of caution: Take it easy on the inside and outside bends. It's easy to sand through a layer of your lamination, ruining your work.



Leg taper pattern - apply to backside of each leg

Build the Braces

Sandwiched between the legs and the top are two 1" x 2⅜" x 20" poplar braces that are joined into an "X" shape using a half-lap joint at the center. The braces make the top sit above the legs and reveal the curve; they don't add much to the structure of the table. I laid out the half-lap joint, cut it on the band saw and cleaned it up with a chisel and shoulder plane.

Once you get the braces nesting together, screw a ¾" x 2⅜" x

This looks like a funky jointer operation, but the leg actually just bends around the guard, making it safe and simple. Too bad you'll have to sharpen those cutterhead knives now, but you were probably overdue.

Press the top of the leg against the fence and this cut is a snap. I clamped the scrap block to the leg during the cut to prevent tear-out on the backside of the leg. Another option is to use your miter gauge and a gauge block clamped to the fence.

The third in our series of odd machinery operations. The band saw's blade pushes the work against the table, so it's easy to keep control of the leg as you make this bend. Still unsure? Then cut from both ends and finish the middle with a hand saw.

2⅜" block of plywood to the center of the "X." Then butt each leg against the center block and screw them to the braces.

To give the braces a clean look, trace the taper of each leg onto its matching brace. Disassemble the entire base assembly and taper the long edges of the two braces. I cut the taper on my band saw along my pencil lines and cleaned up the edges with a block plane.

A Solid Top

There are ways to make the top imitate the look of the original, but we decided a less slavish imitation was appropriate. This top has a large chamfer on the underside and a rounded top edge to give it some lightness. Once you've edge-glued your boards for the top, lay out the circular shape. Then, on the underside, lay out a 28"-diameter circle. This is where you'll begin the chamfer.

Cut the top to rough shape using a band saw or jigsaw. You can then sand the sawn edge to a circular shape or rout the top round using a straight bit in your router and a circle-cutting jig.

Once your top is round, cut a roundover detail on the top edge. I used a ½"-radius roundover bit. Then scribe a line all around the top that's exactly one-half of the thickness of the top. This is where your chamfer will end at the edge.

Before you cut the chamfer – the most enjoyable part of this table – prepare the top surface for finishing. Plane and scrape (or sand) the surface smooth.

Once that's complete, flip the top over and get out your hand-held power planer. You heard me. The best way to make this chamfer is with a power tool usually used by door installers. The power planer happens to be a champ at shaping large chamfers, too.

Work from the inside out to the edge to sculpt the chamfer and follow the grain as much as possible. Once you get within 1/32" of your two lines, move on to another section of the top. Clean up the chamfer with a block plane and a random-orbit sander.

With the top complete, it's just a simple matter of a few more screws to get the table on its feet. Screw the braces to the underside of the top. Make sure the clearance holes in the brace that cross-es the grain of the top are slotted. The slots allow the top to expand and contract. Screw your legs to the braces and you're in business.

A clear finish is appropriate for this piece, as is a red dye or even an ebonized look. I sprayed on two coats of clear satin lacquer (sanding with #320-grit stearated paper between coats) and called it done. **PW**

SUPPLIES

DoItBest
doitbest.com or 260-748-7175

4½ lb. • DAP Weldwood plastic resin glue (resorcinol)
334178, $23.69

Price as of publication deadline.

When my grandfather visited Japan he was presented with these beautiful machine-age trammels as a gift (his hosts knew he was a woodworker and engineer at heart). I use them every chance I get.

Use the hand-held power planer to sculpt the chamfer on the underside. It's a free-form operation. Set your tool to take a small bite and you'll do just fine.

Exploded view

EAMES-STYLE TABLE

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	72	Leg strips	1/16	3	33	Japanese ash
❑	2	Braces	1	2⅜	20	Poplar
❑	1	Center block	¾	2⅜	2⅜	Plywood
❑	1	Top	¾	34	34	Maple

WOODWORKING ESSENTIALS

BY NICK ENGLER

CHAPTER 4

Router Joinery

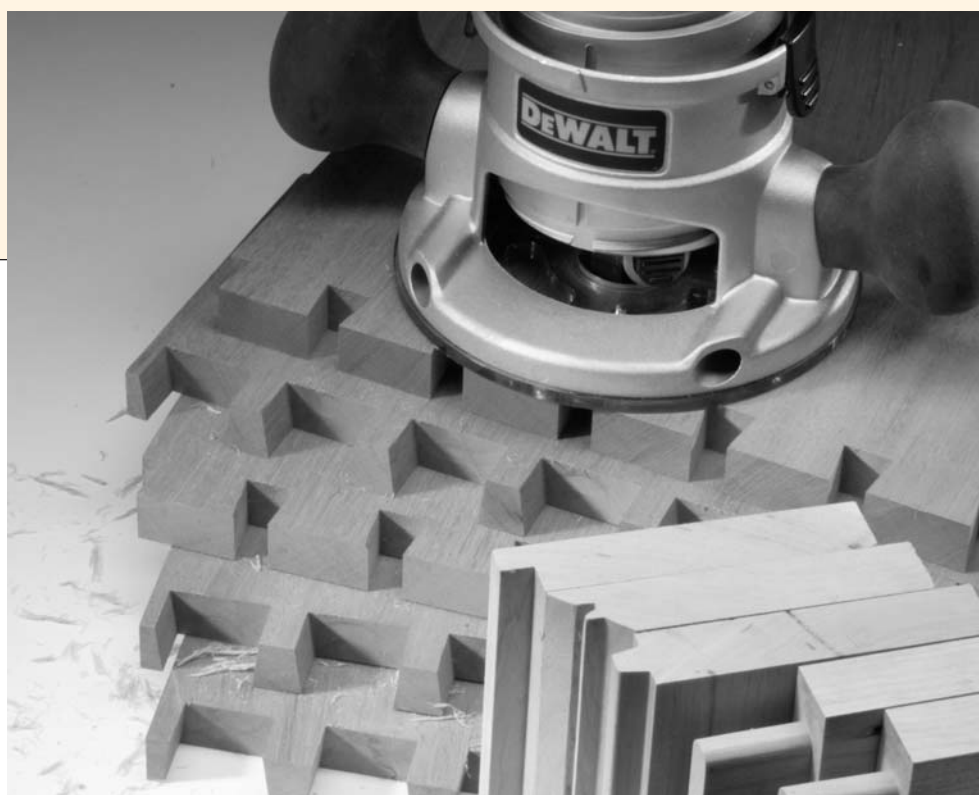
Although routers were originally designed to create moulded shapes, they can be excellent joinery tools. In fact, they're better in some ways than table saws, professional-quality mortisers or dado cutters when it comes to cutting joints. There are several reasons routers have an advantage:

- **Simplicity:** Setting up hand-held or table-mounted routers is rather straightforward. Tools dedicated to joint-making such as hollow-chisel mortisers are more complex and require more time to set up. Sure, it could be worth the effort to use a mortiser if you're planning to make dozens of duplicate joints. But if all you want to cut are a few mortises and tenons, for example, a router will save you loads of time.
- **Versatility:** You can make a greater variety of joints with a router than with any other joinery tool. No matter if you have a fixed-base or plunge router, you can cut more types of joints than with any other kind of tool.
- **Accuracy:** There isn't a more precise joinery tool. You may find tools just as accurate, but none that surpass the router. Because routers cut quickly, they leave a smooth surface, meaning joints fit better and bonds are stronger.

There are some disadvantages to using your router for joint-making, and I'd be remiss if I didn't mention them:

- Most routers won't stand up to continual cutting as well as heavy-duty woodworking machinery.
- Because you can't make deep cuts in a single pass on a router, it may take you longer to rout some joints than it would to use a mortiser or dado cutter.
- Depending on the joint you want to make, you may be limited by the sizes and configurations of available bits.

These shortcomings, however, are minor. Routers are indispensable joinery tools in any workshop.



PRO TRICK:

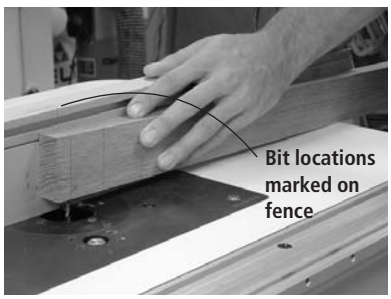
Dehumidifier Can Make Your Tenons Fit Tighter

Woodworkers who use mortise-and-tenon joints sometimes keep a dehumidifier in their shop to make it drier than the surrounding environment. Once in the shop, wood shrinks slightly. Then, when a completed project is returned to normal humidity, the tenons swell in the mortises, making the joints tighter.

TIPS & TRICKS

PRO TRICK:

Tilting Pieces to Create Stopped Cuts



Stopped grooves or dados can be made safely on the router table by first marking the bit location (both sides of the bit profile) on the fence, then carefully lowering and raising the piece for the cut using the end of the board opposite the cut as a fulcrum.

PRO TIP:

No Templates Needed If You Copy an Existing Piece

To reproduce a shape quickly and precisely without making a template, just use an existing part to make copies. Adhere the shaped part to the stock with double-faced carpet tape and, using either a pattern-cutting or flush-trim bit, cut the stock while tracing the shaped part with the bearing. However, because the bit won't cut inside corners that are smaller than the bit diameter, you'll have to cut this with a band saw or scroll saw.

GREAT TIP:

Mortising Bits are Worth Taking the Plunge For

Some manufacturers offer so-called mortising bits. They look like a standard straight bit with one difference: They have an additional small cutter at the end of the bit. This bit allows you to plunge directly into your work, instead of wiggling the bit as you plunge, which is typical with a straight bit.

Rabbets, Dados & Grooves

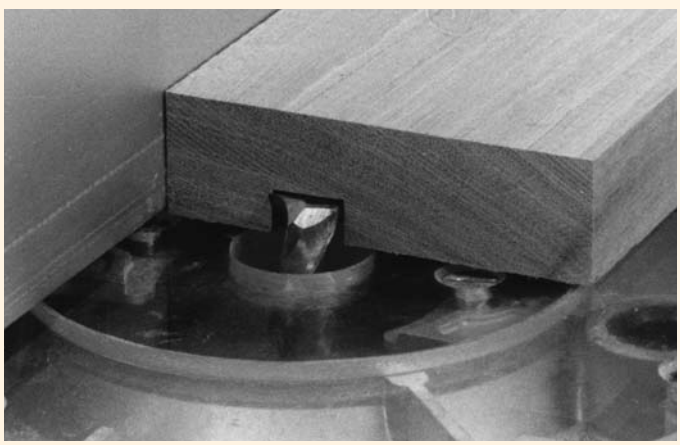
You can make the most basic woodworking joints – rabbets, dados and grooves – using a simple fixed-base router and an inexpensive set of straight bits.

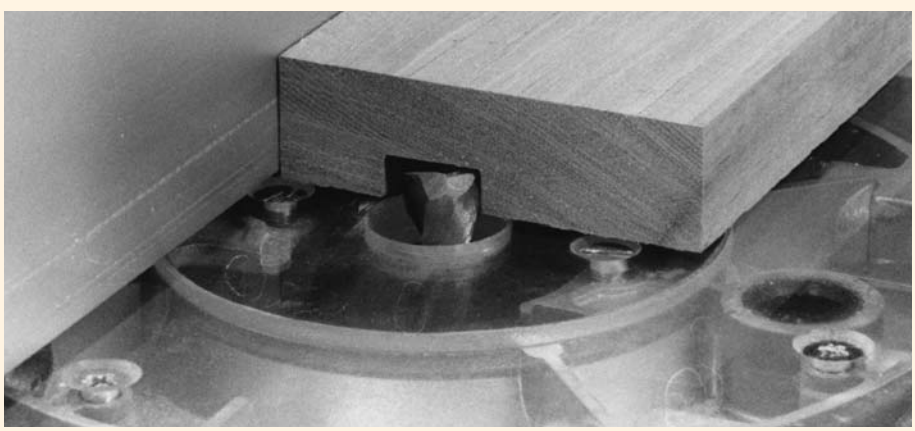
Rabbets (and the simple tongue for a tongue-and-groove joint) are produced easily with a router. While you may need a variety of rabbet sizes, a single rabbeting bit can accomplish them all. By purchasing a rabbeting bit with interchangeable guide bearings, the width of the rabbet can be changed quickly by selecting and installing a different diameter guide-bearing on the bit.

Rabbeting can be accomplished safely using a router free-hand or in a table. For rabbeting smaller pieces (such as with frames or door mullions) I recommend using a router table. In a table, you can use a simple straight bit to cut the rabbet, or you can use a rabbeting bit with a bearing guide. Even though you may think the bearing guides make a fence unnecessary, you still should use one to limit the amount of bit exposed and to help guide the pieces. Align the fence with the outside edge of the bearing for a seamless process. For improved accuracy and safety, use a fingerboard to hold the material against the fence and table.

As mentioned earlier, a rabbet also can form the tongue for a tongue-and-groove joint. The tongue can be flush to one side of a board (for offset raised-panel doors) or the tongue can be centered on the board. Essentially, the tongue is just a long tenon. Run the groove first, then simply size the tongue to fit in that groove.

Many dados or grooves can be made with a straight bit that is sized to accurately make the joint with a single-width pass. To make a dado or groove that's a non-standard size, choose a cutter that's slightly smaller than the width of the joint and cut the joint in two passes, as shown in the photos below.





When routing dados and grooves, the joint ordinarily will be the same width as the bit. If you need to make a joint of a larger size, first make a cut that's somewhat narrower than the joint needed (left), then move the fence or straightedge to make a second cut (below), enlarging the joint to the desired width.

Because most basic joints are cut parallel or perpendicular to straight edges, you must guide the router or the work in a straight line. The best way to do this is to use an edge guide, straightedge, fence or miter gauge. You also can use a shop-made jig, such as the T-square Router Guide (*which was featured in the "Jig Journal" in Chapter One of this series*).

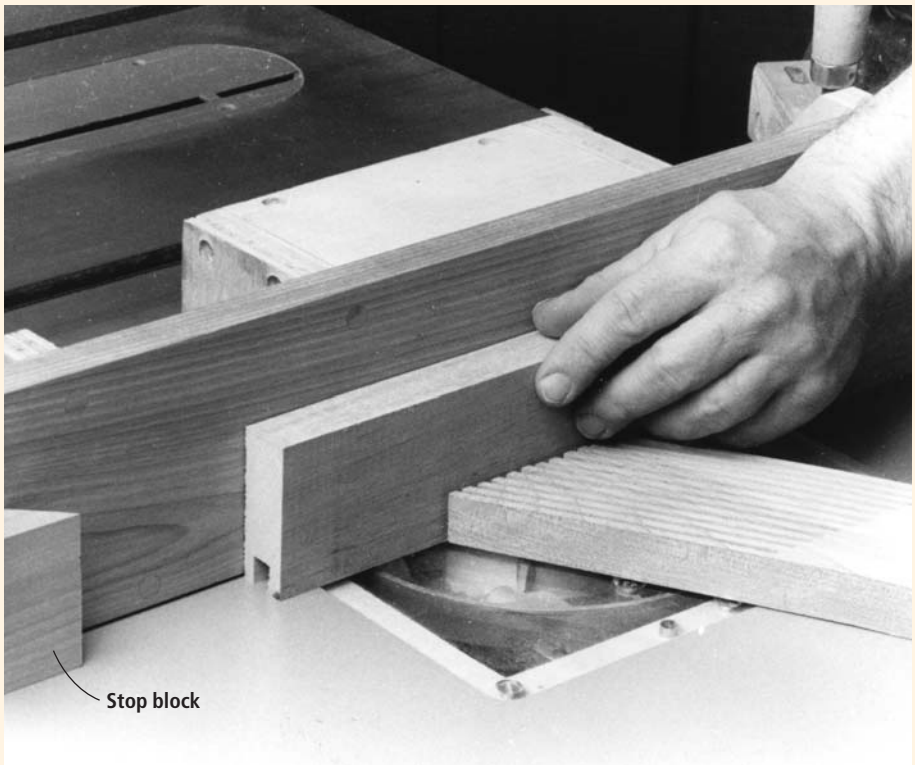
If the joint is blind (which means it stops before running through the board) at one or both ends, attach stops to the workpiece or the guides to automatically halt the cut. The location of these stops depends on where the joint is to be cut in the board. For example, to cut a blind groove that stops 6" from the ends of the board, clamp a stop to the outfeed side of the fence 6" from the router bit.

Now, if the joint is blind at both ends, you can determine the distance between the two stops by adding the length of the board to the length of the joint and subtracting the router bit diameter. (For example, if you want to cut a 4"-long double-blind groove in a 10" board with a $\frac{3}{8}$"-diameter straight bit, position the stops $13\frac{5}{8}$" apart.)

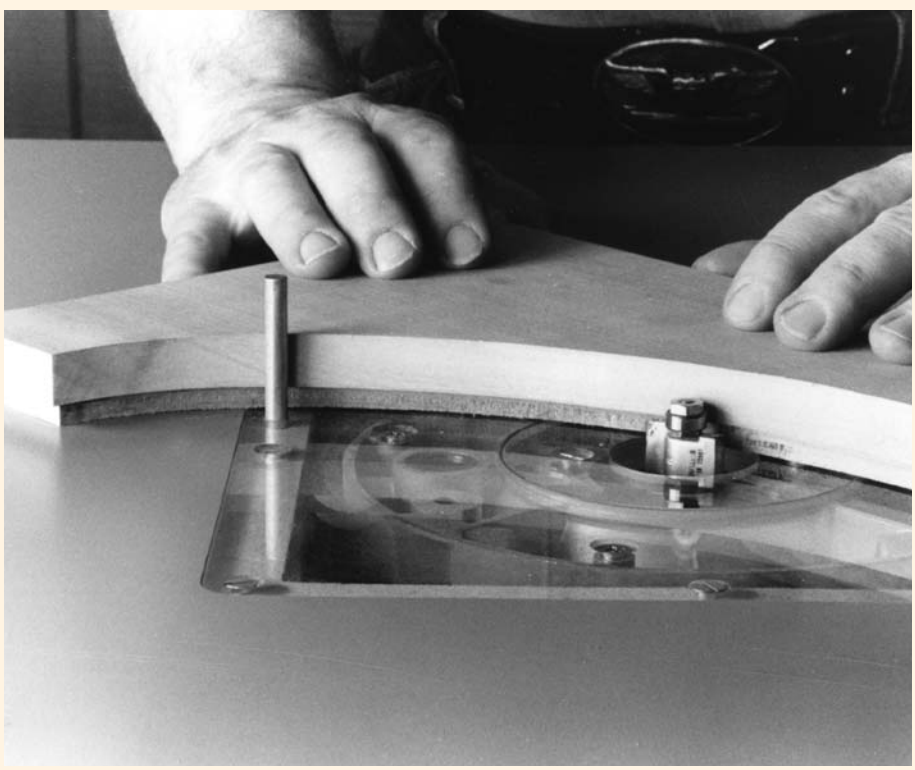
But what if the rabbet must follow a contour? Well, there are a couple of choices, but the only bit that makes good sense for making contoured rabbets is a bearing-piloted rabbeting bit.

For a contoured groove, a different approach will likely be necessary. The answer this time is a guide collar (also called a template guide) and a template. Because a guide collar is slightly wider than the diameter of the bit, the contour cut by the router will not be the same size as the template. For inside curves and corners, the contour will be smaller; for outside ones, it will be larger.

There always will be a small gap between the edge of the template and the nearest side of the cut because of the different diameters. To determine the width of this space, subtract the diameter of the bit from the outside diameter of the collar and divide by two. (For example, if you cut a contoured groove with a $\frac{5}{8}$"-diameter collar and a $\frac{1}{2}$"-diameter bit, the distance between the template and the groove will be $\frac{1}{16}$".)



When cutting blind joints – rabbets, dados and grooves that are closed at one or both ends – use a stop block to halt the cut at the blind ends. Note that the end of the stop block is mitered. This prevents sawdust from being trapped between it and the stock, where the dust might interfere with the accuracy of the cut.



When cutting a joint in a contoured edge, use a piloted bit to follow the contour. A piloted rabbeting bit will neatly cut a rabbet in an irregular edge, while a spline cutter will likewise make a groove in an irregular edge a simple task.

TIPS & TRICKS

PRO TIP:

Let the Wood Get Acquainted With its New Surroundings

When you first purchase lumber, bring it into your shop and let it sit untouched for a few weeks before you use it. This will give the moisture content of each board a chance to reach equilibrium with its new environment. If you cut a board while its moisture content is in flux, the wood may expand or contract unevenly, ruining the fit of your joints and distorting the project.

GREAT TRICK:

Connect the Dots to Keep Cutting in Straight Lines

The bit does not always fall in the exact center of a round router sole. Because of this, the cut won't be accurate if the router turns while you're guiding the base along a straightedge. The accuracy also may be spoiled when you remove and replace the sole. To avoid this, put a spot of paint on the edges of the sole and base, one above the other. Keep these spots toward you as you rout, and align them each time you reattach the sole.

GREAT TIP:

Watch Your Tenon Widths

As a rule of thumb, most woodworkers limit the width of mortise-and-tenon joints (where the wood grain must be glued perpendicular to its mate) to 3". Once you exceed 3" wide, you will need to use double tenons.

Mortises and Tenons

To make a mortise and its matching tenon, you must combine several techniques. Although it may seem complex, a mortise-and-tenon joint is just a combination of several basic joints. After all, a mortise is simply a groove that's blind at both ends, and a tenon is made by cutting two or more rabbets in the end of a board.

The trick to cutting precise mortises and tenons is to make the cuts in the proper order. Most experienced woodworkers agree that it's easiest to cut the mortise first, then fit the tenon into it.

To make a mortise, you must bore a starter hole and expand it to the dimensions needed. There are several ways to do this using a fixed-base or a plunge router, either hand-held or in a table. However, when you make mortises for mortise-and-tenon joints, you usually want to make several mortises in several different workpieces, all the exact same size and shape. The easiest way to accomplish this is with a simple template.

As a general rule, mortises should be about half the width of the material they're made in. So a mortise in a ¾"-wide piece of wood should be ⅜" wide, with a 3/16" shoulder on either side of it. The depth of the mortise should be no less than ¾" to ensure a good joint, but 1" or slightly more usually is a good idea.

The simplest form of template is a piece of plywood that has a hole in it that is the exact size of the mortise you wish to rout. Just clamp the template directly onto your work and then form the mortise using a straight bit that has a bearing above the cutting flutes. There are a variety of ways to make the template, from making plunge cuts on a board with a table saw to edge-gluing four pieces of wood together and leaving a gap in the middle that is the size of the mortise. All work just fine.

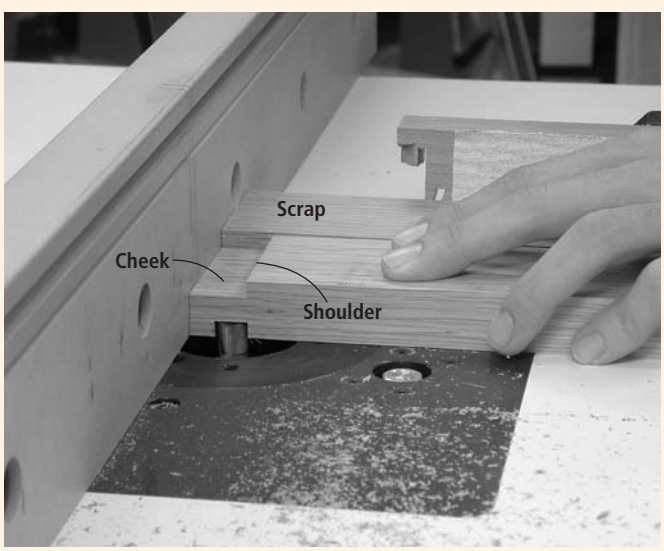
When cutting the mortise, first plunge straight down in the area you wish to waste away. Then, with the router fully plunged, follow the template's edge with your bearing to shape the mortise to its finished size. (See below for how to cut the tenon.)

Dovetails

There are three basic dovetail joints: half-blind dovetails, through dovetails and sliding dovetails. The router is the only power tool that can create them all, using a special dovetail bit.

Both half-blind and through dovetails are most easily made using accurate templates. These can be purchased (there are many commercially manufactured ones) or you can make your own.

Through dovetails require two passes and two matching templates. These templates are less common than half-



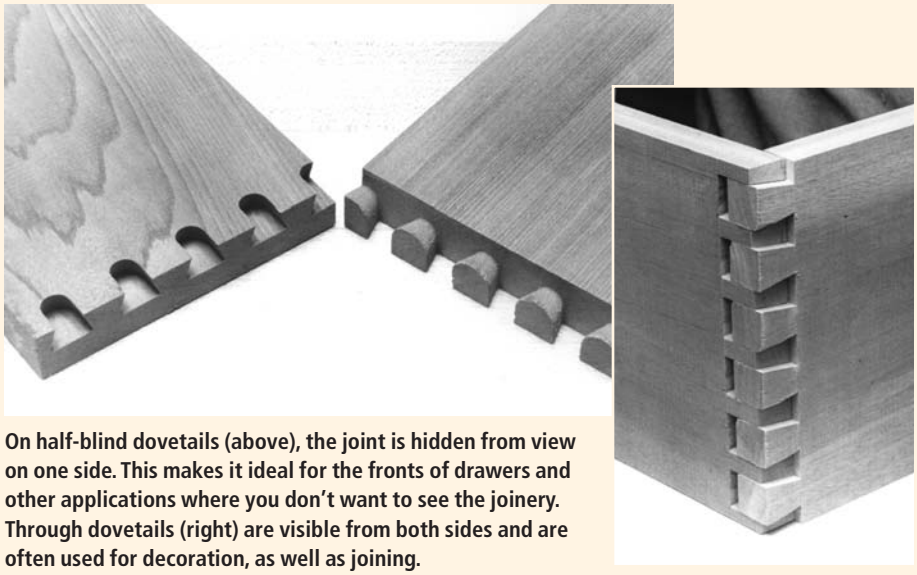
To make a tenon, cut two or more rabbets in the end of the board – these rabbets will become the cheeks and shoulders of the tenon. To fit the tenon to the mortise, cut the tenon just a bit large, then slowly raise the bit, shaving away a paper-thin layer of stock on each cheek until you get the fit you're after. Guide the cuts with the miter gauge, using the fence as a stop.

blind dovetail templates and, because of the precision required to make them, can be much more expensive.

Sliding dovetails require no special equipment, other than your router, router table and dovetail bit.

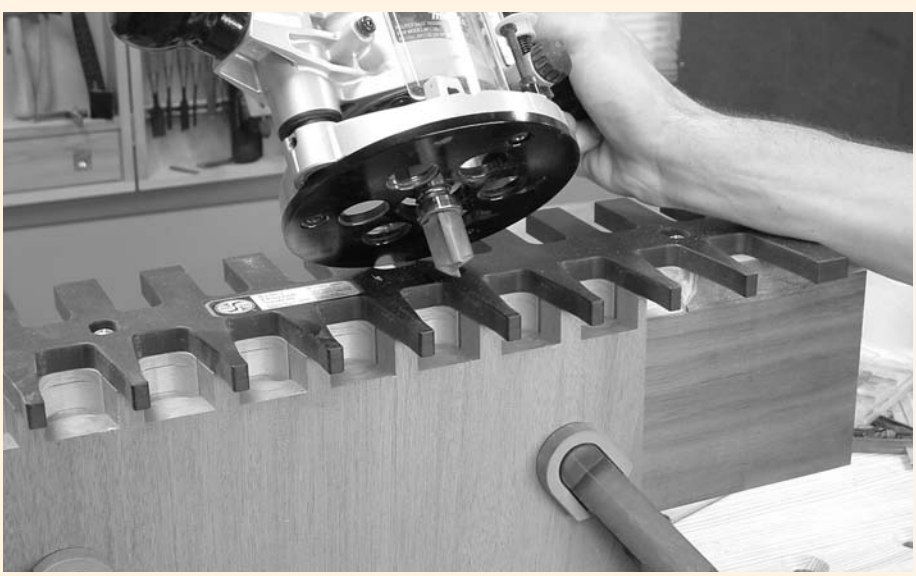
To make a sliding dovetail, first rout a dovetail slot the same way you would rout a dado or groove. Because of the bit shape, however, you must cut the full depth in one pass. Next, cut a dovetail tenon to fit this slot – this must be cut on a router table. The slot, on the other hand, can be cut using a hand-held router. Leave the depth of cut unchanged from the setup you used when routing the slot. Then pass a board by the bit, cutting one face. Then turn the board around and cut the other face. These two cuts form the tenon.

To assemble the joint, just slide the tenon into the slot. If necessary, adjust the fit by trimming a little stock off the tenon's cheeks, either with your router, a small plane or simply with sandpaper.



On half-blind dovetails (above), the joint is hidden from view on one side. This makes it ideal for the fronts of drawers and other applications where you don't want to see the joinery. Through dovetails (right) are visible from both sides and are often used for decoration, as well as joining.

To rout a half-blind dovetail joint (right), secure both of the adjoining boards in the template. The "tail" board is held vertically, so its end is flush with the top surface of the horizontal "pin" board. Cut both the tails and the pins in one pass with a dovetail bit, using a guide collar to follow the template.



When using a fixed through-dovetail template (left) you can't change the size and position of the tails and pins. Rout the tails first, using the tail template, a guide collar and a dovetail bit. Then you can switch to the pin template and a straight bit. Fit the pins to the tails by moving the template forward or back on its holder. This will change the size, but not the location, of the pins.

TIPS & TRICKS

GREAT TRICK:

Need a Hinge? Just Add a Hole to Finger-jointed Boards

To make a wooden hinge, roundover the ends of two boards with a roundover bit (the radius of the bit must be half the thickness of the boards). Cut finger joints in the rounded ends and assemble the joint. At the center of the rounded ends, drill a hole through the interlocking fingers and insert a wooden or metal dowel to serve as a pivot.

PRO TRICK:

Two Jigs are Better than One, Especially for Dovetails

Many woodworkers keep two dovetail fixtures in their shops – one for half-blinds, one for everything else. For example, I make frequent use of two commercial dovetail routing setups. In one, I have an inexpensive half-blind dovetail jig and an old router with the necessary guide collar and dovetail bit. Because I rout more half-blind dovetails than any other dovetail joint, this saves me lots of time. Then, when I need to rout through dovetails or other special dovetail joints, I just use my other jig.

GREAT TIP:

Just a Little Bit off the Top, Even when Routing Mortises

When routing deep mortises, remember to make the cut in several passes, routing no more than 1/8" with each pass. If the wood is very hard or tends to chip and splinter, it's better to rout in 1/16" passes. Also, use a spiral straight bit to help clear the chips from the mortise as you cut. This is especially important when you're using a hand-held router and the bit is positioned over the work because the chips tend to fall down into the mortise and clog it.

Coped Joints

Perhaps the easiest way to make a joint with a router is to cut a "coped" joint, where both adjoining surfaces are shaped. The most common example of this is on cabinet doors where the rails (the horizontal pieces) meet with the stiles (the vertical pieces). Each joint surface is a mirror image of the other, so the two surfaces mate perfectly.

This has two advantages: the shape of the joint aligns the adjoining parts so the surfaces are flush and the corners are square, and the shape increases the gluing surfaces and strengthens the joint.

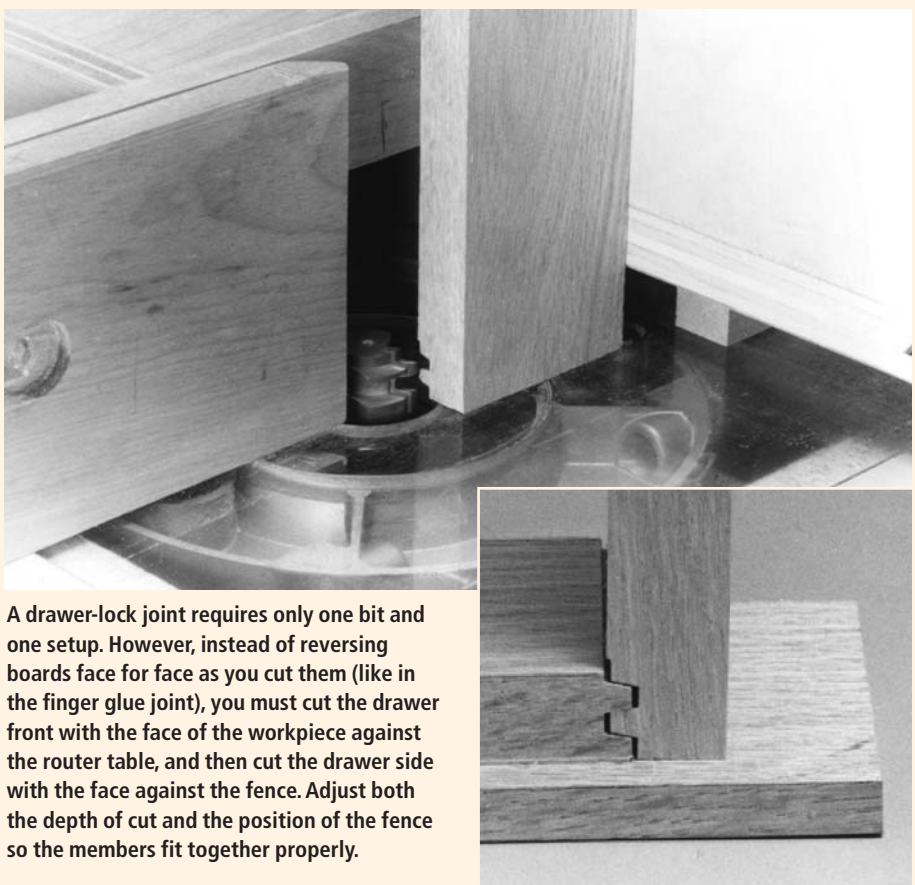
Coped joints require special router bits that can be pretty expensive. There are three types of bits, and each must be used in a different manner:

- **Single bit with one cutter:** The male and female cutters are on the same bit, making it a long piece of tooling. You raise and lower the bit in the table to change which set of cutters are in use.
- **Single bit with interchangeable cutters:** You switch from the male to the female cutter by disassembling the bit and changing the orientation of the cutters. There are small shims involved so you need to keep those in the right place as you assemble the bit each time.
- **Two bits:** There's one bit for cutting the male part of the joint and a second for the female. This is usually the most expensive route.

There is another type of bit used for assembling boxes that routs the joinery on both edges. The drawer-lock joint – one example of these – is shown below.

Loose-tenon Joints

Along with all the joints we have discussed so far that require joinery parts cut on the mating pieces, there are a number that use an extra piece to form a loose-tenon joint. The three most common are the true loose-tenon joint, the spline joint and the biscuit joint.



A drawer-lock joint requires only one bit and one setup. However, instead of reversing boards face for face as you cut them (like in the finger glue joint), you must cut the drawer front with the face of the workpiece against the router table, and then cut the drawer side with the face against the fence. Adjust both the depth of cut and the position of the fence so the members fit together properly.

The true loose tenon is exactly what it sounds like. Rather than making a mortise in one piece and a tenon on the other, both pieces have mortises. A third piece (often made in a long stock piece and cut to length) becomes a double-sided tenon, connecting the two mortises. The strength is essentially the same as it is in a mortise-and-tenon joint, but the process is perfect for use with a router, and it is quick and accurate.

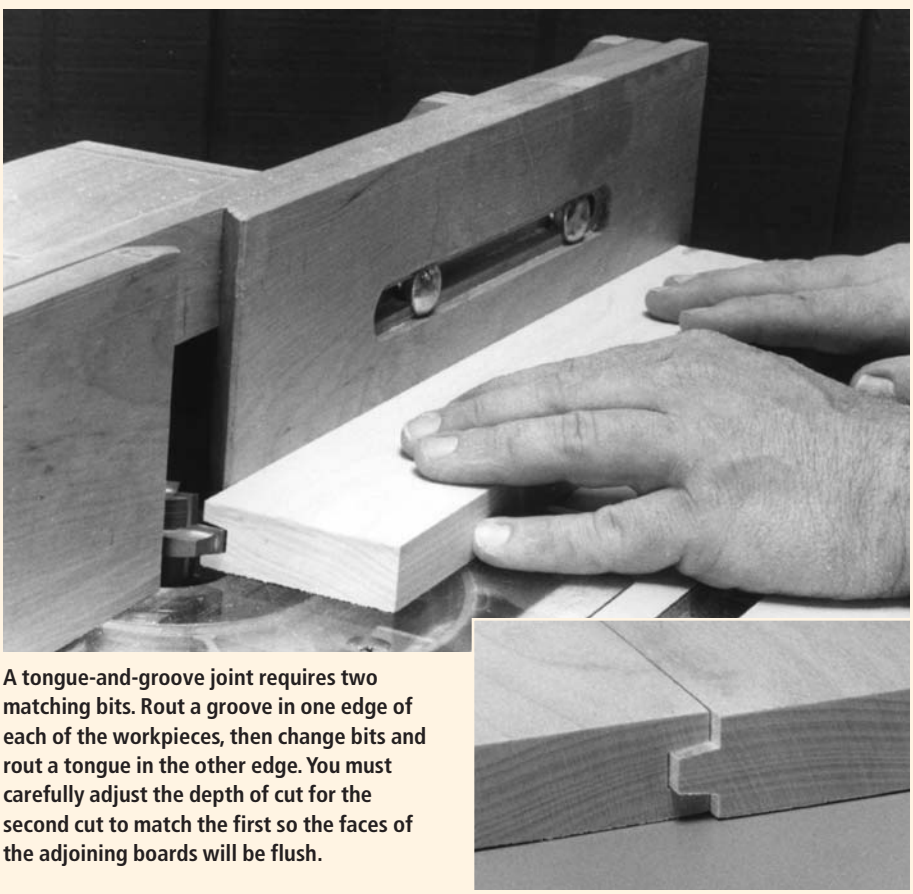
The mortises are made as described earlier and can be left rounded on the ends, as created by the bit. The tenon is made from a piece of stock planed and ripped to fit the mortises. Next the four arises are rounded using a roundover bit in your router to make a perfect fit in the mortises. Then you simply crosscut the tenon to fit the mortises.

Spline and biscuit joints are cousins to each other. The spline joint requires a groove (usually about ¼" wide) that you run the entire length of the two pieces to join together. This can be an edge-to-edge joint or an edge-to-face joint. It doesn't matter.

A special router bit called a spline-cutting bit is used to cut the groove. As with a rabbeting bit, the spline cutter uses interchangeable bearing guides of different diameters to adjust the depth of cut. A router table's fence also can be used to adust the depth.

With the mating grooves cut, just glue a spline in place. The spline can be made from ¼" plywood or solid wood, depending on your preference. Again, the spline should be slightly less wide (deep) than the groove to allow some room for glue squeeze-out.

Biscuits follow the same concept, except the spline cutter is used to cut shorter grooves and commercially available biscuits are used to bridge the joint. In essence you've replaced the need to buy a $150 biscuit jointer with a $20 router bit – not too bad. **PW**



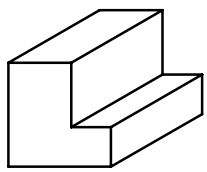
A tongue-and-groove joint requires two matching bits. Rout a groove in one edge of each of the workpieces, then change bits and rout a tongue in the other edge. You must carefully adjust the depth of cut for the second cut to match the first so the faces of the adjoining boards will be flush.

A BIT OF ADVICE

A router bit consists of a cylindrical shank (¼" or ½" in diameter) and one or more flutes or cutting wings, usually comprised of a piece of carbide brazed to the metal body of the bit. Throughout this series, we will be providing a closer look at many of the common and specialized bits that can be used with your router. These three bits are great when using your router for joinery.

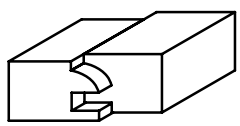
Rabbeting Bit

This handy bit usually comes with a set of different-sized bearings that you can simply swap out to cut rabbets of different depths.



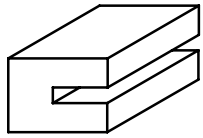
Cope-and-stick Bit

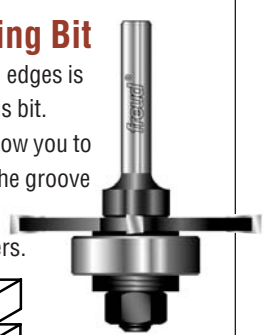
Making decorative frame-and-panel assemblies is a snap with this bit. There are three versions that have different ways of approaching the same operation. In this version, one bit cuts both the male and female pieces.



Spline-cutting Bit

Making grooves in edges is the mainstay of this bit. Newer versions allow you to adjust the size of the groove with shims or by adjusting the cutters.

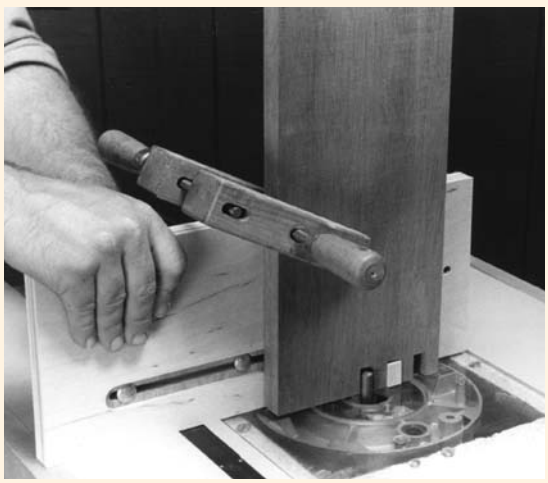




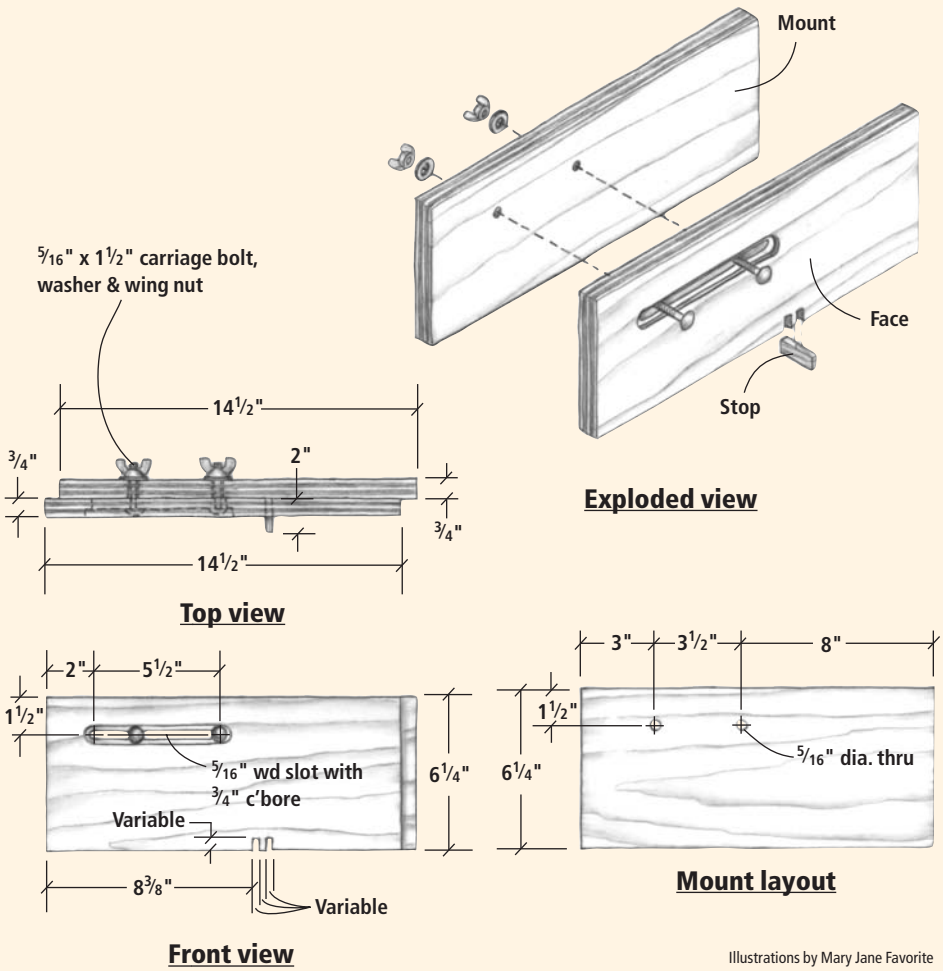
Finger-joint Jig

This jig will evenly space notches as you cut them, allowing you to make perfect finger joints. It's designed to mount on any miter gauge and will work great on your router table (or, if you're so inclined, you also can use it on your table saw).

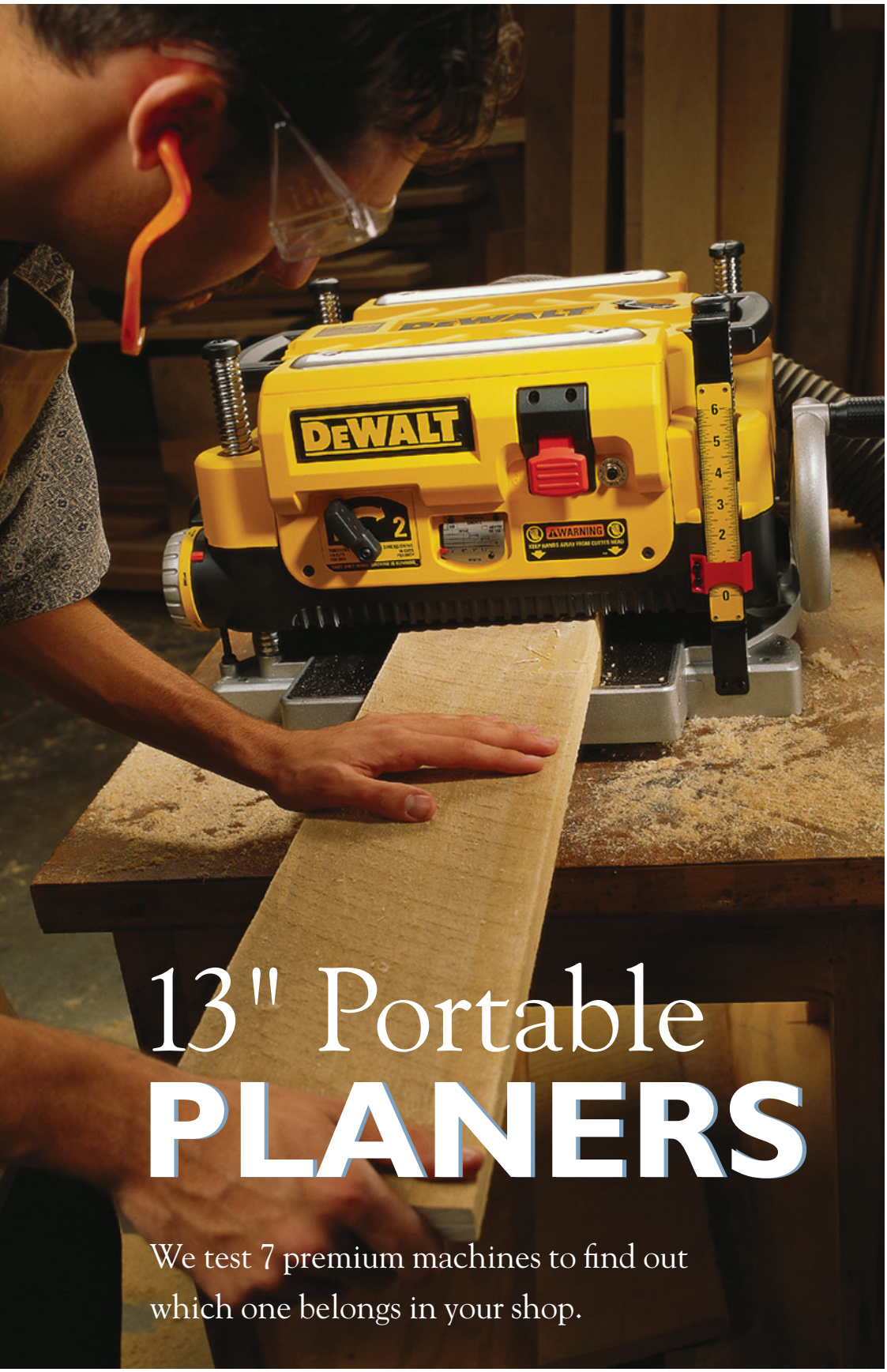
Make the face and the mount from cabinet-grade plywood and the stop from hardwood. If you wish, you can make several different faces, each with a different-sized stop. This will enable you to cut different sizes of finger joints.



To use the jig, screw or bolt the mount to a miter gauge. Loosen the wing nuts that secure the face to the mount and slide the face sideways until the stop is the proper distance away from the bit. When the stop is positioned properly, tighten the wing nuts.



Illustrations by Mary Jane Favorite



13" Portable PLANERS

We test 7 premium machines to find out which one belongs in your shop.

Photo by Al Parrish

Since our last review of portable planers in 2001, several manufacturers have introduced 13"-wide machines, and a couple even have two feeding speeds. So it was clear that it was time to take another look.

The two most significant changes are from Craftsman and DeWalt. Craftsman has added powered height adjustment that raises or lowers the cutterhead with the push of a lever. Also, a new internal dust-collection fan pulls chips away from the cutterhead and into a garbage can without a dust collector.

DeWalt also added an internal dust-collection fan, plus two feed speeds, similar to the Delta. But DeWalt went further, adding a three-knife cutterhead – all the others have two. The three blades significantly increase the opportunity for a fine finish.

DeWalt also upgraded its physical design. (The traditionally designed DW733 is now available in an upgraded DW734 version that is a 12½" disposable three-blade model. Disposable blades are used twice – once on each side – and are then thrown away. They can't be resharpened.) The new DeWalt has a short, wide design that has some advantages we will discuss later in this article.

Another significant change on the DeWalt is its lack of a head lock. All the other 13" models offer a manual head lock, which fixes the moveable head in place and reduces snipe. DeWalt eliminates snipe by adding strong springs to remove the "backlash" tendency of the head (one of the causes of snipe). The result is a glass-like finish with virtually no snipe and no head lock to engage.

by David Thiel

Comments or questions? Contact David at 513-531-2690 ext. 1255 or david.thiel@fwpubs.com.

Even with these changes, the DeWalt may not be the planer you need. It's pricey ($479) and may be more machine than required. We've listed our individual comments on each of the test models on the following pages.

Putting Them to the Test

Our tests were based on real-world use. We tested how much amperage the motor needed, both while free-spinning and while making a 1/16" cut on a 6"-wide white oak board. We also tested the revolutions per minute on each machine (both with and without lumber being planed) indicating how the feed rate and cuts per inch changed under load. The best planers kept up their rpm without drawing huge amounts of additional amperage.

We also evaluated how easy the blades are to change. All of the test models use double-sided, disposable blades – a good economic option over resharpenable blades. And they all allow you to drop them into a ready-to-use position without having to be set or adjusted. Check out "Three Blade Systems" below for additional information.

Understanding the Chart

We should mention the significance of some of the test categories. Feed speeds that are listed in the chart on page 61 are as stated by the manufacturers. A slower feed speed usually will improve the quality of your board's finish because each knife can take a smaller bite of wood, so there are more cuts per inch.

But you also have to take into consideration the cutterhead speed. An increase in rpm also increases the cuts per inch, and this should improve the cut quality. This means that a machine with a fast feed rate and a fast cutterhead may have the same number of cuts per inch as a machine with a slower feed rate.

Then there's the whole problem of whether the motor can handle the higher cutterhead speed and feed speed under load. As we noted in the chart, some manufacturers have listed a different maximum depth of cut when you are planing a 6" or 13" board. This tends to indicate the motor won't perform at peak performance on a full-width board at a full-depth cut.

Feature Attractions

Other features that deserve comment are the depth stops and the material-removal gauges. Depth stops let you set the machine to plane a certain thickness time and again. Some of the machines offer several adjustable stops within a certain range. Two offer a single stop with infinite adjustment. Your methods of work will dictate the better system for you.

There also are two styles of material-removal gauges. These let you see how much of a bite you're going to take before you feed the wood through. Most offer a scale with graduations in 1/32" up to 1/8". Delta's machine employs an indicator that snaps back into the housing when the material is contacted, but it doesn't have a scale. Again, personal preference will help you choose your favorite scale or gauge.

The Bottom Line

We got to test a number of nice machines. The Ryobi is a decent tool for a pretty low price, but only if you're an occasional woodworker. The Ridgid and Craftsman models both have advantages, but each is hampered by either price or the competition.

Ultimately the DeWalt planer walks away with our highest praise and Editor's Choice award. Its strong innovations and user-friendly design are only icing on the very impressive quality finish left on the material.

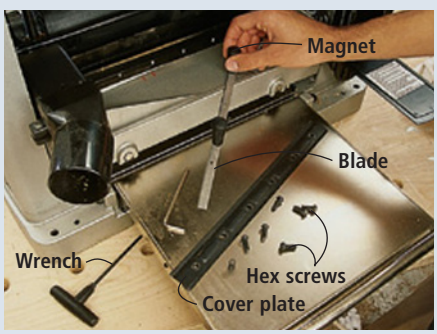
Of course, you could save $80 and buy the Delta, which also has a very good quality of cut and two speeds. And so we award the Delta our Best Value prize. **PW**

THREE BLADE SYSTEMS: EASY, EASIER AND SUPERB

Five of the planers we tested use a good blade hold-down system that made it simple to adjust or change the knives. Pictured (below left) is what we call the "Screw-and-plate" system. You remove the hex-socket machine screws and a cover plate to remove the blade. When provided with the proper tools (a T-handle wrench and magnetic pickups) it's a user-friendly method.

Two better methods also were found in this test. The first, on the Delta, is a variation on the Screw-and-plate system. We call it the "Fixed Screw-and-plate" (below middle). You don't have to remove the screws and the cover plate; the screws need only to be backed out enough to lift the blade over the setting pins. This is achieved with reasonable ease using the magnetic tool provided. With this system, there's little chance of losing screws.

The last method is found on the Ridgid, and we call it the "Fixed Nut-and-plate" (below right). Similar to the Delta, the cover plate doesn't need to be removed to adjust or change the blade, only backed off. Using square nuts rather than socket-hex screws is an advantage. It has been our experience that the socket-hex screws are easy to strip (especially when they're machine-tightened from the factory – see the Shop Fox review) and the square nuts are more reliable. In fact, we'd rather see a square or hex bolt on all of the "Screw-and-plate" models.



Screw-and-plate

Fixed Screw-and-plate

Fixed Nut-and-plate

CRAFTSMAN 21743

This is a pretty good planer with nice features, but it also has a couple of things that curb our enthusiasm. The powered height-adjustment feature lets you quickly raise or lower the head without making yourself dizzy turning a handle. It's nice, but not really necessary. The built-in dust-collection fan, however, is functional, necessary and pretty darn cool. It might sound gimmicky, until you consider that this machine doesn't need to be hooked up to a dust collector to remove the chips. You just saved $150 and some floor space. This also is the only machine with fold-up extension tables that allow you to close the outfeed table with the dust collection device still in place.

The motor is sort of a good story/bad story. Running at the slowest speed in the test (8,000 rpm, which is bad for cut quality), it actually appears to be an efficient motor when looking at the amperage spike during operation. Closely related to the rpm is the cut quality. The Craftsman is tied for the lowest cuts per inch (50) in the test. Happily, the finish is within an acceptable level. The blade change is acceptably easy, though there are springs under the cover plate that were a nasty surprise, popping loose and heading toward the interior of the planer. The height scale is located horizontally across the top of the infeed side, an unusual location. It is in both English and metric, and is difficult to read. As the second-highest-priced model in the test, the Craftsman had a couple of good points, but not enough to warrant the price compared to the competition. (craftsman.com)

DELTA 22-580

Best Value

One of the "old guard" in the test, the Delta performed admirably against the youngsters. Priced in the middle of the pack, the two feed speeds provided a quality finish. The amperage draw also was in the middle of the pack, and well below a 15-amp circuit concern. Snipe with the head lock in place was less than .001" – good enough for us. The head-lock lever is mounted on the right side and is easier to access and engage than others in the test. The full-height depth stop is a nice feature, but we're a little conflicted about whether having the ability to set only one stop at a time is a limitation. It will probably depend on your woodworking habits.

While the Delta has what can be called a wood-removal gauge, it's more of a contact indicator rather than a scale and does not tell you how much material will be removed in a pass. As with most of the dust diverters in the test (available as an accessory on the Delta), this one impedes the outfeed table closure. The blade-changing system on this model is one of the best. The pop-top access is an excellent feature, offering lots of room and light. The head can be turned to the correct position from the exterior of the machine by using a tool, so there's less chance of getting nicked. Not having to take out the cutterhead screws is a strong plus in our book. The height scale is graduated in $\frac{1}{32}$" and is fairly easy to read. When we ended up tallying the numbers, the Delta's cut quality (owing to the two feed speeds), motor performance and price were impressive enough to give this planer our Best Value award. (deltawoodworking.com)

DEWALT DW735

Editor's Choice

The DeWalt is the leader of the pack. It's the most expensive, but only by $50 and we think that's justified. It stands out for a number of reasons, the obvious one being visible. The motor and head are mounted side-by-side rather than on top of one another. There are no standard infeed or outfeed tables, but the $19\frac{1}{2}$" table is larger than the more-standard 9"- to 13"-deep beds. Most importantly, it uses a three-knife cutterhead that, in conjunction with the two feed speeds, offers an excellent finished surface. Because of the extra knife, each is working less, extending the life of the blades. Also an important part of the "finish" process is the lack of a head lock. Rather than being immobilized, the DeWalt's head is under constant pressure to counteract the movement that causes snipe. It's always on and it really works.

Other features include a wood-removal gauge (running the full width, not just measuring at one point as with the other machines in the test) and a clear height scale graduated in $\frac{1}{32}$". The height adjustment moves smoothly, and the integral dust-collection fan leads to a snap-in port with two sizes (4" and $2\frac{1}{2}$") for hose hook-up or attachment to an optional garbage-can hood accessory. Access to the blades is excellent, with the whole top coming off via four screws that stay attached to the hood. Inside there are bright red, easy-to-reach finger bolts to release the head cover. The rest is pretty simple, but it's still the same cover with hex-head screws that have to be fully removed. On most of the planers it is noticeably harder to raise the height of the head than to lower it. But this is fluid in either direction. Amperage spike during operation was decent, but we did notice higher amperage draws in general, so make sure it's on a 20-amp breaker for best performance. This is a well-engineered and thought-out machine. (dewalt.com)

RIDGID TP1300LS

In the 13" category, the Ridgid is better outfitted with features than the average planer. It's a mid-priced machine with a dust diverter (which blocks outfeed table closure but also offers deflection to either side by switching the diverter cap location), a cord wrap, on-board tool storage in a clever side-mounted tool box, and very convenient access to the cutterhead (as with the Delta, the whole top pops off). One feature on the Ridgid that is unique in the test is the blade-change mechanism, using a "Fixed Nut-and-plate" configuration (see "Three Blade Systems" on page 58). There's no need to remove the nuts to release the blades; just back the nuts off a few turns.

The blade alignment on the TP1300LS is slightly different than on the rest of the planers in the test. Still efficient and offering lateral adjustment, the blades align via hooks on the ends rather than the common pins on the competitors. The height scale, graduated in inches (by 1/32") and millimeters, is reasonably easy to read. The TP1300LS also comes with an extra set of knives and a stand, in case you want it to be less mobile. During operation the amperage draw was low enough for a 15-amp circuit and indicated a reasonably efficient motor. The finished cut was reasonably good with less than .001" snipe with the head lock engaged. The Ridgid put in a good performance in the test, but it was ultimately beaten out by the more feature-laden three-knife DeWalt. (ridgid.com)

RYOBI AP1300

Priced $109 less than the next model in line, we didn't expect amazing results from the Ryobi. But we did find a planer with a number of quality features that turned in an OK performance in regards to the final finish. The graphics on all the controls indicate that the machine is geared towards first-time users. Unlike most machines in the test, the cord is stored in a cloth bag attached to the underside of the outfeed table. It's a little easier to access and put away, but this is not a huge benefit. The head lock is a large lever that very obviously lets you know when it's engaged. It's not a huge benefit, but it's nice for the novice.

As with most models, the dust diverter impedes the closing of the outfeed table. The top of the machine offers a handy little tool box, but they forgot a tool that should be included – magnets. Most of the machines in our test offer magnets to handle the blade covers and the blades themselves. While the Ryobi does have "finger lifts" on the standard "Screw-and-plate" blade cover, you still end up handling the blades with your flesh – not preferred. The height scale is graduated in inches (by 1/16") and millimeters and has clear, understandable graphics. The motor is of average efficiency, but the finish cut fell short with the poorest example of snipe in the test. This machine is priced well for someone who is likely to use it occasionally and won't have unrealistic expectations about performance. But if you want a planer for the long haul, we can't recommend this one. (www.ryobitools.com)

SHOP FOX W1675

The Shop Fox typifies the average planer for this category. Its features include a wood-removal gauge, head lock, tables with rollers and a dust diverter that blocks the outfeed table from closing fully. It has an infinitely adjustable depth stop that functions between 1/8" and 2", but it can only be set to one height, unlike the "preset" stops found on other planers in our test. This model also uses the "Screw-and-plate" blade cover, but the screws were overtightened at the factory, and we stripped two screw heads (and even stripped the tip off the hex wrench) when we tried to change the blades. If you choose the Shop Fox, we suggest that when you take the blades out for the first time, take it slow and then replace the screws with better-quality screws.

During the test, the motor showed a very high amperage spike and pushed over a comfortable 15-amp breaker level. The board finish was reasonably clean and smooth with good snipe performance at less than .001". This machine is sadly the only one in the test that doesn't offer lateral adjustment for the knives to compensate for nicks – that's an oversight. When adjusting the cutterhead height we felt it was rougher to move than expected. Even with the reasonable performance, the lack of features and the difficulties in operation don't justify the price of this machine. (woodstockinternational.com)

WOODTEK 115-946

We're just going to call the Woodtek the "Craftsman Light" planer. These two models are the only ones in the test offering 8,000-rpm motors (providing the least cuts per inch, which is going to adversely affect the quality of the cut). There are significant structural similarities between the two machines, but the Woodtek is missing the dust-collection fan, the auto-height feature and the chain-drive mechanism; it uses a plastic transverse tooth drive. It does have a head lock, a wood-removal scale and the "Screw-and-plate" blade cover with the tools (even the magnetic holders) stored on the machine. The height scale is graduated in inches (by 1/16") and millimeters. It's adequate for the task, but we prefer a 1/32" graduation. The manufacturer has also thrown in an extra set of knives.

During testing we found that the Woodtek has the highest amperage spike while under load and the recorded amperage draw may cause problems if your shop is equipped with only 15-amp breakers. Conversely, the rpm loss on the Woodtek was the lowest in the category, so perhaps the amp spike is useful for performance. The snipe test measured out at about .002", which isn't terrible but also not the best. Priced at the same level as the Delta and Ridgid, the Woodtek should offer more features or equal cut quality, but it doesn't. If you're looking to spend $380 on a benchtop planer, make it an even $400 and buy the Delta. (woodworker.com) **PW**

13" PORTABLE PLANERS

	Craftsman 21743	Delta 22-580	DeWalt DW735	Ridgid TP1300LS	Ryobi AP1300	Shop Fox W1675	Woodtek 115-946
PRICE	$440	396	479	397	270	399	379
MOTOR SPEED (RPM)	8,000	10,000	10,000	9,500	9,900	10,500	8,000
CUTS PER INCH	50	60/90	96/179	66	66	67	50
FEET PER MIN.	26	20/30	14/26	26	25	26	26
CUT CAPACITY (MAX)	13" x 6"	13" x 6 1/2"	13" X 6"	13" x 6"	13" x 6"	13" x 6"	13" x 6 1/8"
MAX DEPTH OF CUT *	3/32"	1/8", 1/16"	1/8", 1/16"	1/8"	1/8"	1/8", 1/16"	1/8"
TABLE LENGTH & TYPE **	12"F/R	12 1/2"F	N/A	12"C	11"C	12"F/R	12"F/R
CORD LENGTH & TYPE ***	6'/P	8'/P	10'/RB	10'/P	8'/P	8'/P	8'/P
DEPTH STOPS (#/LOC.)†	6/1/8"-1 1/4"	IN/1/8"-6 1/2"	6/1/8"-1 1/4"	8/1/8"-1 3/4"	8/0"-1 3/4"	IN/1/8"-2"	6/1/8"-1 1/4"
WEIGHT (LBS)	97	97	92	85	77	93	77
AMPS/NO LOAD	8.7	6.8	10.8	7.4	7.68	7.12	6.83
AMPS/UNDER LOAD	12.5	12	15.2	13.8	14.2	16	16.5
AMPERAGE SPIKE	44%	76%	41%	86%	85%	125%	142%
RPM/NO LOAD	8,000	9,600	9,300	9,500	9,760	10,500	8,000
RPM/UNDER LOAD	5,750	6,700††	8,000	6,600	7,500	7,000	7,500
RPM LOSS	28%	30%/27%	14%	31%	23%	33%	6%
DECIBELS	94	89	94	90	92	91	92
BLADE†††	2D	2D	3D	2D	2D	2D	2D
BLADE SIZE (INCHES)	.056 X 15/32	.058 X 15/32	.060 X 7/8	.070 X 3/4	.060 X 15/32	N/A	.056 X 7/8
KNIFE CHANGE/EASE‡	SP/3	FSP/5	SP/4	FNP/5	SP/3	SP/2	SP/4
SNIPE (W/LOCK)	.002	<.001"	.002	<.001"	.007"	<.001"	.002"
DUST COLLECTION‡‡	IF	DNI	IF	DI	DI	DI	DI

* When two numbers shown, manufacturer has specified different maximum cut for full-width boards

** C = Corrugated, F = Flat, R = With rollers

*** P = Plastic, RB = Rubber

† IN = Infinite settings

†† rpm is 7,000 on fine setting

††† All blades are double-edged

‡ FNP = Fixed Nut-and-plate, FSP = Fixed Screw-and-plate, SP = Screw-and-plate; 5 is best, 1 is worst

‡‡ DI = Diverter included, DNI = Diverter not included, IF = Integral fan

True Japanese Dovetail Saws

Photo by Al Parrish

Sure they look like standard dozukis, but these saws have rip teeth. We compare the Kaneharu (in use) with new saws from Harima-Daizo (left) and Lee Valley (right).

2 new rip-tooth dozuki saws are efficient dovetailers.

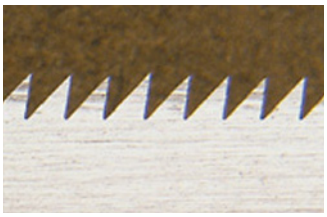
Cutting dovetail pins and tails is primarily a ripping operation. So it has always bewildered me that almost every Japanese saw sold for dovetailing had teeth designed for crosscutting or cutting plywood.

A few specialty importers do sell Japanese backsaws with a rip-tooth configuration, but these are made mostly by hand and cost between $140 and $1,500.

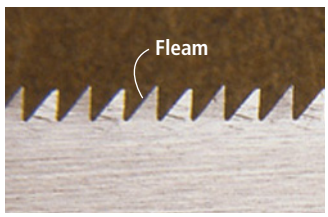
Why, I wonder, isn't there a machine-made dozuki that sells for about $35 – the cost of a decent crosscutting dozuki? Well, I don't have the answer yet, but the two new rip-tooth dozukis on the market are considerably less expensive (between $70 and $80). To check the quality, I compared them to a premium rip-tooth dozuki that I'm quite familiar with – the Kaneharu ripping dozuki, sold by Hiraide America for $182 (see the Sources box for more information).

by Christopher Schwarz

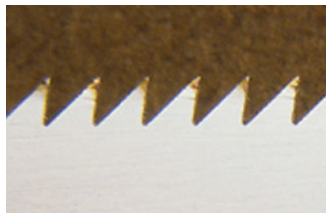
Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.



The Kaneharu saw has graduated teeth. Near the handle (left) there are 15 teeth per inch, while at the toe (right) there are 10 tpi. This combination of tpi makes the saw simultaneously easy to start and fast-cutting.



The Lee Valley saw has 18 tpi and a small fleam that it uses for crosscutting. It cuts slower but starts easy.



The Harima-Daizo Deluxe saw has 10 tpi. This makes the saw cut faster but a bit harder to start.

To understand how the less-expensive saws are different, let me introduce you to the Kaneharu.

Kaneharu: Small and Perfect

For anyone familiar with traditional dozukis, the Kaneharu appears small. At about 18⅞" long with 6¾" of the blade devoted to teeth, the Kaneharu is about 4"-5" shorter than many dozukis.

The teeth are different, too. Crosscut dozukis traditionally have teeth that are all the same size. The teeth on the Kaneharu start small near the handle (15 teeth per inch) and get larger toward the toe of the blade (10 tpi). This is similar to the configuration of rip teeth on a ryoba saw.

The graduated teeth make your cuts easy to start: You make your initial kerf with the smaller teeth, and once you get going you use the full blade and the saw dives through the wood. (All three of the backed saws discussed here have a maximum cutting depth of 2", which is ideal for cutting dovetails and most tenons.)

For someone accustomed to cutting dovetails with a crosscut saw, the difference is significant. A dovetail that takes 14 strokes to cut with a crosscut dozuki takes only 10 with the Kaneharu. Plus, it's my opinion that the rip saws track better than the crosscut saws during a ripping operation. The quality of the cut surface is as good as any dozuki I've tried – no matter what the tooth configuration.

Lee Valley: Easy to Use

The rip dozuki offered by Lee Valley Tools shares some of its DNA with crosscut dozukis.

The handle and blade are longer, like the traditional crosscut saw (23¾" total length; 9⅝" of teeth). The teeth are finer than those on the Kaneharu – 18 tpi, and they have a small secondary bevel filed on them. This secondary bevel – called the "fleam" in saw parlance – is what allows crosscut saws to sever the wood fibers like a knife.

The fleam on the Lee Valley saw is small enough not to interfere with a rip cut (which is mechanically similar to levering out the sawdust with a chisel). But it's large enough to allow the saw to be used for some crosscutting.

Also, the rip teeth are more durable than crosscut teeth. In a month of testing, I didn't have any problems with snapping teeth – even in notorious ring-porous woods such as white oak.

Because the teeth are small, the saw is easy to start. And while it cuts a little slower than the Kaneharu, it's decidedly faster than a crosscut dozuki and leaves a very clean cut surface.

Harima-Daizo: For the Expert

The Harima-Daizo from Tools for Working Wood is a ripping monster. It seemed to consistently outpace the other two saws when it came down to pure speed. I chalk that up to the fact that it has deeper gullets and fewer teeth (10 tpi) than the Lee Valley saw and a longer blade than the Kaneharu (also 9⅝" long).

The downside of the Harima-Daizo is that it was harder to start the cut than the other two saws. While I personally never had any problems, beginners and those unfamiliar with Japanese rip saws reported difficulties when starting the cut, particularly in softer woods such as cherry.

Like the other two saws, the Harima-Daizo tracked perfectly straight in the cut, left an excellent finish and had durable teeth.

Which Saw is for You?

If your budget allows it, the Kaneharu is hard to beat. (The Japan Woodworker catalog offers a similar saw with graduated teeth, the Izeamon dozuki rip saw, for $140. While I haven't tested this saw, I have heard a number of good things about it.)

For the beginning dovetail saw user, the Lee Valley (at $69) is probably best, and it also will pick up some crosscutting chores. For the advanced user who wants to save some money, the Harima-Daizo ($79.95) is my pick.

But more important is how well these three saws compare to the crosscutting and combination-teeth Japanese saws. The rip teeth are far more robust than the crosscut teeth – say goodbye to that "tink-tink" sound you hear when your saw teeth snap.

Another important difference is that all three of these saws can be resharpened – they are not replaceable-blade saws. This can be a good thing or a bad thing depending on your point of view.

If those differences aren't enough to convince you, remember that these three rip saws also track better in a rip cut. Plus they leave an excellent finish. They are, in short, the right tool for dovetailing. **PW**

SOURCES

Hiraide America
877-692-3624 or
japanesetools.com

- Kaneharu Ripping Dozuki, $182

The Japan Woodworker
800-537-7820 or
japanwoodworker.com

- Izeamon 8½"-blade Dozuki Rip Saw #05.114.21, $140 (also available in two longer sizes)

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

- Rip-tooth Dozuki #60T04.04, $69

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

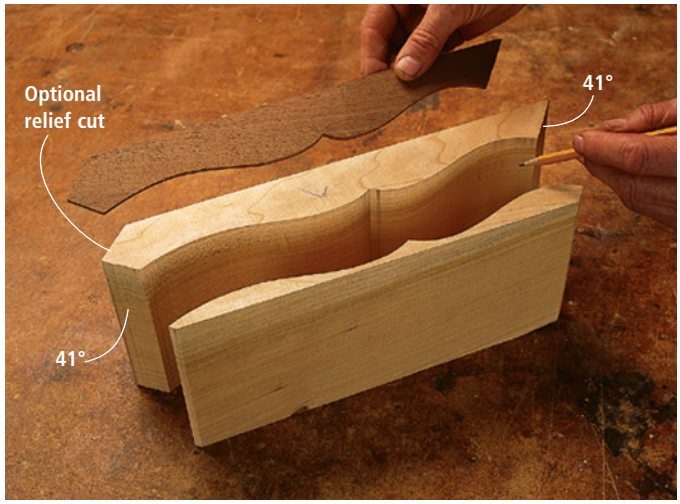
- Harima-Daizo Deluxe Rip Dozuki #MS-JS340, $79.95

Prices as of publication date.


Serpentine
Table

Surprisingly straightforward, the only real trick to this project is a well-tuned band saw.

I make a leg template on thin plywood (right) and trace the pattern on two adjacent sides of the leg blank (left). I then band saw the piece to shape (center).



After cutting the 41° angles on both ends of the side aprons, band saw the pattern onto the outside. The relief cut makes it easy to fit the drawer guides.

This table might look like a snake in the grass, but with a good band-saw blade and the right patterns, it's actually quite the charmer.

The idea behind the serpentine aprons and drawer front is to enhance the grain of the wood, making the piece look fancier than it really is. You want the highlights, shadows, reflections and wood grain to bring out its inner beauty, so one of the most important steps in creating this piece is wood selection. I typically use walnut or cherry and select my boards for good figure.

Here's the project in a nutshell: First cut all your parts to size. Then make the patterns for your front legs and the front and side serpentines.

With those patterns in hand, the actual construction isn't difficult. Saw the curved side aprons and legs to shape, then screw the legs and side aprons together. Saw the curved front pieces and complete the table base by attaching the side assemblies to the back (with biscuits) and front rails (with mortise-and-tenon joints).

Then it's a simple matter of building the drawer's web frame with screws and then the drawer itself. Finally, shape and attach the top – I've even got a trick for making the serpentine top match the base. It's all pretty simple with the patterns and construction drawings provided here.

Start With the Legs

When selecting your leg stock, look for the most attractive grain (the straighter, the better) for the two front legs. The simple back legs are for balance and are 1¾" stock that I've tapered to 1" at the bottom on the two insides.

Next, either trace your pattern onto two adjacent sides of the leg blanks or make enough copies so that you can affix them to the sides (making sure the patterns face the correct way). Bandsaw one face, then tape the pieces back on so you can cut the curves on the adjacent face.

Once the curves are cut, I smooth the legs on a stationary belt sander, which is where I do most of my shaping.

I've added an extra-wide table to my sander so the legs can stay horizontal while being shaped on the sander, which I lock in the vertical position. After you've sanded the legs most of the way, you'll need to get all the nooks and crannies by hand.

After the legs are completely shaped, cut the ⅜"-wide mortises to accept the tenons on the top and bottom front rails. I do this on my drill press with a ⅜"-diameter drill bit, overlapping the holes. Sit the legs on a block and drill the overlapping holes. Each finished mortise should measure ⅜" wide, 1½" long and a tad more than ½" deep.

(Note that the mortise for the top drawer rail is 7/16" from the top of the leg to prevent you from blowing out the mortise wall during assembly of the base.)

The Side Aprons

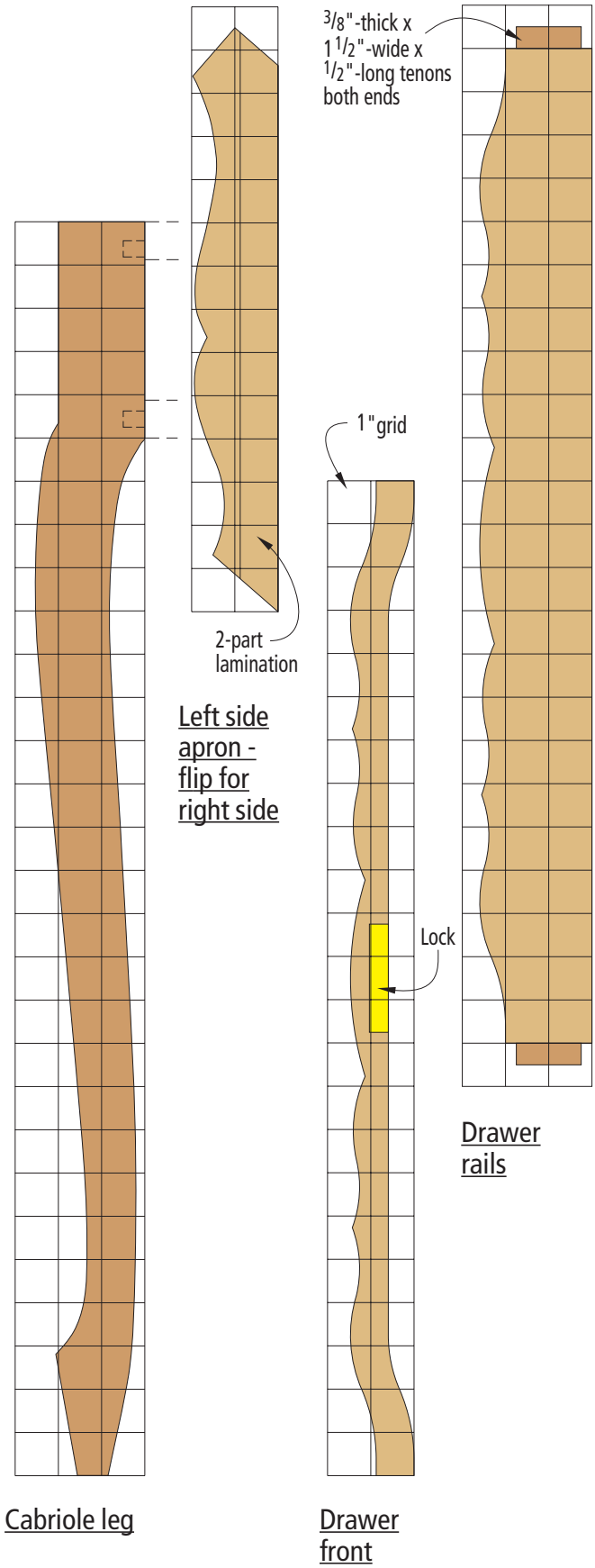
The word "serpentine" simply means curved, and that's all you're doing here. Choosing plain-sawn wood with smaller growth rings for the side aprons, as well as the front rails and drawer front, will yield the best-looking results. (More dramatic grain or upward sweeping grain at the bottom of the rail is the most pleasing.)

To save your nice wood for the surfaces that show, the side aprons are laminated to their 2"

by Warren A. May

Warren A. May has been crafting solid-wood furniture and mountain dulcimers for more than 28 years. His showroom and dulcimer workshop is at 110 Center St. in Berea, the arts-and-crafts capital of Kentucky.

Photos by Al Parrish



thickness from two pieces that are face-glued together. You need your side aprons to be extra-thick to ensure they can be joined solidly with the legs.

Once the glue dries, bevel the ends of the aprons at 41° using your miter saw or table saw. Next, affix the curved pattern for the side aprons to your wood and cut the curves (see "Serpentine Patterns Online" on page 69 for full-size copies of these patterns) and sand them to their final grit.

To attach the aprons to the front legs, you'll want to cut a screw pocket on the backside of the apron. I use a stepped drill bit designed to be used with pocket-hole jigs in my drill press. Simply clamp the apron to your drill-press table, tilt the table 41° and drill the pocket hole. (The other option is to keep your drill-press table flat and tilt the apron 41°, which I don't recommend.)

I use this same setup to drill the pocket holes that attach the aprons to the back legs. The only difference is that you'll make your hole on the back side of the leg and later plug the holes with a matching wood before finishing.

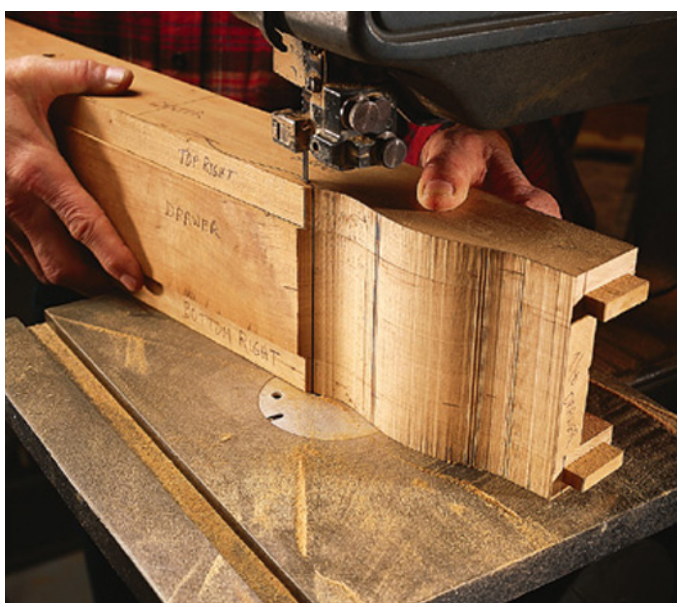
(Tip: You don't have to use pocket screws for this operation. Common drywall screws drive and hold just as well for me.)

The Front Curves

If you prefer, you can make the front drawer and rails from one solid piece of wood that's 2¾" thick. Or you can go the easier route (shown here) by making them out of three separate pieces – one for the top drawer rail, one for the drawer front and one for the bottom drawer rail – and temporarily screw them together before band-sawing your pattern.

Before you cut your pattern, trim the drawer rails to length and cut the ½"-long tenons that join the rails to the legs. The tenons on the rails are ⅜" thick and 1½" wide (the same dimensions as the mortises).

For the bottom drawer rail, cut the tenons so they are centered on the thickness of the piece.



You can screw the top and bottom rail to the drawer front before cutting the pattern on the band saw. I'm using a ¼" band-saw blade (Lenox 6-tooth hook Flex Back blade – lenoxsaw.com or 800-628-8810) to make the cuts. Also, you can see the tenons I've cut in the rails that will attach the rails to the legs.

This should give you a 1/4" shoulder on the top and bottom of the tenon. For the top rail, you need to offset the tenon a bit so that it doesn't blow out the mortise wall in the leg. So while the tenon is the same finished size, I make the bottom shoulder 1/16" and the top shoulder 7/16".

With the tenon shoulders established, screw the drawer front blank between the rails. Cut the curves on this assembly and sand the piece with a 6" belt sander, a detail sander and sanding blocks.

Unscrew the rails from the drawer front, then dry-fit and clamp the rails between your assembled side aprons. Measure the opening for the back piece. Cut this part to length for biscuits or tenons (whichever you prefer). The unit is now ready to assemble. Glue the back and rails between your side assemblies.

Making the Drawer

To assemble the drawer's web frame, first cut the front support rail that fits behind the bottom drawer rail. This will need 41° miters at either end, so cut it to fit the opening.

Then cut the two drawer runners to size and screw them to the front support rail. I put the web frame together simply by screwing through the front support rail and into the drawer runners.

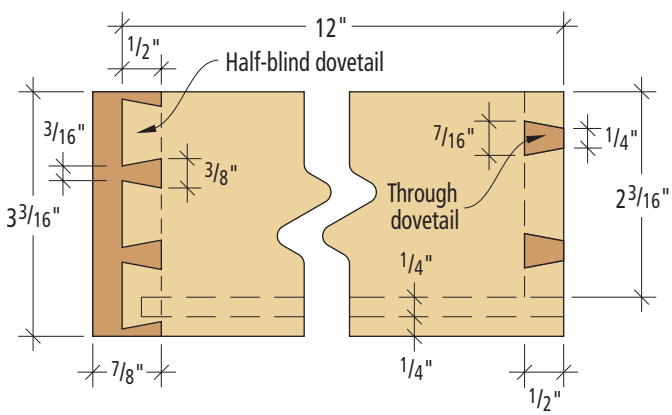
To install the web frame in the case, glue the front support rail to the bottom drawer rail. To attach it at the back, screw two small support blocks to the back of the case, then screw the drawer runners to each block. See the photo at right for details.

Next, cut and fit the drawer guides. These narrow strips are screwed to the web frame and keep the drawer moving smoothly. Position and install these once your drawer is built and fits.

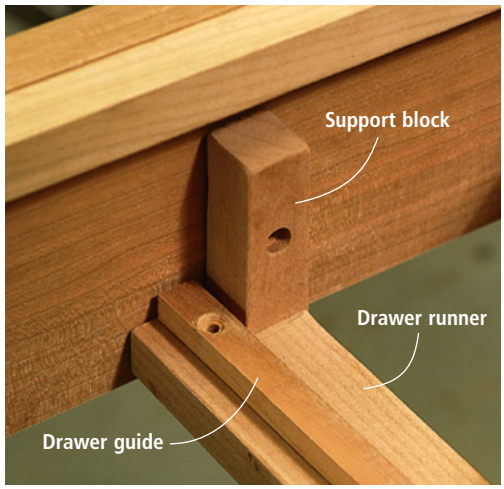
Then cut the drawer front to fit its opening and cut a curve on its inside face. This lightens its appearance and makes it easier to fit the lock.

You'll want to add the lock and inlay design to the drawer front before you complete construction of the drawer (see "Adding the Lock Inlay" at right). My lock and drawer pulls usually are 3/4" solid brass. Check your hardware store and choose whatever will be most pleasing.

The most challenging part of building the drawer is the 1/4" groove on its curved backside that holds the drawer bottom in place. Once you've cut the curve, mill the groove for the bottom using a bearing-guided slot cutter in your router table. The bearing will follow the curve easily. Use



Drawer profile



After attaching the drawer support blocks to the back, install your drawer runners.

ADDING THE LOCK INLAY

One of the traditions of Kentucky-style furniture is the inlay, which I've done on this table around the lock/key area of the drawer.

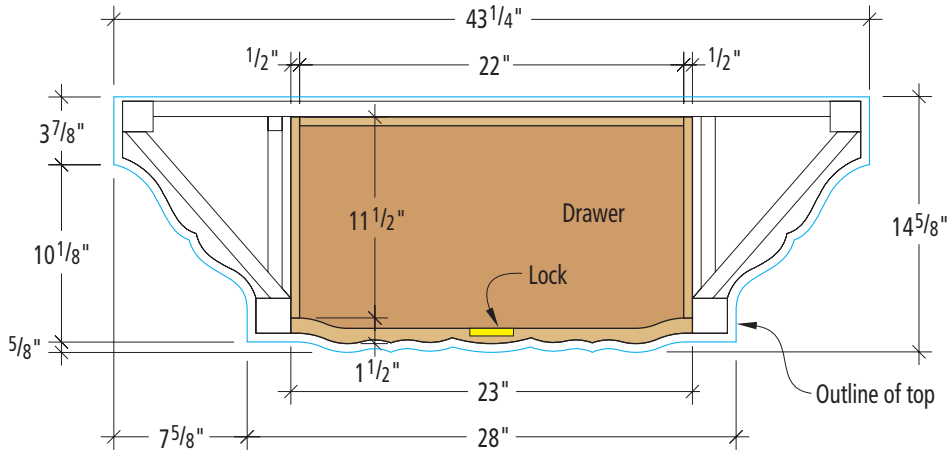
Once you have a pattern you like, mark on the drawer front where you want it and clamp your template to the piece using a wood block as shown.

Then take a sharp knife and trace around the pattern. Remove the clamp and template and make the cuts deeper so you can see the outline clearly.

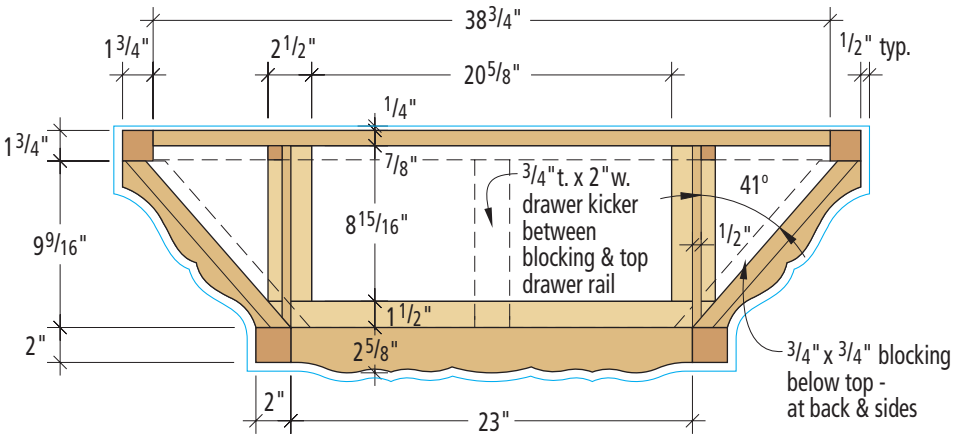
Next, take a router with a small bit (I usually use a 1/16"-diameter straight bit) to waste away the wood up to your knife lines. Then you can chisel out the rest. Insert the inlay piece you've made (also based on your template) and you'll be pleased with the way it works.

I've done some pieces where the inlay is of a contrasting wood, as well as where the inlay is of the same wood, and have been pleased with both.

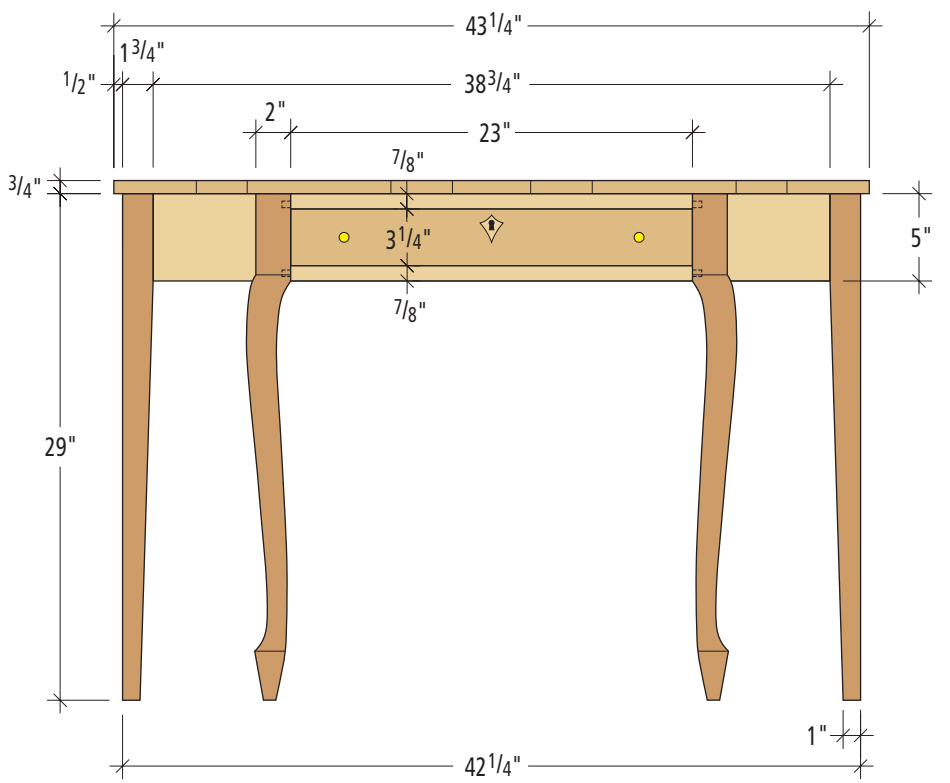
Here you can see me installing the inlay on another table I'm making. Notice the piece of scrap wood I use to help clamp the inlay template to the drawer front.



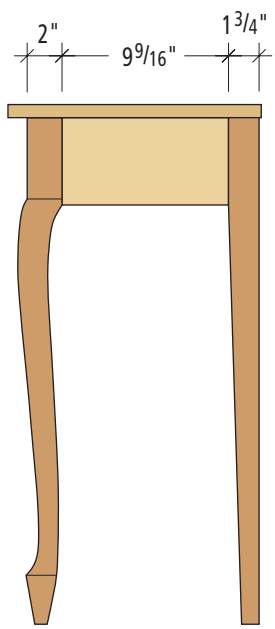
Drawer plan



Plan - top and drawer removed



Elevation



Profile

the same slot-cutter to mill the groove for the bottom piece on both of your drawer side pieces. With the groove cut, you can cut your drawer joints. I use half-blind dovetails at the front and through dovetails at the rear. The drawing on page 67 shows you how I laid out my dovetails.

Dry-assemble the drawer and fit the drawer bottom to the groove and curve on the drawer front.

Topping it Off

Choose some nice boards with grain that curves to mimic the shape of the top (if possible) that you can glue together to serve as the top. Once this glue dries, you're ready to cut the pattern along the sides, and for this you can use the table's base as a pattern.

Turn the top upside down on your bench and flip the table base on top of it. Clamp the top drawer rail to the underside of the top and mark all around the base with

a marking block that offsets your line by ½". (See "Outline of top" in the illustration at left.)

Band saw the top to shape, sand the curves and finish-sand the top to its final grit.

To attach the top, glue scraps (about ⅞" x ⅞") to the top edge of the side and back aprons. You'll attach the top to the base by screwing through these blocking pieces.

Now screw a drawer kick between the top drawer rail and the blocking. This piece of wood keeps the drawer from drooping as you pull it out of the case. Then screw the top to the base through these strips and the front drawer rail.

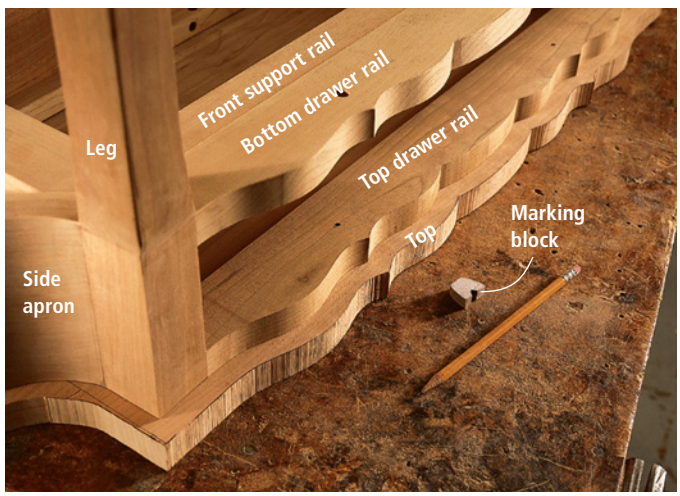
My Finishing Technique

Round over all the edges with a ⅛" roundover bit in your router and sand everything up to #150 grit. Saturate the piece with one thinned coat of DEFT oil (an oil and varnish blend) and let it dry for one week – yes, one week.

Add two coats of sanding sealer, sand it with #240-grit paper, use two coats of semi-gloss lacquer and rub with 0000 steel wool.

Then spray on some furniture polish and wait for the inevitable compliments. **PW**

Once your drawer is built, fit the drawer guides and screw them to the drawer runners.



After assembling the unit, flip the base onto the underside of the top and trace the pattern using a marking block. This will give you the identical serpentine shape on the front and side of the table.

SERPENTINE TABLE

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	Front legs	3	3	29	Cherry	
❑	2	Back legs	1¾	1¾	29	Cherry	
❑	2	Side aprons	2	5	14	Cherry	Laminated from two pieces
❑	1	Top drawer rail	⅞	3	24	Cherry	½" TBE
❑	1	Bottom drawer rail	⅞	3	24	Cherry	½" TBE
❑	1	Drawer front	2	3¼	23	Cherry	
❑	1	Back of table base	⅞	5	38¾	Cherry	
❑	1	Front support rail	⅞	1½	25	Cherry	Miter to fit opening
❑	2	Drawer runners	⅞	2½	8 15/16	Cherry	
❑	2	Support blocks	⅞	⅞	3	Cherry	
❑	1	Drawer guides	½	½	10½	Cherry	Miter to fit
❑	1	Drawer kick	⅞	2	9 9/16	Cherry	
❑	2	Drawer sides	½	3 3/16	12½	Cherry	
❑	1	Drawer back	½	2 3/16	23	Cherry	
❑	1	Drawer bottom	¼	12½	22½	Cherry	Cut to fit
❑	1	Top	¾	14¾	43¼	Cherry	

TBE = tenon on both ends

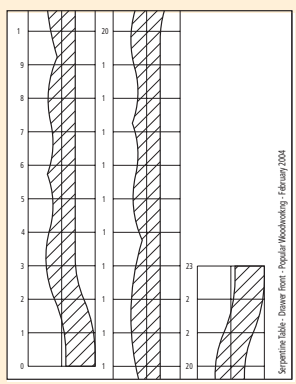
SERPENTINE PATTERNS ONLINE

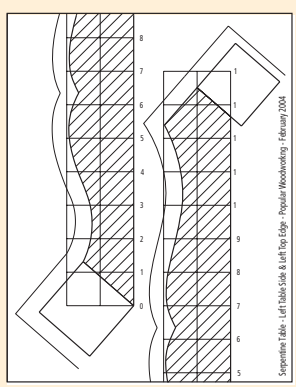
For all the curves you'll need to make a Serpentine Table just like this one, we've provided full-size patterns online at popwood.com. Click on "Magazine Extras" and you'll be able to download and print the 8½" x 11" pages similar to those shown below. You can then tape them together and affix them to your lumber to make the curves.

You'll get the patterns for:

- The Front Legs
- The Drawer Front & Rails
- The Side Aprons
- The Top

You will need Adobe Acrobat Reader to view these plans, which is a free computer program that you can download through a link on our "Magazine Extras" page.





UPGRADE


BEFORE

AFTER

Your Workbench

10 ways to make your bench indispensible.

You can order plans for our $175 Workbench as shown, top left, at popwood.com. Go to "Plans for Sale."

Photos by Al Parrish

I hate to say it, but no matter how much time and money you spent building or buying your workbench, it's probably not as useful as it should be. Like adjustments to a new table saw or hand plane, there are a number of things everyone should do to tune up their bench. Also, there are several simple improvements that will make your bench perform feats you didn't think were possible.

Most of these upgrades are quick and inexpensive. All of them will make your woodworking easier, more accurate or just plain tidier.

1 Improve Your Topography

Flattening your benchtop regularly is like changing the oil in your car. It's a routine step that will save you headaches down the road. A flat top is essential to accurate work for three reasons:

- When planing, sanding or routing a board, you want your work to rest firmly against your bench; a flat benchtop helps keep your work in place.
- A flat top will divine whether your workpieces are cupped or bowed. If you ever want to remove the cup or twist from a door panel – a common malady – you must have a flat benchtop to know when your panel is finally flat.
- A flat top guides you as you assemble your projects. If you want your latest table, chair or cabinet to not rock, you have to make the legs or base all in the same plane. A flat bench will quickly point out your problems and the best solution.

So how do you flatten a benchtop? The simplest way is to run it through a big drum sander, which

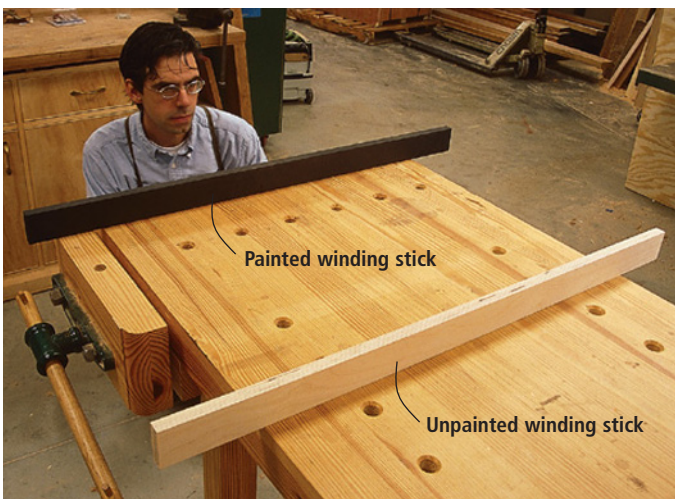
by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

you can find in mid-sized cabinet shops. A couple woodworkers I know have paid about $50 for the privilege. The only downside is that you'll have some sanding grit embedded in your bench when it's all over, which can scratch your work in the future.

There is a way to flatten your bench at home by planing it with a router – once you build a somewhat complex carriage system that guides and holds the tool.

My way is faster. I flatten my benches with a No. 5 jack plane, an old No. 7 jointer plane, and a couple of sticks. The sticks are two pieces of plywood that measure ¾" x 2" x 36". Traditionally called winding sticks, these will quickly determine if your bench is flat and where it's out of whack.



Winding sticks are the key to making sure a benchtop or tabletop is indeed flat. Check the top by moving the light-colored stick to different positions across the length of the bench and comparing the top edge of each stick.

First place one of the winding sticks across one end of the bench. Then lay the other stick across the bench at various places along the length of the top. Crouch down so your eye is level with the sticks to see if their top edges are parallel. If they are, that area is flat. If they're not, you'll see where there are high spots.

Old-time winding sticks were made using a stable wood, such as mahogany, and were sometimes inlaid with ebony and holly on the edges (a black wood and a white wood) so you could easily see the difference. I prefer plywood because it's dimensionally stable and cheap. If you need contrast between your sticks, I highly recommend "ebony in a can" (black spray paint).

Mark all the high spots directly on your bench and start shaving them down with your jack plane. Continually check your work with your winding sticks. (For more on these sticks, see "Keep Your Winding Sticks in Focus" at right.)

When the top is reasonably flat, fetch your No. 7 plane. First plane the top diagonally, moving from corner to corner. Then come back diagonally the other way. Do this a couple times until you're taking shavings at all points across the top. Finally, plane the length of the bench. Start at the front edge and move to the back edge. When it looks good, check it with the winding sticks.

2 A Deadman Lends a Hand

One of the trickiest operations is working on the narrow edge of a board or door. Securing the work is the No. 1 problem. The traditional solution is what's called a sliding deadman. I installed the one shown here in an afternoon and now I wonder how I ever got by without it.

Because the deadman slides across the front of the bench, you can accommodate all lengths of work. And because the ledge can be adjusted up and down, you can hold narrow boards or even entryway doors. With the help of your face vise, you can immobilize almost anything with this rig.

I added the deadman by screwing two rails to my bench that each have a groove milled in one long edge. The deadman itself has a slightly undersized tenon on each end that allows it to slide in the grooves. You can download a construction drawing for

Most of the hard work when flattening your top is handled by the No. 5 jack plane, which can take down high spots quickly. My bench always seems to dish in the middle (similar to a waterstone), so I begin by taking down the sides.

A No. 7 jointer plane's key asset is its length. Because of its length, the plane rides over the low spots and shears the high spots. Begin by working diagonally; don't worry about tear-out (above). When the top is flat from your diagonal passes, plane directly with the grain (right).

this project from our web site at popwood.com. Click on "Magazine Extras" to get to the drawing.

3 Add a Leg or Bench Jack

While I consider the sliding deadman to be the cat's meow, there are simpler ways to support oversized work at your bench.

If you do a lot of work on big doors, a leg jack is probably the best bet for you. Basically you bore ¾"-diameter holes every 4" up the front leg of your bench that's opposite your face vise. (For example, if your vise is on the left side of your bench, bore the holes in the right leg.) Chamfer the holes (see the next section on dog holes for directions) then insert a ¾"-diameter dowel in one of the holes. You're in business.

The disadvantage of this jack is that it supports only long work. To hold shorter work, you need to add a second kind of jack to your bench – a bench jack.

For your bench jack, you'll bore the ¾"-diameter holes across the front edge of your workbench – every 4" or so should be sufficient. Make the holes about 2" deep and chamfer their rims.

Next get a 2" length of ¾" dowel. To create a ledge for the board to rest on, your best bet is to buy an L-shaped piece of steel from your local hardware store. This $1 item usually has screw holes already bored in it and is used for reinforcing corners.

Screw this L-shaped steel to the end of the dowel (see photo below right). This jig now will allow you to hold narrow boards of almost any length in place so you can work on the edge.

4 Add Bench Dogs

A good system of bench dogs and dog holes makes routine operations easier and impossible tasks a cake walk. And retrofitting a bench with round dog holes is quick and simple.

I like to have at least two rows of dog holes running down my benchtop that are spaced 4" apart. On some benches, I've had the dog holes line up with the dogs on my tail vise so that I can clamp things between my tail vise and any dog hole on the bench. But even if you don't have a tail vise you can unlock the power of the dog hole with a product called the Wonder Dog from Lee Valley (see the Supplies box at the end of this article).

The Wonder Dog is essentially a mini-vise that slips into any ¾"-diameter dog hole. It allows you

TIP: KEEP YOUR WINDING STICKS IN FOCUS

When using winding sticks, one of the difficulties is trying to keep both sticks in focus when they are 6' away from each other. If one of the sticks is blurry it's difficult to tell if they are in line with each other.

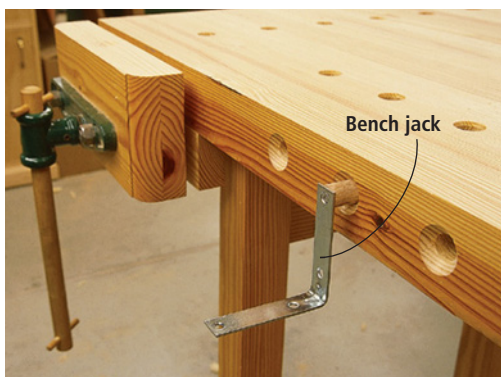
The solution comes from the world of photography. Take a piece of thin cardboard – I use the stuff from the back of a notebook. With your brad awl, punch a small hole (1/32" or so) in the center of the cardboard. Crouch down in front of your winding sticks and look at them through the hole. They should both be in focus.

In a camera, when you close the aperture (also called the F-stop), more of the picture is in focus. The same principle works with your eye. If you close the aperture that light passes through, more of what you see will be in focus.

As a practical matter when doing this, check both ends of the sticks by moving your eye left to right, not your head. It's easier to get a reading on your sticks this way.

While flattening the top is the most important upgrade, a close second is the sliding deadman. This clever bit of engineering will allow you to immobilize doors easily.

A leg jack is great for clamping long work, and it takes only about 20 minutes to add to your bench. There are fancier ways to do this, but none is more effective.



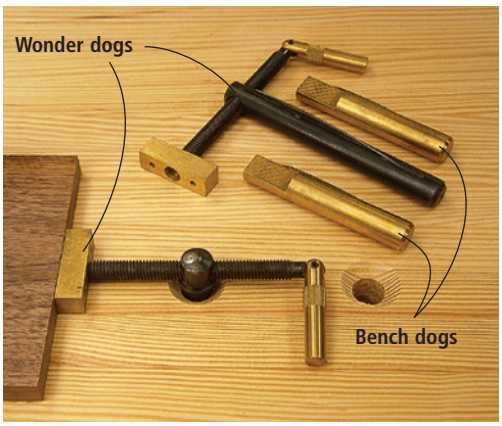
This simple bench jack excels at clamping boards that are 8" wide or narrower. Like the leg jack, this is a quick upgrade.

to apply pressure in any direction, which is great for clamping round or other irregularly shaped pieces for sanding or planing.

To drill the dog holes, your best bet is to make a jig like the one shown below (middle picture). Also grab a ¾" auger bit and a corded drill.

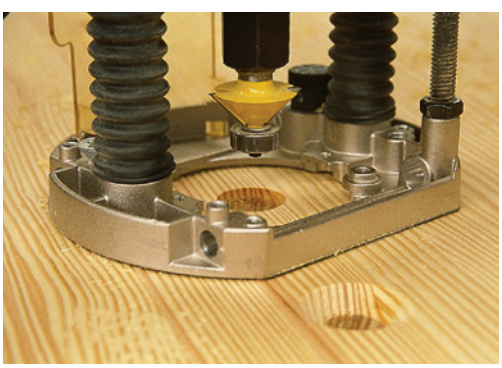
Clamp the jig to your bench and drill the hole all the way through the benchtop. Use a slow speed. After you drill each hole you need to chamfer the rim to keep from ripping up your benchtop when you pull out a dog. The easiest way to do this is with a plunge router.

Chuck a 45° chamfer bit that has a ¾" bearing on its end in your plunge router. Insert the bearing into the dog hole, turn on the router and plunge straight down, making a ⅜"-deep cut.



If you can't afford a tail vise, these Wonder dogs make many clamping chores easier. With two Wonder dogs and bench dogs you can clamp odd-shaped material.

This gizmo works like a primitive doweling jig. Mark lines on your top where you want your dog holes. Clamp this jig to your bench and line it up with your marks. Drill away using a corded drill. Chances are you'll cook a cordless drill.



Chamfering your dog holes prevents you from tearing out the grain when you remove a stubborn dog.

5 Add a Tail Vise

If you've got just one vise it's almost always on the front (sometimes called the face) of your bench. A tail vise (located on the end of the bench) is an extremely useful upgrade. The retractable metal dog on most vises allows you to clamp really long workpieces to your bench between the vise's dog and a dog in the benchtop. It's also just plain handy to have a second vise.

When choosing a tail vise, you have three good options:

- You can buy a traditional quick-release metal vise with a retractable dog for between $65 and $150. It's easy to install.
- You can buy a front-vise screw kit that you just add wooden jaws to. This option can be a bit cheaper (about $70) but requires more labor. The advantage to this vise is that you can add dog holes to the top or front edge of the wooden vise faces.
- You can buy an expensive specialty vise that will do things your face vise won't. The Veritas twin-screw vise ($159) gives you a huge tail vise that can be used for clamping or holding almost any flat work. Or you can buy a patternmaker's vise ($220 - $550) that excels at holding irregular objects at any angle. Both of these are expensive, but worth it.

6 Add a Planing and Sanding Stop

Many woodworkers clamp their work down when they don't have to. In many cases, gravity and the force of your tool will do the job.

A planing stop is essentially a lip on the end of your bench that can be adjusted up and down. When you're going to plane your work you merely put the wood

A tail vise, such as this Veritas, is a luxury we all deserve. Since adding one to my bench at home, shown here, I've found myself using it far more than a face vise.

against the stop and plane into it. The force of gravity plus the direction you are pushing your tool holds the work in place.

The same concept works for belt sanding. Just remember which way the sander spins. The front of the sander should point away from the stop. Otherwise the machine will shoot your work across the room, easily puncturing any styrofoam cooler in its path. Don't ask me how I know this.

The most versatile planing stop is a piece of ½"-thick plywood that is as long as your bench is wide. A couple wing nuts, bolts and washers allow you to position and fix the stop up and down, depending on the thickness of your workpiece.

The hardware is readily available at any home center. The part that is driven into the bench is sold as a ¼" x 20 screw-in insert nut. To install it, first drill a ⅜"-diameter hole in the end of your bench. Coat the hole with epoxy and drive the insert in slowly using a (usually metric) hex wrench. Then thread a 1¼"-long bolt through a ¼" x 20 wing nut and a ¼"-hole washer.

The stop itself is plywood with two stopped slots that measure ⅝"-wide. Make the slots long enough so your stop can go below the edge of your bench.

This stop allows you to plane wood of almost any thickness with ease. Unscrew the wing nuts, adjust the stop where you want it and tighten the wing nuts to hold the stop in place.

7 Add a Holdfast

Sometimes you need to hold a board on your bench so you can work on its end, such as when you're chiseling out the waste between dovetails. Nothing is as quick or efficient at this job as a quality holdfast.

A holdfast is essentially a hook that drops into a hole in your bench. You tighten it with a screw or rap it with a mallet to lock the work to your bench.

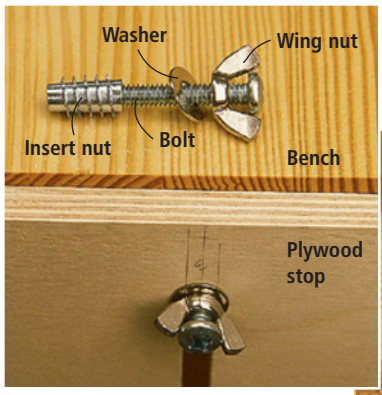
There are three major types that are worth purchasing. The Veritas Hold-down is the Cadillac of the bunch ($52.50). It drops easily into any ¾" hole in your bench and is tightened by turning a screw on the top. I've used this holdfast every day for five years and has never let me down.

The second option is more economical. Glass-filled nylon holdfasts are cheap ($11.50 a pair from Lee Valley Tools), but you have to reach under your benchtop to operate them.

The third type is a metal hook. Rap the top to tighten it and rap the back to release it. All of the versions I've seen in catalogs are cast metal and don't work well for me. My fellow hand-tool enthusiasts recommend forged holdfasts, which are handmade by blacksmiths. It's worth asking around in your area if there's a blacksmith who will do this work for you. Expect to pay about $30, maybe a bit more.

8 Add a Sharpening and Finishing Tray

While some people might accuse me of just being fastidious, there are sound reasons to protect your bench from sharpening slurry and finishing materials.



The key to the planing stop is the hardware. Here you can see how the ¼" x 20 screw-in insert nut, 1¼"-long bolt, ¼" x 20 wing nut and ¼"-hole washer are assembled.

If you use a hand plane, you really should invest $6 and an hour of your time to make this planing stop. It is the most versatile stop I've ever used and works great for thick or thin stock.

The Veritas Hold-down is a joy. It's well-engineered and holds the work with astonishing pressure. I won't cut dovetails without it.

Never sharpen or finish on your bench without protecting the top. The slurry and stain will dig into your work and sully the wood you place on top of it. This simple tray drops into the dog holes in the top (no clamps) to contain your mess.

Sharpening slurry is made up of bits of metal and abrasive that will dig into your bench and later get embedded in your work. And finishing materials (dyes, stains and glazes in particular) can rub off on your work for weeks or years if they spill on your bench.

That's why a tray with a low lip is ideal for typical sharpening and finishing jobs. I make my trays from inexpensive plywood with the lip made of ¾"-thick scrap pieces – plus glue and screws. The best thing about the tray is that it drops into two dog holes, so there's no need to clamp it in place. This makes the tray especially good for sharpening because the tray stays put as you work.

9 A Top Just for Gluing

Not all of us have the luxury of a separate bench for assembly, so I end up constructing most of my furniture right on my bench – both at work and at home.

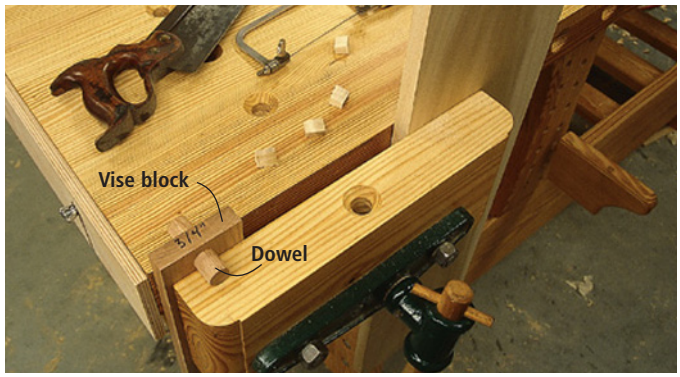
Getting glue on the bench is a big problem most woodworkers face. Yellow glue, which is mostly water, isn't good for your top because you're introducing moisture in places where it has spilled. And dried glue can easily mar your work.

So I have a removable top that fits right over my benchtop for gluing chores. It's made using ⅛"-thick hardboard (available at your local home center store) and four cleats that keep it securely in place on the benchtop.

Why not use newspaper or a blanket? Well, newspaper makes a lot of waste, and is slow and messy. Blankets, if not perfectly flat on your bench, can actually introduce a little twist in your glue-ups. If you don't want to make a hardboard glue-up top, the next-best option is to buy a thin plastic tablecloth.

10 Vise Blocks Add Bite

One of the biggest complaints woodworkers have with their vise is that it doesn't hold the work very well when they clamp using only one side of the jaw. The jaw bends a little bit – especially with wooden vises – and this weakens its grip on the work.



Vise blocks improve the holding power of any vise. The dowel prevents the block from dropping to the floor when you open the vise.

The solution is so simple I'm surprised that I don't see this more often. Put a block of equal thickness on the other side of the jaw and your problem is solved. I have a set of "vise blocks" in the most common thicknesses I deal with (½", ⅝", ¾", ⅞" and 1"). To help me out even more, I drive a ¾" dowel through each block to prevent it from dropping when I release the vise. This quick and simple fix will save you a lot of future frustration. **PW**

Until I can afford my 3,000-square-foot dream shop, I have to assemble projects on my bench. This cover keeps my benchtop like new. Make sure the cleats that keep the top in place don't interfere with your vises.

SUPPLIES

BENCH DOGS AND WONDER DOGS

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

- Veritas round bench dogs #05G04.02, $17.50/pair
- Veritas Wonder Dog #05G10.01, $23.50

BENCH VISES

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

- Large front vise kit #70G08.02, $69.50
- Record quick-release vise #10G04.03, $149
- Veritas Tucker patternmaker's vise, #05G09.01, $549
- Veritas twin-screw vise #05G12.21, $159

Woodcraft
800-225-1153 or woodcraft.com

- Economy 9" quick-release vise #129850, $64.99
- Patternmaker's vise #128748, $219.99

HOLDFASTS

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

- Veritas hold-down #05G14.01, $52.50
- Inexpensive hold-down clamps #16F02.10, $11.50/pair

You can find hardboard at your local home center.

Prices as of publication date.

Photo by Al Parrish

The Joint Maker

This horizontal router jig has a table that slides in four directions, turning a router into a joint-making monster.

by Nick Engler

Nick Engler, the author of more than 50 books on woodworking, has built a replica of the 1903 Wright Flyer, the first true airplane, and is now working on the 1905 Flyer.

This horizontal routing jig, which I call "Joint Maker," holds the router to one side of the work. This setup offers several advantages over a standard router table for certain operations:

- You have more control when making mortises – you can rest the part on its face and feed the edge into the bit.
- When making tenons, the rotation of the bit doesn't pull the work sideways as it does on an ordinary router table. Instead, you cut directly against the rotation.
- And if you use vertical panel-raising bits, you'll find that with the panel resting flat on the worktable, gravity works for you.

I've built several Joint Makers throughout the years and I've noticed that the most serious limitation encountered is in routing small, narrow parts – your hands come too close to the bit for safe, accurate control. So I added a carriage on this one – essentially it's a sliding table. It works wonderfully. Just clamp the workpiece to the carriage and use it to feed the work into the router bit. Four stops on the carriage help position the work and control the cut. A unique cross slide keeps the work perfectly aligned with the bit, yet allows you to feed it front-to-back and side-to-side.

How Do I Build It?

In essence, the Joint Maker is just a Baltic birch plywood box with two flat work surfaces – one vertical, one horizontal – mounted to it. The vertical surface (or router mount) is attached to the back of the box and holds the router. The horizontal surface (or carriage) slides over the top of the box and holds the work.

Cut the parts to the sizes given in the cutting list. Rout $\frac{3}{4}$"-wide x $\frac{1}{4}$"-deep grooves in the top surface of the top and the bottom surface of the carriage, as shown in the illustrations on page 81. Note that the grooves in the top run front-to-back, while those in the carriage run side-to-side. The grooves fit around the cross slides.

Cut the shape of the top and cross-slide mount. The top has a "fixed stop" on one side and a cutout in the other.

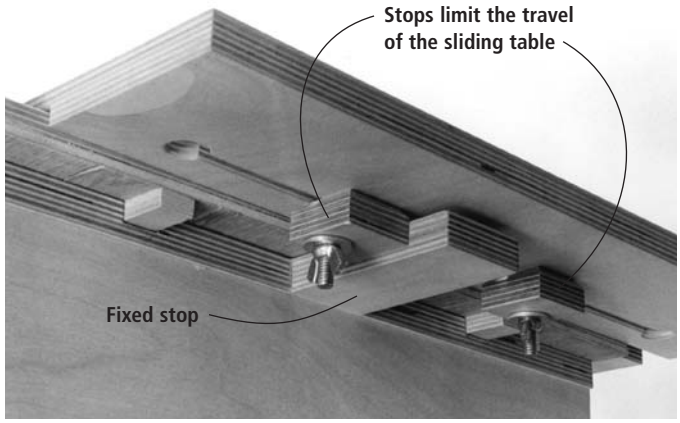
Then cut a $2\frac{1}{4}$"-diameter dust-collection hole in one of the end pieces. Next, you should drill a $\frac{5}{16}$"-diameter pivot hole for the router mount in the back side.

Assemble the bottom, sides, ends and baffle (which is a dust-collector diverter) with glue and screws. Insert the carriage bolt that serves as the pivot for the router mount through the pivot hole in the back side, then screw the top in place. But don't glue the top to the assembly – I found that out the hard way. If the pivot bolt happens to fall out, you can lose your religion trying to get it back in. (Of course, had I been smart, I would have epoxied the bolt in place.)

Mounting the Router

Attach the router to a clear plastic plate before putting it in the router mount. Because this router mounting plate is thinner than the board it attaches to, this arrangement gives you a fraction of an inch more depth of cut. More importantly, it lets you see what the router is doing as you cut.

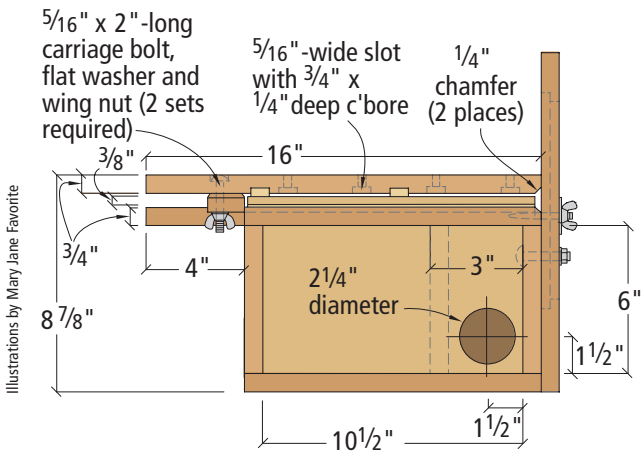
To attach the plastic plate to the router mount, make a cutout and rabbet the edge to accept the mounting plate. Attach the router mounting plate to the router mount with #10 flathead sheet-metal screws. When installed, the router mounting plate must be flush with the work surface of the router mount. The heads of the screws must be countersunk in the mounting plate so they rest slightly below the surface.



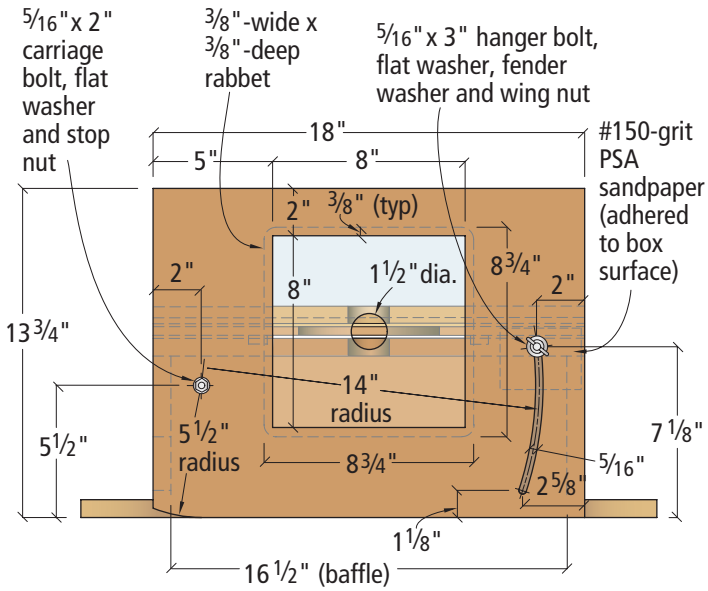
The sliding carriage has several straight slots with a $\frac{3}{4}$"-diameter hole at one end for you to mount the stops without having to remove the hardware. Just insert the head of the mounting bolt in the hole and slide the stop in.

Cutting the Slots

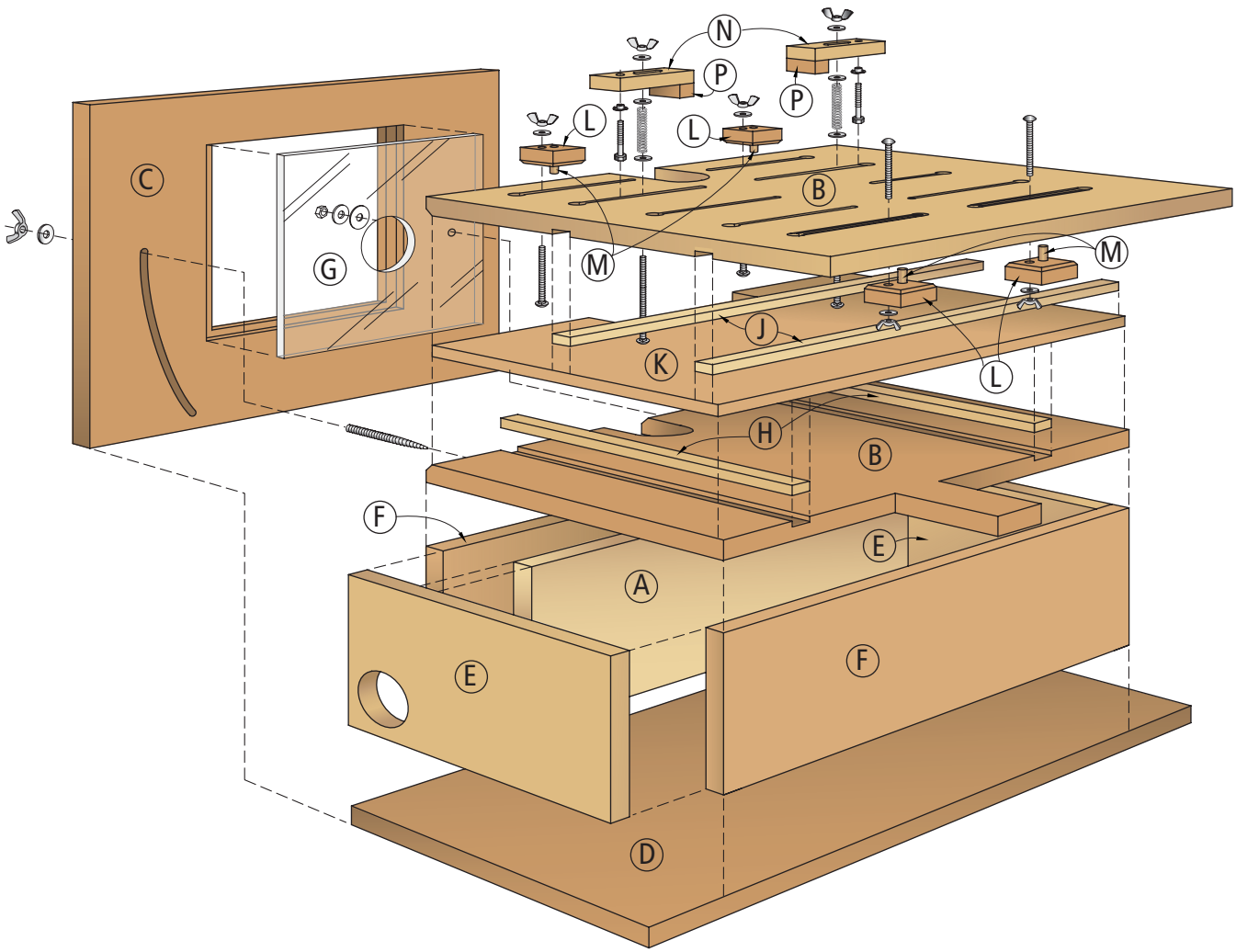
There are two types of slots in this fixture. The carriage has several keyhole slots – straight slots with a $\frac{3}{4}$"-diameter hole at one end. The holes let you mount the stops and clamps instantly, without having to remove the hardware. Just insert the heads of the mount-



Profile



Back view



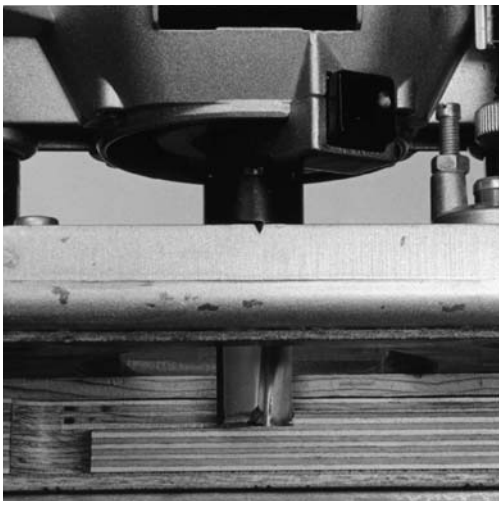
Exploded view

THE JOINT MAKER

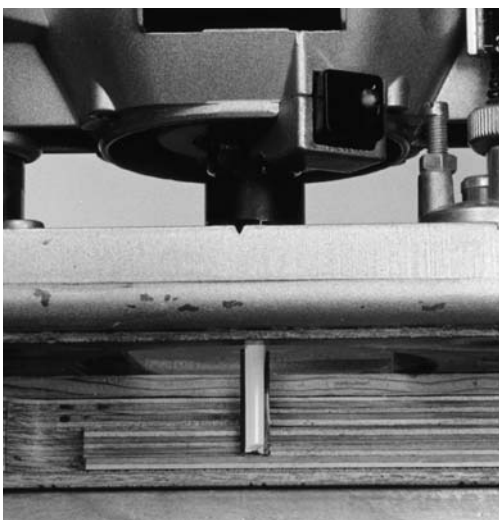
	NO.	LET.	ITEM	DIMENSIONS (IN INCHES) T	W	L	COMMENTS
❑	1	A	Baffle	3/4	6	16 1/2	Baltic birch plywood
❑	2	B	Top/carriage	3/4	16	18	Baltic birch plywood
❑	1	C	Router mount	3/4	13 3/4	18	Baltic birch plywood
❑	1	D	Bottom	3/4	12	24	Baltic birch plywood
❑	2	E	Ends	3/4	6	10 1/2	Baltic birch plywood
❑	2	F	Sides	3/4	6	18	Baltic birch plywood
❑	1	G	Router mounting plate	3/8	8 3/4	8 3/4	Acrylic plastic
❑	2	H	Front-to-back slides	1/4	3/4	11 3/4	Baltic birch plywood
❑	2	J	Side-to-side slides	1/4	3/4	18	Baltic birch plywood
❑	1	K	Cross-slide mount	1/4	11 3/4	18	Baltic birch plywood
❑	4	L	Stops	3/4	1 1/2	1 1/2	Hardwood
❑	4	M	Stop pins			1	5/16" diameter
❑	3	N	Clamps	3/4	2	5 3/4	Baltic birch plywood
❑	3	P	Clamp jaws	3/4	3/4	2	Baltic birch plywood

HARDWARE

- ❑ 5/16" x 2" carriage bolts (6)
- ❑ 5/16" x 5" carriage bolts (3)
- ❑ 5/16" flat washers (15)
- ❑ 5/16" wing nuts (8)
- ❑ 5/16" fender washer
- ❑ 5/16" stop nut
- ❑ 5/16" x 3" hanger bolt
- ❑ #10 x 3/4" flathead sheet metal screws (8) & nuts
- ❑ #12 x 1 1/2" flathead wood screw
- ❑ compression springs (3)
  0.030 wire x 11/32" I.D. x 5" long
- ❑ #8 x 1 3/4" flathead wood screws (45)
- ❑ 5/16" x 4" full-thread hex bolts (3)
- ❑ 5/16" T-nuts (3)



You can make a counterbored slot in two steps. First rout the wide "counterbore groove" that forms the step inside the slots .



Then rout a slot down the middle of the groove, cutting completely through the stock in four 1/8"-deep passes.

ing bolts in the holes and slide the stop sideways in the slot.

The slots let you position the stops and clamps wherever you need them when making cuts. Note that these slots are counterbored, which helps hold the heads of the bolts so they don't rub on the top of the fixture.

To make the keyhole slots, drill the 3/4"-diameter holes first. Then rout 3/4"-wide x 1/4"-deep counterbore grooves using a straightedge as a guide. Without changing the position on the router guide, change bits and rout a 5/16"-wide slot through the middle of each groove.

The other slot used in this Joint Maker is the curved slot in the router mount. To rout this slot, attach the router to a router compass jig. Insert a pivot bolt through the compass and the mount, then swing the router in an arc as you cut.

Make the Cross-slide Mount

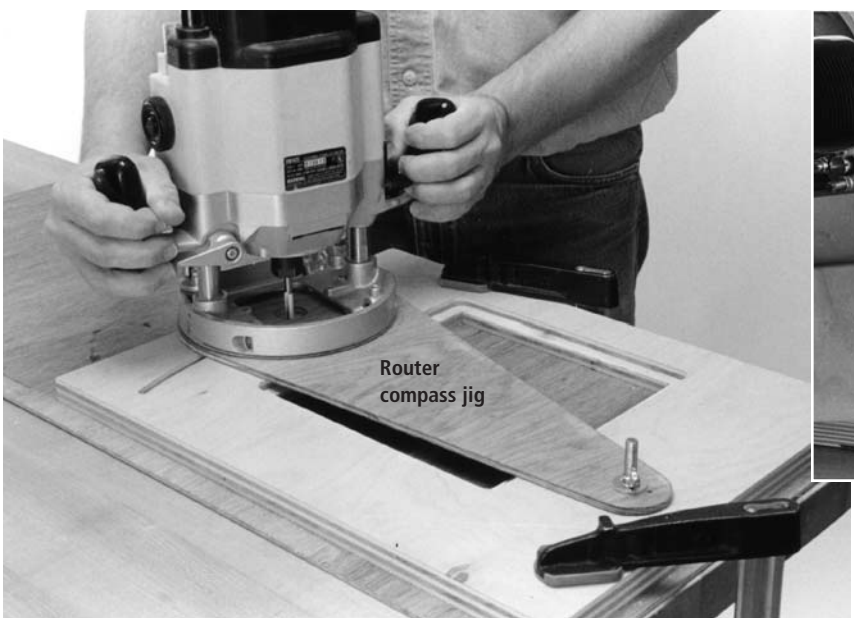
The cross-slide mount is a simple assembly, but you have to get all four of the slides positioned correctly for it to work well. The best way I found to do this was to use the tool itself as a glue-up jig.

Place a single layer of thin plastic in the grooves in both the top and the carriage (a plastic grocery bag works well). Then press the slides into their grooves on top of the plastic. Apply a thin bead of glue to the exposed surface of each slide. Place the cross-slide mount on top of the slides in the top, then place the carriage (with the slides in place) on top of it. Don't worry if there's glue squeeze-out; the plastic will prevent it from accidentally bonding surfaces that shouldn't.

Make sure everything lines up properly and the back edge of the carriage is flush with the back of the Joint Maker. Then clamp the parts together and let the glue dry. After it sets, take the carriage, cross slide and Joint Maker apart, and trash the plastic.

Make the Stops and Clamps

The stops and clamps are all attached to the carriage by carriage bolts. The stops are just blocks of wood with dowels protruding from the underside to keep them from rotating while in use. Chamfers around the bottom edges prevent



To rout the curved slot in the router mount, first make a router compass jig to guide your router in an arc. Drill the 5/16"-diameter mounting hole in the router mount and mark the ends of the curved slot. Use the mounting hole as the pivot and swing the router in an arc to cut the slot.

sawdust from interfering with the accuracy of your setup.

I found that as sawdust builds up around the stops, it prevents the parts from making full contact. This, in turn, keeps you from positioning the parts correctly. The chamfers give the sawdust somewhere to go. You will still have to brush the dust away from time to time, but you don't have to get every little particle.

On the clamps, a compression spring around the mounting bolt automatically raises the clamp when you loosen the knob. A hex bolt threaded into a T-nut at the back of the clamp prevents the assembly from tipping when you apply pressure.

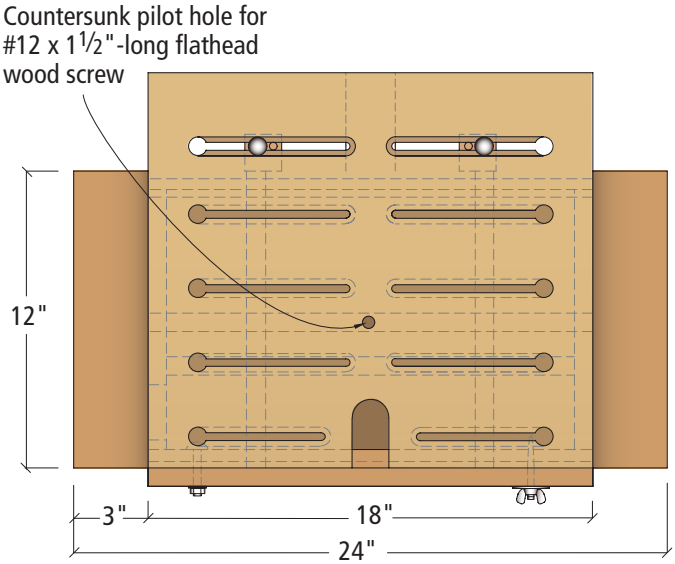
Make as many clamps and stops as you think you'll need. I made just three clamps and four stops, which I've found to be adequate for the work I do. But if you think you'll need more, now is the time to make them.

As another option (if you've got a few extra dollars) there are a couple of hold-down clamps available from catalogs that will also work very well when attached to the Joint Maker (see "Some Store-bought Options to Improve the Joint Maker" on page 82 for more information).

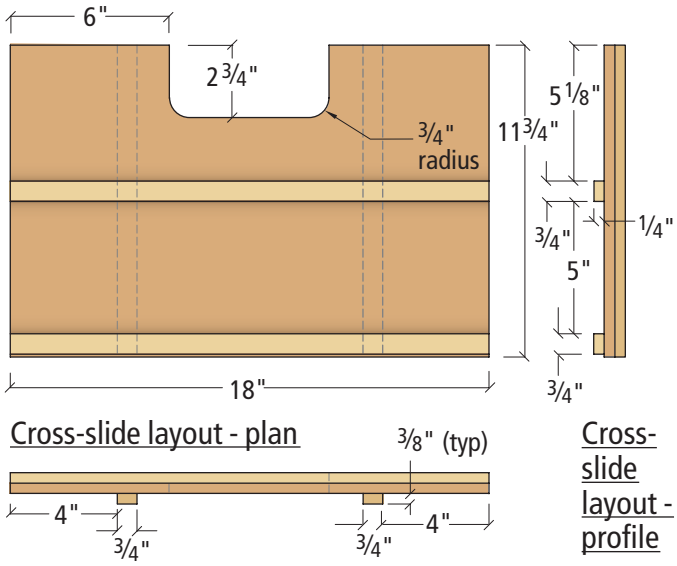
Final Assembly, Finishing

Give all the wooden surfaces a light sanding, then apply a durable finish to all parts of the Joint Maker: the router mount, carriage, cross slide, clamps and stops.

Apply a thin coat to all exposed surfaces, then rub down those surfaces that will slide together (such as the back and the router mount, or the top and the cross slide) with steel wool or fine



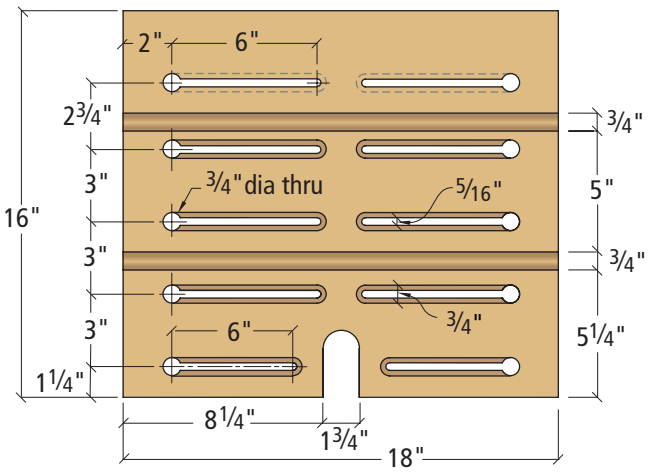
Carriage layout - plan



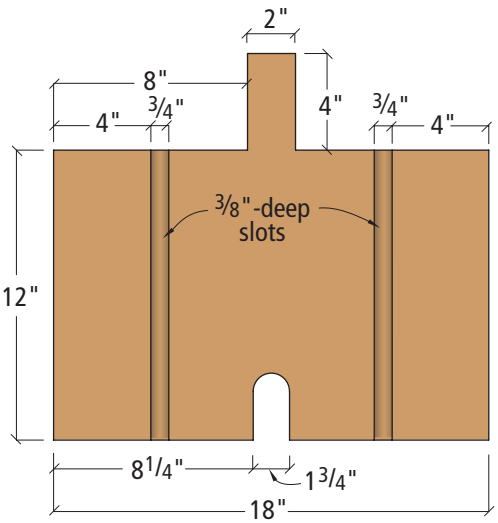
Cross-slide layout - plan

Cross-slide layout - elevation

Cross-slide layout - profile



Carriage layout - bottom view



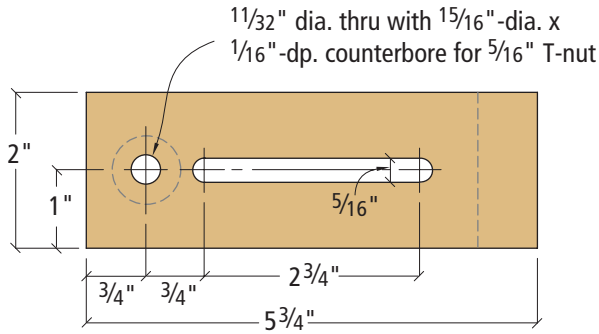
Top layout - plan

abrasive pads. Then apply a coat of paste furniture wax to the sliding surfaces of the top, cross slide and carriage, and buff it out. The thin layer of wax lubricates the surfaces and helps the parts slide much more easily.

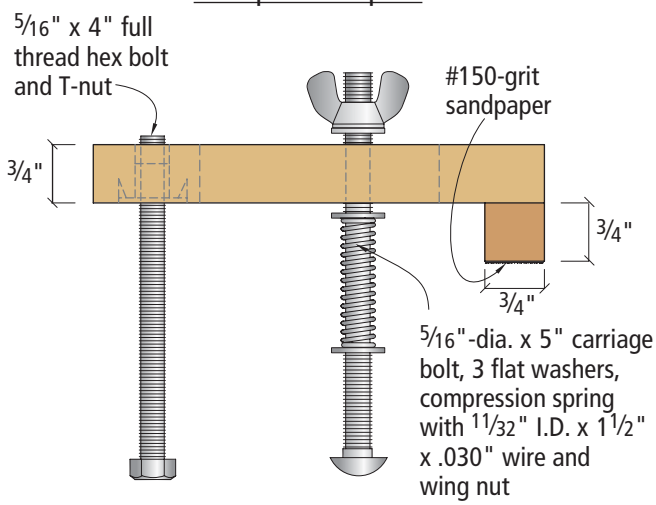
Attach the router mount to the Joint Maker with a pivot bolt, washer and a stop nut. Using the curved slot as a guide, drill a ¼"-diameter pilot hole for the hanger bolt in the edge of the top. Install the hanger bolt, fender washer, flat washer and wing nut, as shown in the illustrations.

Also install the hardware in the stops and clamps. The carriage and cross slide are not attached; they simply rest atop and slide on the Joint Maker.

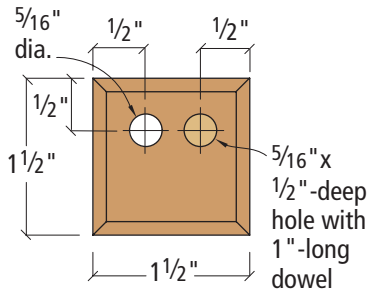
Once you've done that, you're ready to test it out on all your joint-making operations. **PW**



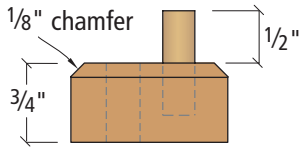
Clamp detail - plan



Clamp detail - profile



Stop detail - plan



Stop detail - elevation

SOME STORE-BOUGHT OPTIONS TO IMPROVE THE JOINT MAKER

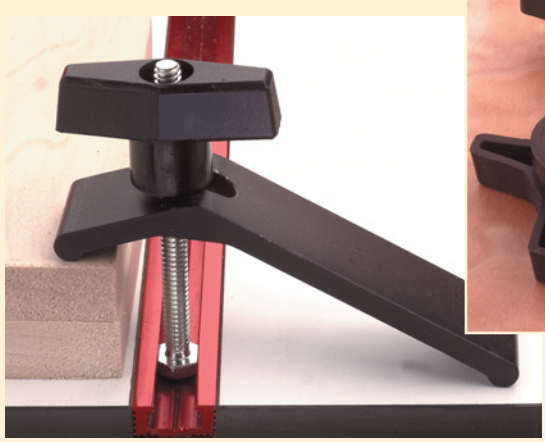
When we had a chance to work with the Joint Maker in the *Popular Woodworking* shop, we were definitely impressed with the cleverness of the design. Our minds were spinning with the amazing number of operations that could be performed easily with this homemade jig.

We also let our minds wander a little further about some of the features of the jig. After adjusting the numerous wing nuts (especially when applying hold-down torque to such a small surface area), we decided that some very affordable handles would make the jig more user-friendly. T-handle, star and three-wing knobs are available for 50 cents to $2 each, and make gripping and tightening the adjusters a whole heck of a lot easier.

Another addition we felt would be useful were some optional manufactured hold-downs. While Nick's hold-downs function well, there are a number of other hold-downs available for less than $5 that offer slightly better performance. The store-bought hold-downs shown at right will work with the slots as shown in the plans, and by purchasing them you'll reduce the time necessary to build the jig and get you using it more quickly.

Both the knobs and hold downs shown here are available from Hartville Tool (800-345-2396 or hartvilletool.com). The knobs (right) are made from recycled plastic and available as two-prong (item #60936), three-prong (item #60866) or four-prong (item #60796). Each costs 89 cents. The hold-down unit below left (item #60736) costs $3.99 and includes a solid aluminum hold-down, a bolt and a ¼"-20 knob.

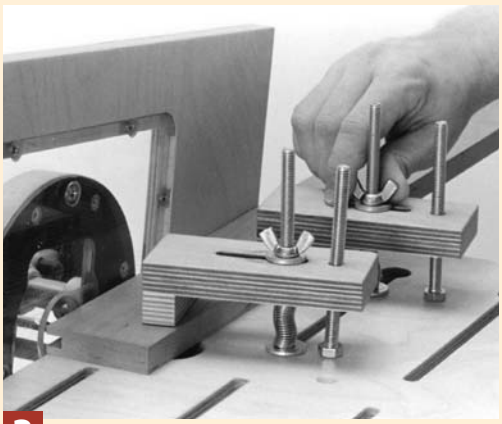
– David Thiel



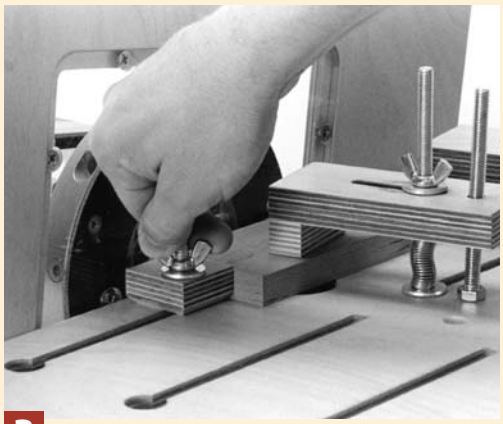
While the four-prong "star" knobs are easiest to grab, the two-prong "T" knobs require less clearance. The hold-down at left also works in the Joint Maker's slots.

USING THE JOINT MAKER TO CREATE A HAUNCHED MORTISE-AND-TENON JOINT

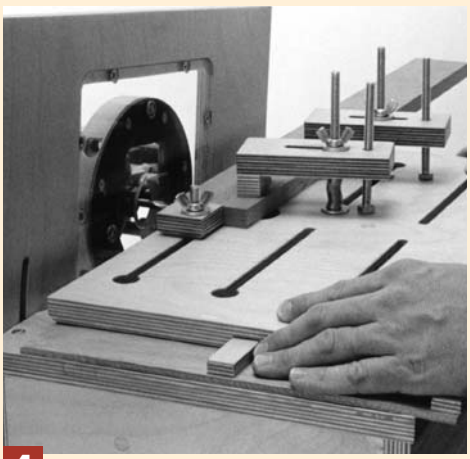
1 You can cut grooves on the inside of edges of rails and stiles with a straight bit. Lock the carriage to the base with a wood screw and feed the parts past the bit, guiding them along the mount.



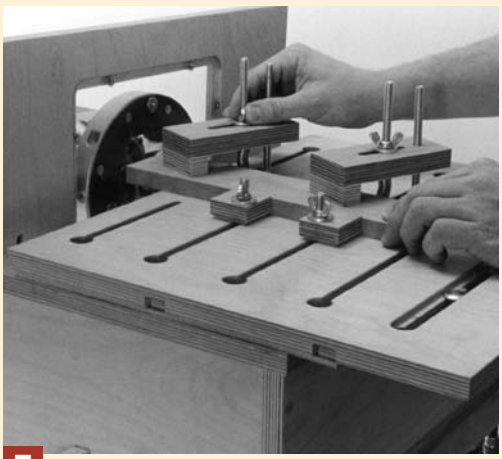
2 To cut the mortise, clamp a stile to the carriage so the inside edge faces the router. Adjust the hex bolts so the clamp jaws sit squarely on the work while you tighten the knobs.



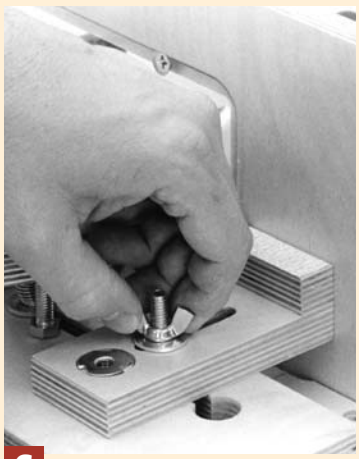
3 Secure a stop against the end of the stile to quickly align the other stiles. This makes it a lot easier to make the same cut in multiple pieces without having to set it up each time.



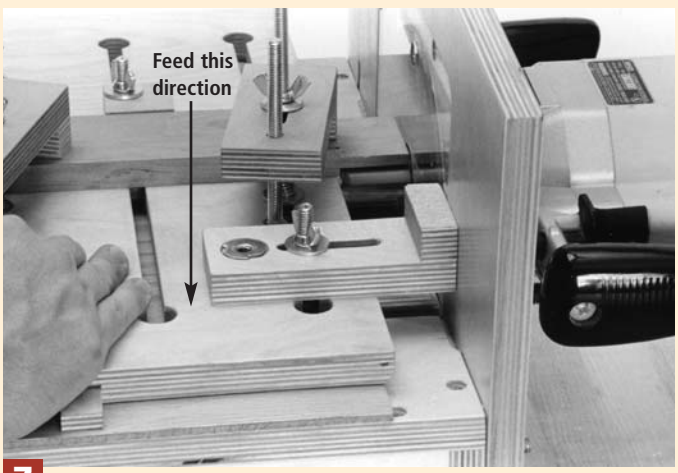
4 Advance the router bit to cut the full depth of the mortise. Holding the carriage, feed the stock into the bit no more than 1/8" deep at a time, moving it side to side.



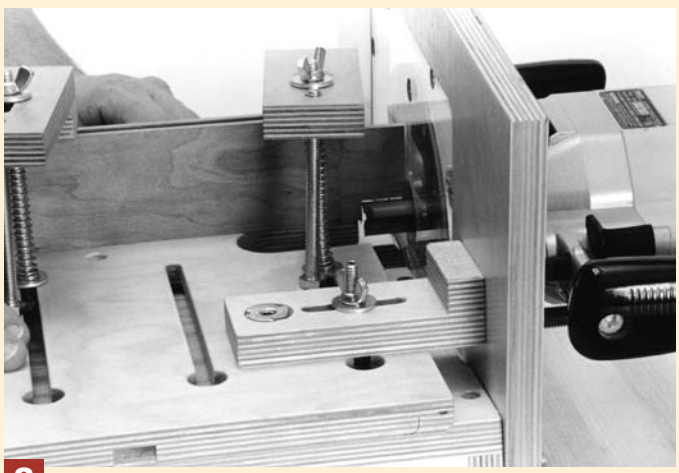
5 For the tenon, mount a rail on the carriage so the edge is perpendicular to the mounting plate. Secure stops against the rail to help you position the others for duplicate cuts.



6 You can use the wooden clamp as a stop to prevent the bit from cutting into the carriage as you work.



7 Once you set up the stops and clamps to cut the tenons just as you want them, feed the rail across the bit, cutting the underside of the stock. With the cutter below the work, you need to pull the work toward you to cut against the rotation of the bit.



8 To cut the tenon's shoulders, turn the rail so the outside edge rests on the carriage and clamp it in place. Readjust the router bit and cut the haunch in the tenon, using the carriage to feed the work and control the cut.

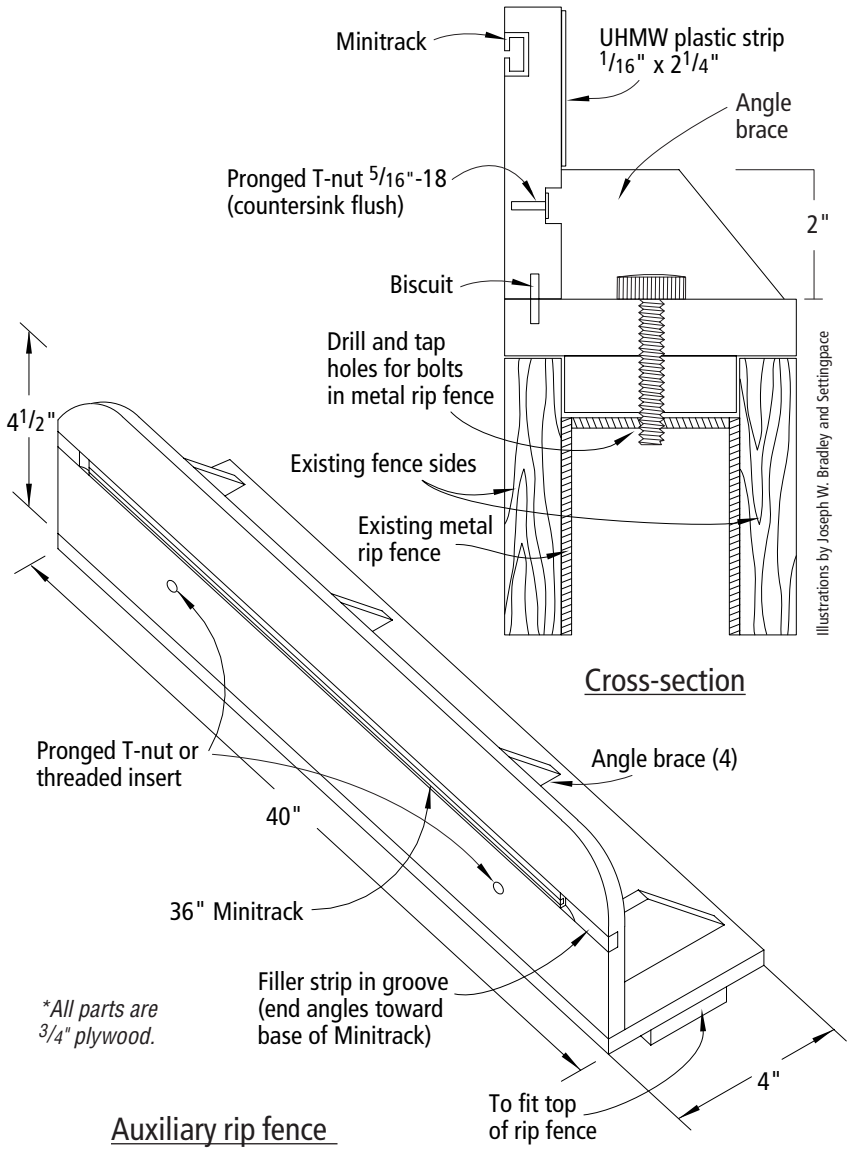
Photo by Al Parrish

Jim Tolpin's
UNIVERSAL RIP FENCE

A simple fixture lets your table saw cut curves, patterns and tenons in one pass.

My universal fence fixture – the heart of my table saw system to which an entire galaxy of accessories can be attached – greatly expands the utility and ease of use of the table saw. With this system you can easily create a wide variety of joints with speed and precision: from tenons to tongue-in-groove and spline joints, to raised panels and rabbets.

It revolves around a single auxiliary fence that quickly bolts to my table saw's existing Biesemeyer-style rip fence. Used by itself, this fixture (which is generally left in place as it does not interfere with most table saw operations), guides wide stock on edge through the blade. This fixture also incorporates a "Minitrack" T-slotted aluminum extrusion that accepts the ¼" x 20 attachment bolts of two or more shop-made hold-downs to keep stock flat to the table.



Building the Fixture

I recommend building the fixture from a high-quality grade of hardwood plywood that's free of voids and warp. Generally speaking, the more laminations the better.

Take your time to get the cuts straight and square, and securely glue and screw the fixture together. I use biscuits to strengthen the butt joints – full-length shop-made splines would give even more strength if you want to take the extra effort to make them. Careful construction of this fixture will ensure that the accessories that depend on it will run smoothly and accurately.

To attach the fixture to your saw's rip fence, you may need only to drill and tap a hole in its metal top surface to accept the hold-down bolts as I did with the Biesemeyer fence at left. If, however, your particular rip fence is not a square steel box, you may have to get a little creative and extend the vertical face of the fence to run down past the face of your rip fence all the way to the saw table. You can then run bolts horizontally through the wood fence (with the bolt heads buried into a countersink) and through your table saw's rip fence.

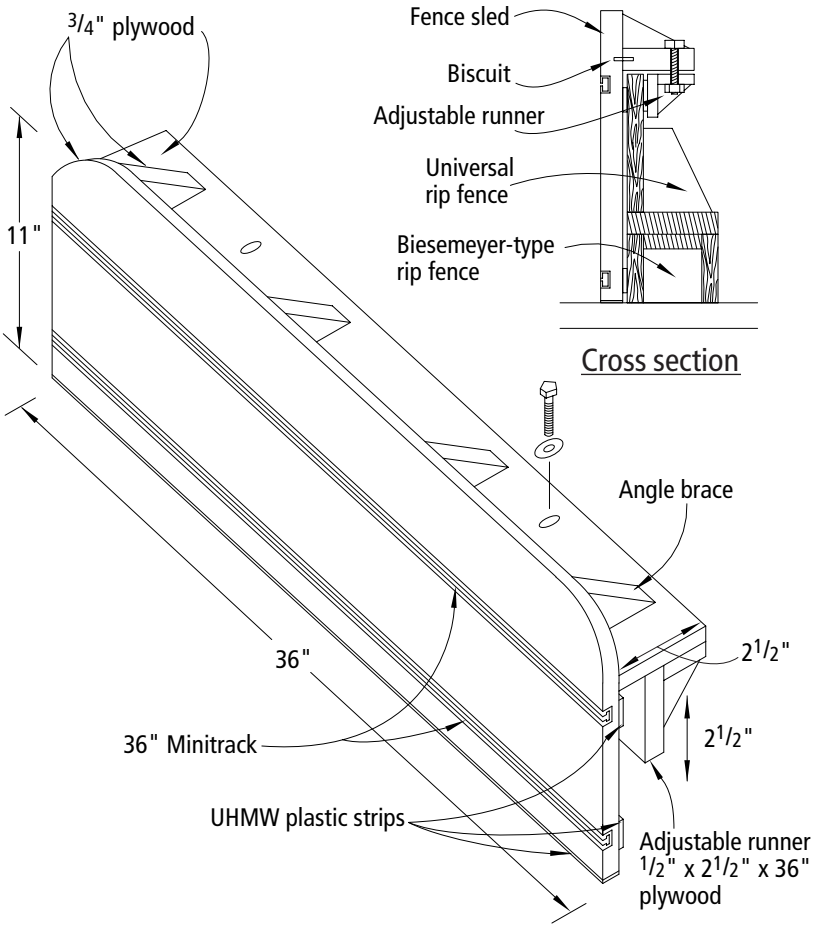
To reduce friction (on this and all other fixtures), note that I use 1/16"-thick strips of ultra high molecular weight (UHMW) plastic on the bearing surfaces of the fixtures where they run against each other or on the table surface. These strips and the aluminum extrusions (which I set into grooves to accept attachment bolts for accessory fixtures) are available from suppliers listed on page 88.

In this article I will introduce you to three of my favorite accessories that I regularly use with my universal rip fence fixture system: the rip fence sled, the pattern fence and the rabbet fence.

The Rip Fence Sled

The most versatile of the fixtures is the rip fence sled, which nests and slides on top of the basic fixture. It offers a multitude of uses depending on how it is set up. It can act as a short rip fence; a tenon jig with integral clamps and replaceable backing strips;

by Jim Tolpin



Rip fence sled

The rip fence sled, set up with a vertical back stop and clamp, carries a board on end through a set of double blades to create a tenon.

Step photos by Craig Wester

an end-bevel cutting and shaping jig; and a feather spline miter-joint carriage (for frames).

An adjustable guide system allows you to tweak the amount of sliding friction. The use of this sled brings precision, efficiency and control to these processes.

Here I will explain just a couple of its applications: cutting tenons on the end of a board and creating a feather spline joint in the corner of a mitered frame.

Cutting Tenons With the Rip Fence Sled

I often use the rip fence sled to cut tenons vertically. It's a fast and accurate process.

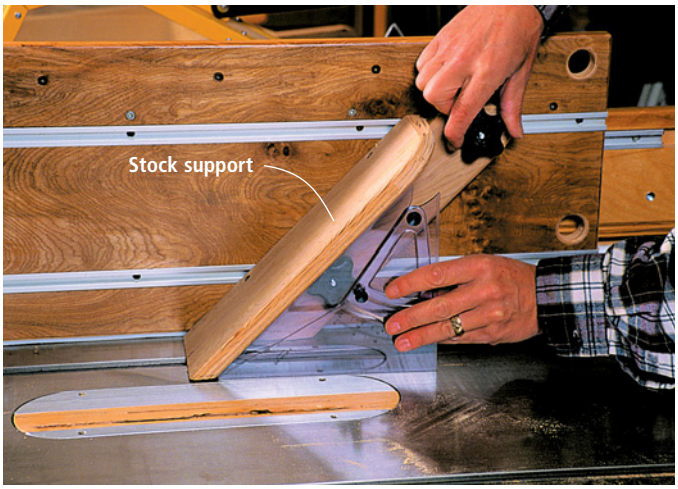
To cut both cheeks of the tenon at once, I install two identical blades. The one caveat is that your saw must have sufficient power (2 horsepower minimum is recommended) to run two blades simultaneously through the type of material you are cutting. I also recommend using a 24-tooth, thin-kerf rip blade – here you'll need two, of course – to ensure best results. If you do not have these blades, you could use the two outer blades from a standard stack dado set. Be aware, however, that they won't cut as efficiently as the thin-kerf rip blades and will require more step cuts.

Setting up the double blades requires a plywood washer (don't use solid wood, as its thickness can change with the humidity) augmented by paper or plastic dado-blade washers for fine-tuning the width. Note that the washer width must be greater than the tenon width to account for the fact that the blades' carbide tips are wider than the saw-blade plate. I install a fresh throat plate and set the fence to a story stick. (A story stick simply is a scrap piece of wood with a project's dimensions transferred to it.)

Begin by test-cutting a scrap of stock. When satisfied, clamp the stock in place and begin making the cuts in steps, never more than 1" in height at a pass – less if dense hardwood. On the last cut, in which the blades reach the shoulder cuts, push the sled all the way past the blade and turn off the saw. After you cut these cheeks, then finish the tenons by cutting the shoulders.

Cutting Feather Spline Joints With the Rip Fence Sled

I often use "feather spline" joints on the corners of a frame to add decoration and strength to an existing miter joint. I often make the feathers out of a contrasting



Set up the fixture to cut the feather splines. A drafting triangle set between the underside of the stock support (attached to the sliding rip fence fixture) and the saw table makes quick work of securing the first support at a precise 45° angle.

Use a 24" framing square, such as the one shown above, to set the second support square to the first. To see this operation in action, check out page 31 of our December 2003 issue or go to "Magazine Extras" online at popwood.com.

hardwood (with the grain running perpendicular to the miter line for strength).

To simplify things, I make the spline the same thickness as the kerf of one of my saw blades. Of course, if you want a thicker feather, you can use a dado blade. Just be sure the slot isn't too tight or there won't be any room for glue when it's time for assembly – you want a slip fit, not a pounding fit.

To set up to cut these feather joints on the rip fence sled, I install a pair of stock supports (with attachment bolts that fit into the sled's integral T-slot shown above). These will carry the frame at an exact 45° angle to the table surface. In this way, the slot made by the blade will cut an even distance along each side.

Set the first support up with a drafting triangle as shown in the photo above left. The second support is then set up square to the first using a carpenter's framing square. Then lock the supports tightly against the sled. Tape a piece of thin hardwood to the face of the rear support to serve as a replaceable backing board for the exiting blade. This helps prevent tear-out.

Set the distance between the sled and the blade by measuring to a story stick and then lock down the rip fence. Make test cuts in scrap to ensure accuracy. At this point it's simply a matter of setting the frame (which I previously glued together – it's fragile but strong enough for this operation) in the crotch of the two supports, clamping it down and pushing the sled along the universal fixture. Use a series of cuts if the slot is going to be more than ¾" or so deep.

The Pattern Fence

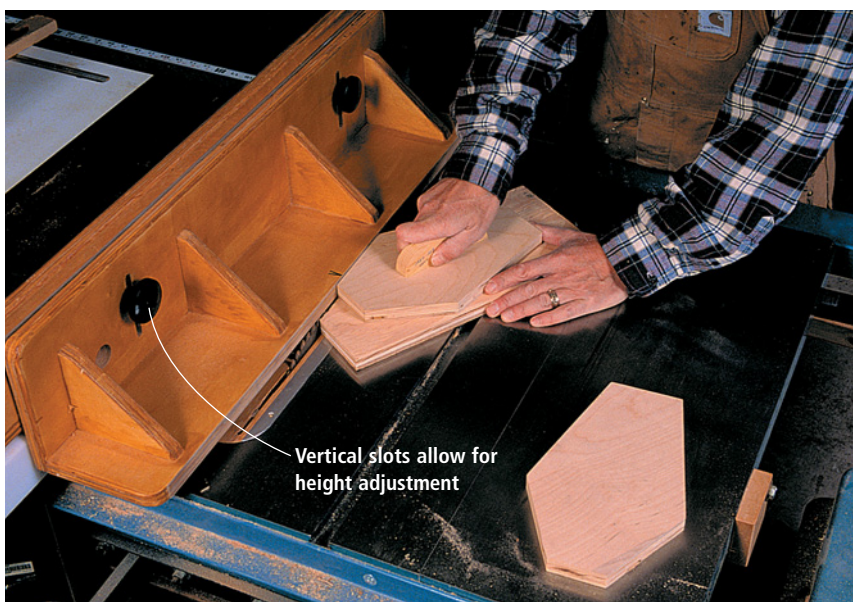
Pattern-sawing on the table saw offers a quick and accurate way to create duplicates.

The pattern fence (below and illustrated on the next page) acts as an index for a template so that the blade makes its cut in the stock precisely along the perimeter of the template. Slotted holes in the fixture allow it to be adjusted to the blade at any height. The pattern fence also can make long straight cuts and gentle curves.

I start by making an exact template of the shape I want to reproduce. Be careful to get it right because all the other pieces will be its clones. I usually add a handle to the template to provide a more secure grasp.

The next step is to rough-size the workpiece within 1" of its finished shape. Try to avoid a larger waste margin as the offcuts might get trapped between the blade and the fence.

Next, attach the template

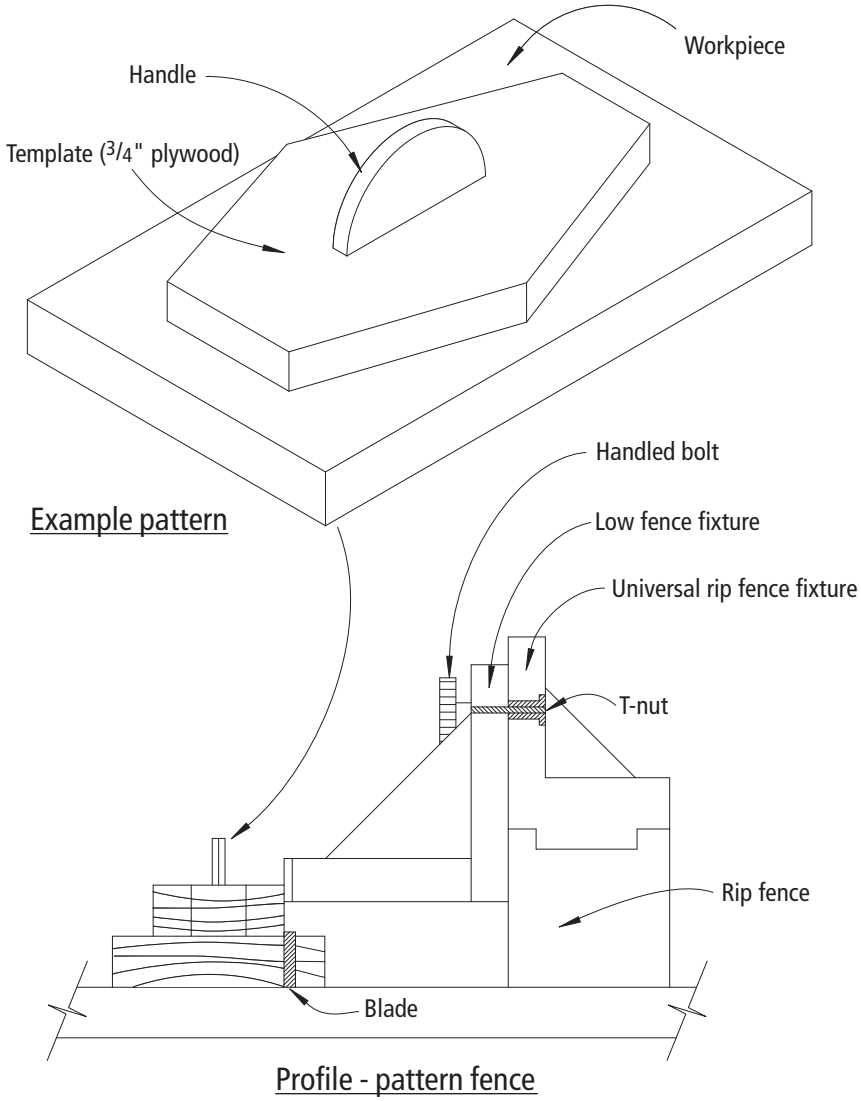


In combination with the pattern fence, a template attached to your workpiece quickly and accurately clones the shape.

to the workpiece with protruding pins (brads) or screws if their hole marks are not going to show on the finished workpiece. If both sides must be clean, I use a vacuum clamp system or go the easy route with double-stick carpet tape. The tape will last for five or six cuts before it needs replacing. To help the tape stick better, I sand the bottom of the template and brush or spray on several coats of shellac or other sealer. To ensure a good grab to the carpet tape, I tap the template onto the workpiece with a rubber-faced mallet.

To set up for the cut, raise the height of the low fence fixture equal to the thickness of the workpiece, plus another 1/4" (use a piece of 1/4" plywood as a spacer). Next, move the fence system over until the outside reference edge of the low fence comes flush to the outside of the blade, then set the height of the blade to just a fraction below the fence base; it should almost touch. Make a note of the cursor reading on the rip fence for future reference.

The magic is now ready to begin. Index one facet of the template against the fence ahead of the blade and, with a steady motion, move the template (with the rough-cut workpiece below) forward through the blade. Work carefully to keep the edge of the template tight to the fence. Then rotate the workpiece counterclockwise to the next facet and cut again. Repeat this process until you have cut all around the template. In just moments, you have created a perfect replica of the template – it's that simple. If you've used carpet tape, remove the template by lightly tapping the side with a hammer.



SUPPLIES

Woodcraft
800-225-1153 or
woodcraft.com
- 1/16"-thick x 3"-wide strips of UHMW plastic #16L65, $18.99

FasTTraK
888-327-7725 or
woodworkingfasttrak.com
- Minitrack aluminum extrusion, available in 12" to 48" lengths $6.99 to $14.99

Straight-edge Ripping With the Pattern Fence

The pattern fence system is also an excellent way to gain a straight edge on a board of any length, without using a jointer. Just attach a known straightedge to the board precisely along the cut line.

On any work more than 1' long I recommend screwing (rather than carpet-taping) the guide in place. Screws are more secure. If the guide board is wide enough (the longer the board, the wider it needs to be, about 1" per 2 1/2' of length), you need to screw the guide board only at the ends. If your guide board is perfectly straight (be sure to check its bearing surface against a known straightedge) and you are careful to keep the guide against the pattern fence, you will come up with an edge as true as one you would gain from a jointer.

Curved Cuts With the Pattern Fence

I was happy to discover that it's possible to cut a curve on the table saw – up to 3/4" per foot arc in 3/4"-thick stock. (I do not recommend cutting curves in stock thicker than 3/4", as the forces involved become huge.)

I discovered the use of the table saw for curve-cutting when I set out to cut planks for a small boat from 4' x 10' sheets of plywood. I found that I could cut these planks nearly four times faster on the table saw than with a jigsaw or circular saw. I also discovered that the table saw produced such an accurate cut that no trim-

ming (other than a bit of hand planing) was necessary to make the planks fit precisely.

The trick to making curved cuts is to use a curved-edge template, or batten, fixed to the stock, in conjunction with the pattern fence and a 40-tooth combination blade (don't use a thin-kerf blade). If you keep the curves shallow, the kerf cannot bind on the blade because the offset of the carbide tips keeps the concave side of the kerf away from the blade plate. The saw blade doesn't care that the cut line runs along a curve as long as you carefully control the stock so it can't back into the blade. This is where the pattern fence comes into play.

The first step to making a curved cut is to lay out the curve. At this point you have two procedural options: You can fix a batten in place to points directly on the workpiece (which leaves little nail holes to fill but is remarkably fast), or you can lay out and then cut a curved template in a piece of sheet stock. You can attach this with screws or carpet tape. Screws do leave small holes but in the long run, they're more secure. The latter procedure is preferable if you intend to make a number of pieces to one curve.

With the template or batten affixed to the workpiece, the next step is to set up the pattern fence as described earlier for template-cutting. If the offcuts of the stock will be too big to fit between the blade and the rip fence, you must first trim any oversize areas.

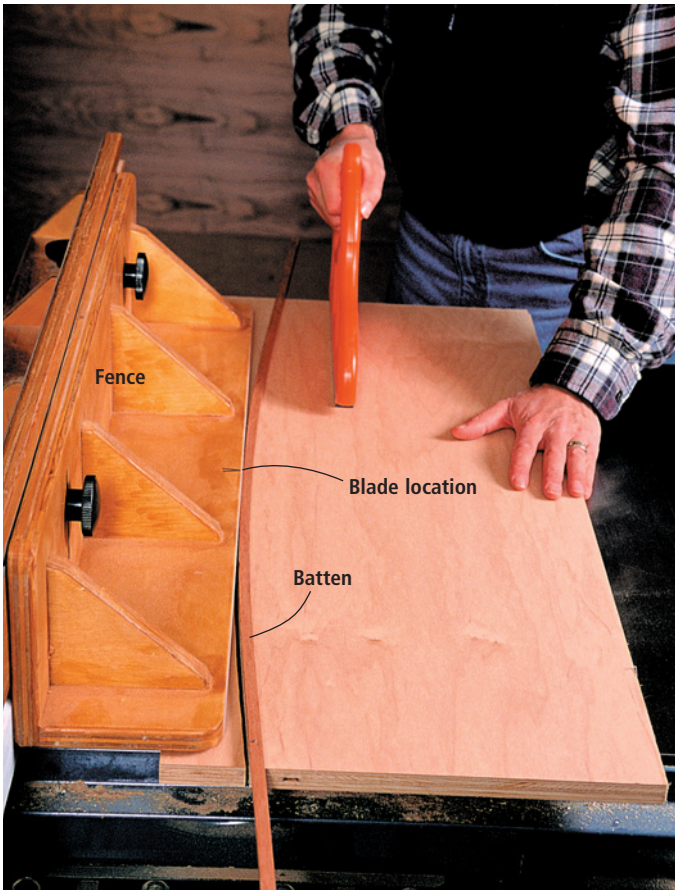
Mark the location of the front of the blade on the top of the pattern fence as a visual reference. This is where you must keep the template or batten in contact with the fence as you proceed through the length of the cut. Feed the stock smoothly and steadily through the spinning blade, keeping the guide tight to the pattern fence at your mark, as shown in the photo below.

Be sure to set an outfeed table to catch the stock. If you encounter resistance and/or see wisps of smoke, the curve is too tight for your blade. Stop feeding immediately, lower the blade and remove the board. Try another blade with greater tip clearance. If this isn't available or doesn't help, you'll have to use another cutting method.

The Rabbet Fence

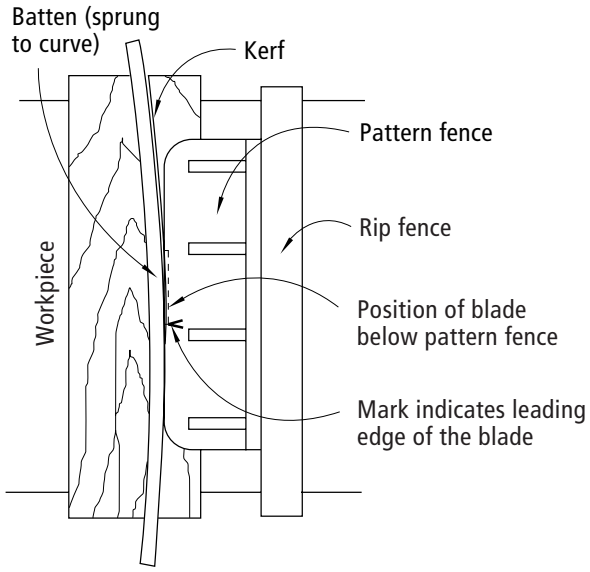
You can cut a rabbet quickly and accurately in a single pass by using a dado blade and this specialized rabbet fence that bolts securely to the universal fence fixture.

The fixture's T-slot accepts bolts to secure my shop-made comb-type hold-downs as needed to hold the stock flat to the table. The cavity cut in the fence lets you "hide" a portion of the dado blade within the fence itself, allowing you to adjust the width of the dado simply by setting the position of the fence

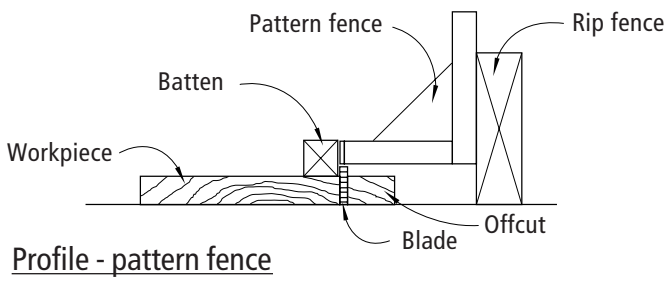


A long, gentle curve cut can be made with the pattern fence by attaching a curved guide batten to the workpiece and running it carefully against the edge of the fence.

Curve-cutting with the Pattern Fence



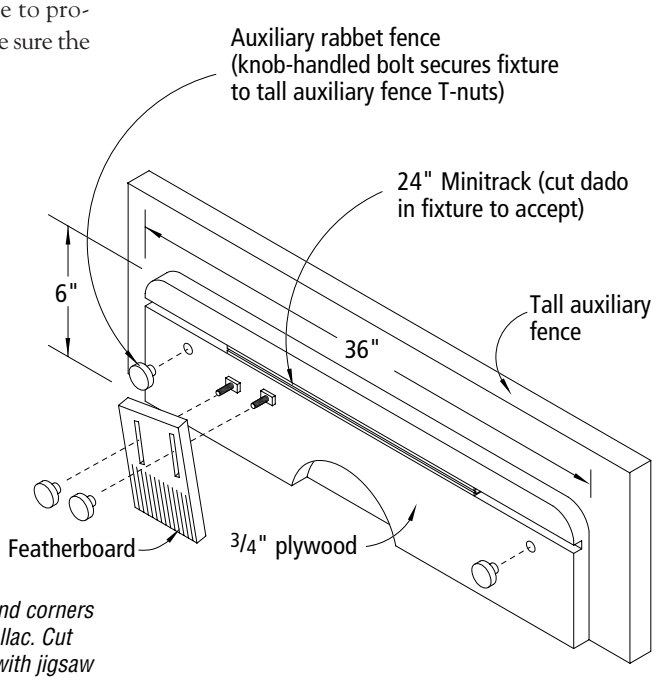
Plan - pattern fence



Profile - pattern fence

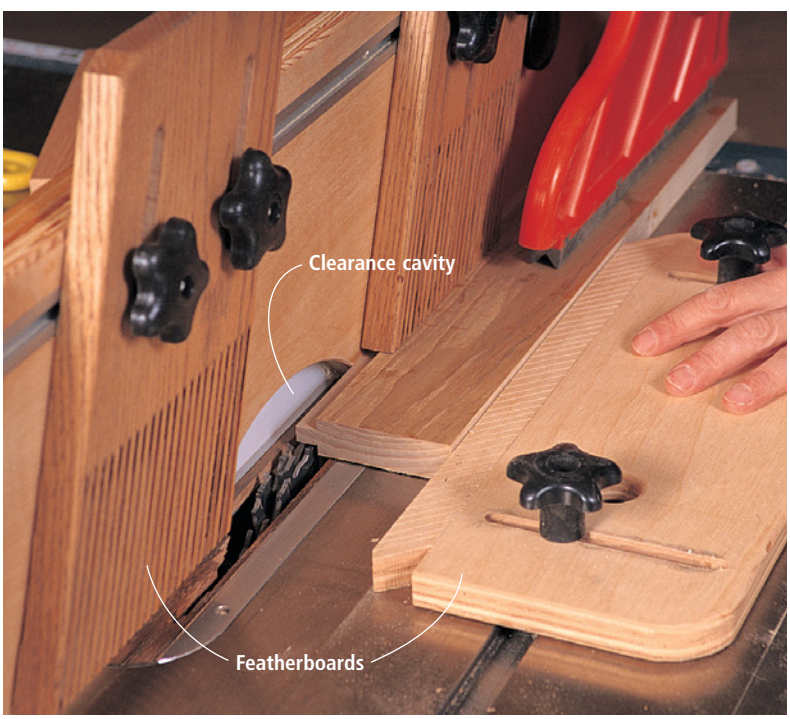
rather than changing the width of the dado blade by adding or subtracting cutters or shims.

With the cutter height adjusted to the depth of the rabbet, you need only to run the workpiece against the fence to produce the finished cut. Be sure the hold-downs are secured firmly in place, as any lifting of the stock up from the table will cause the rabbet to fluctuate in depth. **PW**



Note: Round all edges and corners as shown, sand and shellac. Cut cavity to enclose blade with jigsaw (trace raised blade).

Rabbet fence



The rabbet fence is bolted to the universal fence fixture and then set up with a pair of featherboards bolted to its aluminum T-track.

To order this book visit the Bookstore at popwood.com or call 800-448-0915.

MORE ACCESSORIES FOR THE UNIVERSAL FENCE FIXTURE

The following is a list of additional fixtures that I've devised for this system. You can find a complete description of their construction and use in the fully revised and updated second edition of "Jim Tolpin's Table Saw Magic" (Popular Woodworking Books). The first two fixtures slide on the fence; the rest quickly bolt to it:

- Carriage-type taper jig and straight-line ripping fixture: Features a unique adjustable clamping and guidance system, which simplifies set-up and ensures accurate cutting action.
- Raised-panel jig: Features easy sliding action, integral hold-downs and an adjustable field angle.
- Vacuum-powered rip fence: Works with a shop vacuum to keep delicate, thin slices tight to the fence.
- Long-extension fence: Used to support and guide panel stock and long boards ahead of the saw table.
- Edge jointer: Cleans up and straightens edges of boards and panels.
- End-stop fence: Features easily adjustable stops for setting up single- and double-blind slots and grooves.
- Fence for thin sheet stock: Guides and controls thin, flexible parts.
- Edge-band trimmer: Allows precise flushing of edge bandings.
- Coving jig: Lets you cut multiple flute patterns; accepts a quick-bolt hold-down fixture; a simple spacing system ensures even flute spacing with speed and precision.

– Jim Tolpin

Precision Edge-jointing by Hand

Even if you own a powered jointer, you can get a superior fit with a long hand plane.

Photo by Al Parrish

Learning how to joint a board by hand pays great dividends when you need a perfect fit or you are dealing with boards that are too long for your powered jointer. With a little practice, almost anyone can do it.

I imagine a good percentage of you are wondering why in the world you should learn to joint a board's edge with a hand plane. After all, most woodworkers own a machine jointer and have gotten by without this hand skill.

However, having jointed edges by both hand and machine, I've found it requires a good deal of care to tune a machine jointer for precision edge-jointing. And it's almost always possible to improve the jointed edge by planing it by hand – even those edges from well-maintained machines.

Additionally, there are circumstances where a hand plane is the only way to achieve a true edge. A particularly long or heavy board can be too cumbersome to pass over a machine jointer. In this instance, the most effective method would be to hold the board stationary and shoot the edge by hand – if you have the planes and know how to use them.

Even if you don't have a jack on your bench for supporting long boards, you can use handscrews. Clamp one end in your face vise and the other end in handscrews that you rest on your benchtop.

Some of you may already know the value of this skill, but you are not sure how to proceed and think it might be a bit too tricky. Or you may have already taken a stab at it and met with some frustration.

This column will show you an approach to edge-jointing by hand that is clear and basic enough to help anyone with average hand-eye coordination to begin mastering this fundamental skill. Specifically, the focus will be on the planes and edge-planing techniques involved, as I believe this to be the keystone to edge-jointing by hand.

Getting Straight and Square

At its most basic level, this is the goal when shooting the edges of boards: Create two surfaces that will mate well enough so the glue will create a joint that will not fail under normal circumstances.

It's not accidental that the effort to gain this desirable proximity in edge-jointing involves the quest for straight, square edges. Rather, it flows directly from the critical functional characteristic of the planes woodworkers have used for millennia: The cutting action of the plane iron is regulated by the flat sole of the plane that's in contact with the surface of the wood.

If it were possible for the cutting edge to lie at the same height as the flat sole of the plane, every bench plane would cut in a straight line. However, things are not that simple. Because the cutting edge projects below the sole to take a shaving, bench planes tend to cut in a shallow, concave arc.

Many factors enter into the magnitude of this arc, but it's roughly a function of the length of the plane and the depth of the iron. The shorter the plane and deeper the cut, the more pronounced the arc. Conversely,

by Don McConnell

Don McConnell builds furniture and does ornamental carving in Mount Vernon, Ohio. Formerly at the cabinetmaker's shop at The Ohio Village, he remains an avid student of the history of the trade, tools and shop practices.

When edge-jointing, it's important to pay attention to your body mechanics. At the beginning of your pass, apply considerable pressure to the toe (front) of the plane and push forward with your other hand.

In the middle of the pass, the pressure should be equal fore and aft on the plane's body. At the end of the pass, as seen here, all of your downward pressure should be applied to the heel of the tool.

Use your fingers as a fence when edge-jointing. With your hand wrapped around the plane as shown, you can keep the plane registered on the edge and positioned laterally where you want the cut.

the longer the plane and finer the set of the iron, the more closely its cutting action will approximate a straight line.

That's why longer bench planes (20" to 24" try planes, 26" to 30" jointers) are typically used for final truing of surfaces and edges. Their length, in combination with irons set to take a light shaving, regulates the cutting action to closely approximate a straight line.

Properly Applied Pressure

Throughout history, woodworkers have developed the following simple strategy for taking advantage of the cutting characteristics of these long planes.

The technique involves concentrating downward pressure on the toe of the plane as the cut commences and transferring that downward pressure toward the heel of the plane as the cut continues. The pressure is concentrated toward the heel as the cut ends. This helps ensure that the weight of the plane hanging off either end of the board doesn't interfere with the sole maintaining uniform contact with the material.

When edge-jointing, the principle of maintaining uniform contact between the sole of the plane and the edge is sometimes lost sight of. Often that's because some people think the plane needs to be tipped, laterally left or right, to correct an edge that is out of square. The unwanted consequence of this tipping is that it tends to defeat the self-regulating nature of the plane, causing your edge to have several surfaces, or facets, none of which are straight or square.

To plane straight edges, I recommend taking advantage of the inherent control of the plane by maintaining that uniform contact. By shifting your hand pressure as I describe in the photos above left and center, you get a great deal of control, especially on boards that are ¾" thick or more. (For thinner stock, you can use an appliance known as a shooting board to great advantage.)

Surprisingly, when using this technique to shoot an edge with my try plane, if a straightedge indicates that the plane has left it very slightly hollow in the middle of the board I take it as a sign that the plane is functioning properly and my technique is sound. Though this may seem at odds with the purpose of edge jointing, that largely proves not to be the case. We'll get back to this point in a moment.

Fix a Crooked Edge

First let's deal with the question of how to correct an edge that is out of square if we're not going to tip the plane laterally. The key is using a plane iron with a cutting edge that is slightly cambered. In other words, the cutting edge has a slight convexity.

A slightly cambered iron (only a few thousandths of camber is necessary) will take a slightly thicker shaving where the curvature is at its maximum, namely the middle of the cutting edge. We take advantage of this feature to correct an edge that is out of square by shifting the plane sideways (but keeping the sole in contact with the surface of the edge) so that the middle of the cutting edge is taking a heavier shaving at the high side – or arris. This allows you to bring an edge into square one shaving at a time.

When preparing a board for edge-jointing, I typically take a couple of strokes in the middle of the edge – starting and stopping before the ends. This slightly hollow edge is easier to put the final edge on.

Controlling the lateral position of the plane to correct for square is the main aspect of edge planing that differs from face planing. Rather than gripping across the top of the stock of a wooden plane, or the knob of a Bailey/Stanley plane, place your thumb on the top of the plane and curl your fingers under to grip the sole of the plane (as shown in the photo above right).

This technique allows you to use your fingers as a fence to control and influence the lateral position of the plane, while still using your thumb for downward pressure at the beginning of the stroke.

A slight hollow in the middle is preferable. A hump in the middle will likely result in joint failure.

Begin With a Slightly Hollow Edge

Edge-jointing generally takes place after at least one face of a board has been trued up. It's a good idea to mark the true face to ensure it is consistently used as the reference surface when checking the edge for square.

If an edge is in the rough or has a significant fault, a jack plane with a significantly cambered cutting edge can be used at the outset. A heavier shaving and more pronounced camber allow it to remove saw marks and major faults quickly. This will need to be followed up with a try plane or jointer, depending on the length of the edge.

In either case, the approach is the same. In my experience, it's desirable to remove any convex bow by beginning and ending a couple of strokes short of each end. Next, full-length strokes can be taken, following the basic techniques already described, continuing until full-length shavings are produced. This can be followed by, or combined with, manipulating the lateral position of the plane to square the edge up. Finish by taking one full-length shaving while keeping the plane centered on the edge.

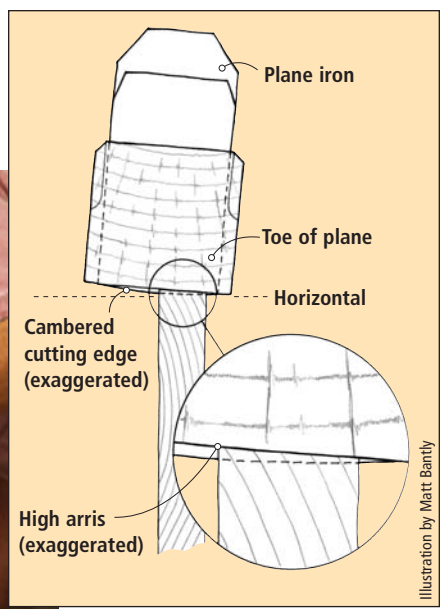
When both edges are to your satisfaction, one edge can be offered up to the other to test the fit. If it rocks, swivels in the middle or if the reference faces don't create a flat panel, adjustments will need to be made.

On shorter pieces, the slow arc of the cut of the longer try plane or jointer so closely approximates a straight line that it is possible to directly achieve a "perfect" fit. In fact, woodworkers have traditionally made use of the rapid adhesion of hot hide glue to do "rubbed joints" in these circumstances. In other words, the two pieces were rubbed together momentarily until the hide glue began to congeal and grab, eliminating the need for any clamps. I've successfully done this with aliphatic resin glue, but I feel safer using at least one clamp.

On longer pieces, woodworkers traditionally have made use of the slight concave arc produced by their planes to execute a "sprung joint." The rationale for leaving this slight hollow in the middle of the joint (to be pulled together with clamps) rests on the observation that the ends are subject to more stress through dimensional changes because of the more rapid moisture movement in the exposed end grain at the ends.

This rationale seems to have some merit, and generations of woodworkers have successfully used sprung joints. However, I am unaware of any research testing this rationale and it seems safest to minimize the clamping pressure required to pull any joint closed.

Edge-jointing by hand is not as difficult or mysterious as many might believe. While it takes some experience to feel comfortable with it, and every situation is slightly different, anyone can have early success at this task by making use of the control inherent in their planes. **PW**



After a pass or two, check your edge to see if it is square to the faces of the board. You can use the cambered iron of your plane to adjust an edge that is out of square, as shown in the illustration above.

The final test is to lay the board's mate on the edge you just planed. The top board should not pivot easily or rock on the board. If it does, you have a convex edge that needs to be removed.

MEDIA SPONSOR
Popular Woodworking®

EDUCATION SPONSOR
AMERICAN SYCAMORE WOODWORKERS' RETREAT

SAWDUST CAFÉ SPONSOR
WoodCentral

FINISHING SPONSOR
ZINSSER
QUALITY SINCE 1849

WATCH FOR SIGNS.

WoodWorks™ is on the road again.

WoodWorks

...woodworking at its best

L E A R N | S H O P | B E I N S P I R E D

SHOW INFORMATION: WOODWORKSEVENTS.COM 310.917.4408

SPRINGFIELD MASSACHUSETTS
JAN. 16 - 18, 2004

ONTARIO CALIFORNIA
JAN. 30 - FEB. 1, 2004

PHOENIX ARIZONA
FEB. 6 - FEB. 8, 2004

PRODUCT INDEX

	PAGE #	CIRCLE #	WEB ADDRESS
ADHESIVES			
Epoxyheads	8	113	epoxyheads.com
Franklin International	20	119	titebond.com
Gorilla Glue	14	124	gorillaglue.com
Norton Abrasives	16	143	nortonabrasives.com
BITS, BLADES & CUTTERS			
Amana	29	102	amanatool.com
Forrest Mfg.	41	118	stores.yahoo.com/forrestman
Freud	9	120	freudtools.com
Infinity Cutting Tools	14	126	infinitytools.com
Librawood	102	136	librawood.com
Olson	22	145	olsonsaw.com
Ridge Carbide	103	171	ridgecarbidetool.com
BOOKS			
Woodworker's Book Club	Insert	—	woodworkersbookclub.com
BUSINESS OPPORTUNITY			
Furniture Medic	37	121	furnituremedic.com
CLAMPS			
Wetzler	22	161	wetzler.com
FASTENERS			
Kreg Tool	26	132	kregtool.com
McFeely's	99	140	mcfeelys.com
Miller Dowel Co.	91	141	millerdowel.com
FINISHES & SUPPLIES			
Waterlox	102	160	waterlox.com
FURNITURE & PROJECT PARTS			
Adams Wood Products	14	100	adamswoodproducts.com
Osborne Wood Products	97	147	osbornewood.com
HAND TOOLS			
BrandNew Industries	103	107	brandnew.net
Fine Tool Journal	102	116	finetoolj.com
Glen-Drake Tool Works	24	123	glen-drake.com
Japan Woodworker	24	127	thejapanwoodworker.com
Lie-Nielsen Toolworks	91	137	lie-nielsen.com
Manny's Woodworker's Place	102	139	manny'swoodbooks.com
Tools For Working Wood	102	157	toolsforworkingwood.com
HARDWARE			
Ball & Ball	30	104	ballandball-us.com
Whitechapel Ltd.	8	162	whitechapel-ltd.com
Woodworker's Hardware	30	169	wwhardware.com
KITS & PLANS			
U-bild.com	102	158	u-bild.com
Woodcraft Plans	103	165	woodcraftplans.com
MISCELLANEOUS			
Dakota Alert	103	108	dakotaalert.com
POWER TOOL ACCESSORIES			
Beall Tool	102	105	bealltool.com
Bench Dog Tools	20	106	benchdog.com
Jointech	37	131	jointech.com
Leigh	30, 91	—	leighjigs.com
Stots Corporation	102	156	stots.com
Woodpeckers	103	166	woodpeck.com
POWER TOOLS			
Delta Machinery	15	109	deltamachinery.com
Delta Machinery	17	110	deltamachinery.com
Delta Machinery	19	111	deltamachinery.com
Delta Machinery	21	112	deltamachinery.com
Fein Power Tools	31	114	feinusa.com
Festool	25	115	festool-usa.com
Fisch	91	117	fisch-woodworking.com
General Mfg.	26	122	general.ca
Grizzly Industrial	C2-1	125	grizzly.com
JET Tools	2	128	jettools.com
JET Tools	4-5	130	jettools.com
JET Tools	7	129	jettools.com
Laguna Tools	C4	128	lagunatools.com

	PAGE #	CIRCLE #	WEB ADDRESS
POWER TOOLS			
Legacy Woodworking	103	135	legacywoodworking.com
Makita	18	138	makitatools.com
Porter-Cable	23	150	makitatools.com
Ridgid	11	151	ridgid.com
Sears Craftsman	C3	153	craftsman.com
Shopbot	22	154	shopbot.com
Smithy	28	155	smithy.com
Wilke	37	163	wilkemach.com
Woodstock Int'l	27	167	woodstockinternational.com
SAWMILLS & KILNS			
Norwood Industries	102	144	norwoodindustries.com
SHOP ACCESSORIES			
Airware America	103	101	airwareamerica.com
Modine	99	142	modine.com
Oneida Air Systems	30	146	oneida-air.com
TURNING SUPPLIES			
Packard Woodworks	102	148	packardwoodworks.com
WOOD & VENEERS			
Newton Woods	102	—	walnutwoods.net
Wall Lumber	30	159	walllumber.com
Woodfinder	102	—	woodfinder.com
WOODWORKING CATALOGS			
Amazon	20	103	amazon.com
Lee Valley Tools	28	134	leevalley.com
Rockler	24	152	rockler.com
Woodcraft	12-13	164	woodcraft.com
Woodworker's Choice	102	168	thewoodworkerschoice.com
Woodworker's Supply	8	170	woodworker.com
WOODWORKING SHOWS			
Woodworks 2003	95, 98	—	woodworks2003.com

See something you want? Need more information?

Use the Free Information Card in this issue to receive free advertiser information.

For ***faster service,*** go **online** at www.popwood.com and click "FREE INFORMATION" or **fax the card** to (585) 321-0043.

Win A Festool PS300EQ Trion Jigsaw

When you request information, you're automatically entered in our drawing to win a Festool PS300EQ Trion jigsaw. When we tested this jigsaw, it came out on top, earning our Editors' Choice. It also earned a Best New Tool of 2003 award. The Trion is just about the most expensive jigsaw available, but it really is German (and Festool) craftsmanship at its best. We'll select one lucky winner from the first 200 information requests received from this issue.

(See Advertiser Index or Product Index for circle numbers.)

ADVERTISER INDEX

ADVERTISER	PAGE #	CIRCLE #	WEB ADDRESS
Adams Wood Products	14	100	adamswoodproducts.com
Airware America	103	101	airwareamerica.com
Amana	29	102	amanatool.com
Amazon	20	103	amazon.com
Ball & Ball	30	104	
Beall Tool	102	105	bealltool.com
Bench Dog Tools	20	106	benchdog.com
BrandNew	103	107	brandnew.net
Dakota Alert	103	108	dakotaalert.com
Delta Machinery	15	109	deltamachinery.com
Delta Machinery	17	110	deltamachinery.com
Delta Machinery	19	111	deltamachinery.com
Delta Machinery	21	112	deltamachinery.com
Epoxyheads	8	113	epoxyheads.com
Fein Power Tools	31	114	feinusa.com
Festool	25	115	festool-us.com
Fine Tool Journal	102	116	finetoolj.com
Fisch	91	117	fisch-woodworking.com
Forrest Mfg.	41	118	stores.yahoo.com/forrestman
Franklin International	20	119	titebond.com
Freud	9	120	freudtools.com
Furniture Medic	37	121	furniture medic.com
General Mfg.	26	122	general.ca
Glen-Drake Tool Works	24	123	glen-drake.com
General Mfg.	26	124	general.ca
Grizzly Industrial	C2-1	125	grizzly.com
Infinity Cutting Tools	14	126	infinitytools.com
Japan Woodworker	24	127	thejapanwoodworker.com
JET Tools	2	128	jettools.com
JET Tools	4-5	129	jettools.com
JET Tools	7	130	jettools.com
Jointech	37	131	jointech.com
Kreg Tool	26	132	kregtool.com
Laguna Tools	C4	133	lagunatools.com
Lee Valley Tools	28	134	leevalley.com
Legacy Woodworking	103	135	legacywoodworking.com
Leigh	30, 91	—	leighjigs.com
Librawood	102	136	librawood.com
Lie-Nielsen Toolworks	91	137	lie-nielsen.com
Makita	18	138	makitatools.com
Manny's Woodworker's Place	102	139	manny'swoodbooks.com
McFeely's	99	140	mcfeelys.com
Miller Dowel Co.	91	141	millerdowel.com
Modine	99	142	modine.com
Newton Woods	102	—	walnutwood.net
Norton Abrasives	16	143	nortonabrasives.com
Norwood Industries	102	144	nortonabrasives.com
Olson Saw Co.	22	145	olsonsaw.com
Oneida Air Systems	30	146	oneida-air.com
Osborne Wood Products	97	147	osbornewood.com
Packard Woodworks	102	148	packardwoodworks.com
Polymeric Systems	102	149	epoxysticks.com
Porter-Cable	23	150	portercable.com
Ridge Carbide	103	171	ridgecarbidetool.com
Ridgid	11	151	ridgid.com
Rockler	24	152	rockler.com
Sears Craftsman	C3	153	craftsman.com
Shopbot	22	154	shopbot.com
Smithy	28	155	smithy.com
Stots Corporation	102	156	stots.com
Tools for Working Wood	102	157	toolsforworkingwood.com
U-bild.com	102	158	u-bild.com
Wall Lumber	30	159	walllumber.com
Waterlox	102	160	waterlox.com
Wetzler	22	161	wetzler.com
Whitechapel Ltd.	8	162	whitechapel-ltd.com
Wilke Machinery	37	163	wilkemach.com
Woodcraft	12-13	164	woodcraft.com
Woodcraft Plans	103	165	woodcraftplans.com
Woodfinder	102	—	woodfinder.com
Woodpeckers	103	166	woodpeck.com
Woodstock Int'l.	27	167	woodstockinternational.com
Woodworker's Choice	102	168	thewoodworkerschoice.com
Woodworker's Hardware	30	169	wwhardware.com
Woodworker's Supply	8	170	woodworker.com
Woodworks 2003	95, 98	—	woodworks2003.com

MEDIA SPONSOR
Popular Woodworking®

EDUCATION SPONSOR
AMERICAN SYCAMORE WOODWORKERS' RETREAT

SAWDUST CAFÉ SPONSOR
WoodCentral

FINISHING SPONSOR
ZINSSER
QUALITY SINCE 1849

WATCH FOR SIGNS.

WoodWorks™ is on the road again.

WoodWorks

...woodworking at its best

WoodWorks is revved-up for a new season of nationwide events designed to please woodworkers of all skill levels. Shop for the newest tools and supplies you won't find in retail stores, watch and learn from experts who come from around the world or be inspired as you wander through exhibition galleries of fine work. *WoodWorks* is family-friendly with many free demonstrations and activities for all ages.

Work safely & see you on the Road!

L E A R N | S H O P | B E I N S P I R E D

VISIT OUR WEBSITE: WOODWORKSEVENTS.COM 310.917.4408

SPRINGFIELD MASSACHUSETTS
JAN. 16 - 18, 2004

ONTARIO CALIFORNIA
JAN. 30 - FEB. 1, 2004

PHOENIX ARIZONA
FEB. 6 - FEB. 8, 2004

Caption the Cartoon

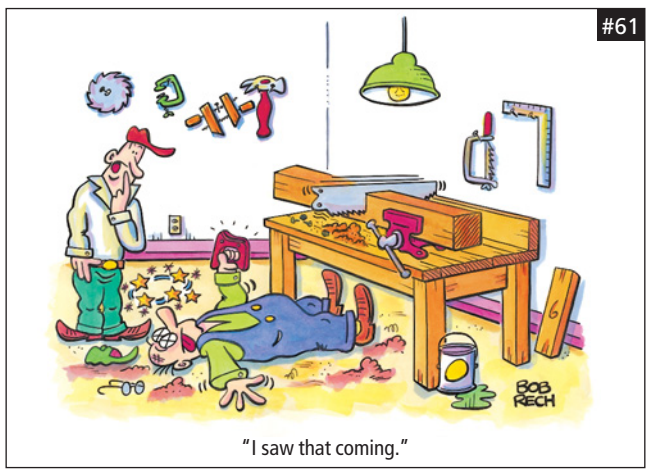
Illustrated by Bob Rech
bobrech@juno.com

We Now Take E-mail Entries!

Submit your captions for this cartoon by e-mailing them to **cartoon@fwpubs.com** (be sure to put "Cartoon Caption #63" as the subject of your e-mail) with your name, address and phone number. Or send it to us on a postcard: *Popular Woodworking*, Cartoon Caption #63, 4700 E. Galbraith Road, Cincinnati, OH 45236 by **March 1**. Winners will be chosen by the editorial staff.

This issue's winner receives Amana Tool's new Patented E-Z Dial Slot Cutter. This carbide-tipped slot cutter has no shims and no spacers. Simply dial it, lock it and cut it. One full turn of the dial changes the slot width by 1/32". The slot cutter is valued at $150! Runners-up each win a one-year subscription to *Popular Woodworking*.

Amana Tool®



"I saw that coming."

Glen Johnstone, of Armstrong, British Columbia, won our Cartoon Contest from the October 2003 issue and will receive of 20 PSI Clamp-n-Spread clamps. The following runners-up each receive a one-year subscription to *Popular Woodworking:*

"Oh gee, one nut missing two." **James Suhr, Richmond, Virginia**

"Hey, look at that. A hand tool with kickback!" **Joe Mastrosanti, Seaford, New York**

"I came, I saw, I bonkered." **Gerald R. Wheeler, Covington, Washington**

The Facts On Wax

Although a poor finish when used alone, wax excels as a polish.

Photo by Al Parrish

Wax has been used for centuries as a finish and polish on furniture and other wooden objects, but it is still a very misunderstood material.

Wax is derived from all three classes of natural materials – animal, vegetable and mineral – and some waxes are made synthetically. The practical difference in these waxes is hardness, which corresponds to their melting points: the higher the melting point, the harder the wax. For example, carnauba (pronounced "car-NOO-ba") wax has a higher melting point (about 180° F) and is harder than beeswax (150° F), which has a higher melting point and is harder than paraffin wax (130° F).

As it turns out, a melting point of about 150° F is best for wax applied to wood or used as a finish. Higher melting-point waxes are too hard to buff out; lower melting-point waxes smudge too easily. So manufacturers using a hard wax such as carnauba commonly blend it with a softer wax such as paraffin.

Because of this blending, all the liquid- or paste-wax products sold for application as wood finishes or polishes develop about the same hardness as beeswax when the solvent evaporates. The differences in these products are in color (if some is added) and in the evaporation rate of the included solvents – petroleum-distillates such as mineral spirits, and terpenes such as turpentine and citrus. The faster the evaporation rate, the sooner the wax is ready to buff off.

To get a paste wax with hardness characteristics not available commercially, you could make your own by dissolving any wax or waxes in mineral spirits or turpentine (and adding a colorant if you like). Heating the wax and solvent in a double boiler, so as not to cause a fire, will speed the dissolving.

Wax as a Finish

Until modern times, woodworkers were limited in the choices they had for a finish because of availability; as wax was widely available, it was often used. But wax isn't a good finish because it's too soft to be built up enough to protect against water. A drop left on a wax finish for even a few seconds penetrates the wax and causes a dull smudge by raising the grain of the wood.

(Don't confuse water repellency with water resistance. Water beads on waxed surfaces because of surface-tension differences. Beading doesn't mean the water isn't penetrating into the wood below.)

To repair a water smudge, simply apply more wax and buff off the excess. If this doesn't remove the smudge, try rubbing the area lightly with very fine steel wool or sandpaper that is lubricated with the wax.

Wax's weak water resistance doesn't prevent it from being a good finish choice for decorative objects – such as carvings or turnings – that won't be handled much. In fact, uncolored wax is the only finish that leaves wood looking entirely natural: The wax just adds shine. For turnings, solid wax sticks are available that make the wax easy to apply while the wood is spinning on the lathe.

It's often suggested that you can improve water resistance by applying shellac or another finish under the wax. Of course you can do this, and of course it makes for a more protective finish. But it's inaccurate to label this a wax finish. It's the other finish with a wax polish applied on top!

by Bob Flexner

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

Wax as a Polish

Though wax is not very functional as a finish, it is excellent as a polish over another finish. Unlike liquid furniture polishes, wax provides long-lasting shine and scratch resistance without smear (as long as the excess is buffed off). In addition, if the wax includes a colorant, the product can be used to fairly permanently color in nicks and scratches so they become less noticeable.

Because it's the finish underneath that provides protection for the wood, wax's weak water resistance is not a factor. You won't get a white water mark unless that finish has deteriorated. If that's the case, waxing the finish won't help much.

To maintain a wax polish, apply more wax when you can no longer buff up a shine in the existing wax. On tabletops in constant use, this might be as often as every couple of months, but on other objects, it might be as seldom as once every year or two.

You don't need to worry about wax buildup. The solvents in each new coat of liquid or paste wax dissolve the existing wax, making one new mixture; wax can't build unless you just don't buff off the excess after each application. Wax doesn't build in layers; it builds because you leave it thick.

Just as the solvents in a new coat of wax dissolve the existing wax, the solvents in liquid furniture polishes also dissolve wax. So it's best to dust a waxed surface with a damp cloth or chamois rather than with furniture polish so you don't remove the wax.

Applying Wax

Wax is very easy to apply – the effort comes in buffing off the excess.

To apply wax, put a lump of paste wax on a cloth, wrap the cloth around the wax and then move it over the surface in any direction, pressing just hard enough so the wax seeps through the cloth and coats the surface. The idea is to cover the surface entirely but deposit as little wax as possible, so removal will be easier.

Alternative application methods include dampening the cloth with water, brushing the wax into recesses or applying the wax with 0000 steel wool. Using steel wool combines the application step with that of dulling the finish surface, so use steel wool only when your intention is to abrade the surface.

To avoid a smeary appearance on a waxed surface, change to clean cloths or lamb's wool pads when you buff. Otherwise you'll just move the excess wax around, rather than remove it.

SUPPLIES

Wax sticks and imported colored waxes are available from Woodcraft at 800-225-1153 or woodcraft.com.

You can use colored rather than clear wax when there are recesses that the wax can lodge in such as around this wedged through-tenon. Clear wax will dry white in the recesses.

To remove excess wax, rub with a soft, clean cloth just after the wax has dulled because of solvent evaporation. At this point the wax should offer a slight resistance to your cloth. If there's no resistance, you've wiped too soon and you may be removing all of the wax, or you've waited too long and the wax has hardened too much.

On non-flat surfaces such as carvings, use a shoe brush for buffing. At any point if you have problems, you can apply more wax to resoften the existing wax, or you can remove all the wax by wiping the surface with paint thinner or naphtha and then start over.

The biggest problem in wax removal is smearing, which is caused by continuing to buff with a cloth or lamb's wool pad (on an electric buffer) that is already loaded with wax. Instead of transferring wax from the surface to the cloth, you're just moving the wax around. To eliminate smearing, change often to a clean cloth or lamb's wool pad.

Of course, you can leave a smear intentionally if you want. This is commonly done by antique dealers, and the smeared-wax look has become popular. Just be aware when using a colored wax that the color has the potential of rubbing off on clothes. **PW**

For non-flat surfaces or any surfaces with recesses that are difficult to get into, use a paint brush to apply the wax and a shoe brush to buff it.

WOODWORKER'S MARKETPLACE

Classified

Classified rate is $4.75 per word, 15-word minimum. Order must be accompanied by payment; ads are non-commissionable. Send to: Popular Woodworking, Barbara Gasper, 4700 E. Galbraith Rd., Cincinnati, OH 45236, Phone: 610-967-1330, Fax: 513-531-1843.

Books

WE HAVE A WIDE VARIETY of woodworking books – from small projects, to home improvement, to enhancing your woodworking skills, and more! To see our full line of books, please visit our Website at www.popularwoodworking.com/store/books!

Business Opportunities

"NEW IDEA? IMPROVE A PRODUCT?
Free Invention Assessment. Patenting, industry presentation, licensing. Free information. 1-800-501-2252; www.franklinforge.com"

Finishing Supplies/Equipment

SPRAY-ON SUEDE. Line boxes easily. Free brochure with sample. DonJer, 13142 Murphy Road, Winnebago, IL 61088; 800-336-6537; www.donjer.com

Lumber

HEART-PINE BEAMS approximately 400 years old. Various sizes salvaged from Glynn Ice Co. 1920. Brunswick, GA. 912-264-1445 http://www.treasuresfromtheicehouse.com.

Miscellaneous

POST OFFICE BOX DOOR FRONTS,
#1 $10.00 + S&H. Coin slot plates, etc. to make banks. SASE for info. Hubbert, PO Box 1415, Fletcher, NC 28732; 828-68700350.

School/Instruction

6-WEEK SUMMER WOODWORKING BOOT CAMP. Cabinetmaking fundamentals, set up your own shop. 413-527-6103; www.nesaw.com.

Software

DESIGN INTUITION: CAD redefined! Create professional blueprints MAC OS X. www.gizmolab.com/save/pw/2

Tools

WOODJOYTOOLS.COM. Fine tools to enhance your skills and ability. 508-669-5245. PO Box 204, Swansea, MA 02777.

Ironwood Logs and Mad Bulls

A quest for lumber leads to some fancy firewood, a sore butt and a full gut.

Illustration by Pat Lewis

The best parts about running a small lumber business are that I get plenty of healthy exercise and bring in a decent income – at least most of the time.

Every few weeks a local dairy farmer, Dick, dumps a spreader load of cow manure on our garden. In exchange for the fertilizer, I give him a load of clean planer shavings.

One time, he was in the spreader packing the shavings as I shoveled them out of the bin. He stuck his head up the chute just as a load of shavings came down.

After he spit out a mouthful of sawdust, he asked: "You still want that giant ironwood log?" (Dick had been promising me this log for at least 10 years.)

"My neighbor is hiring a portable bandsaw mill next week," he told me. "I'm hauling a few logs over for myself. I can take the ironwood log over, if you're interested."

Now ironwood, also known as hop hornbeam, is the hardest of the northeastern hardwoods. Its light tan color polishes to an almost-metallic shine. Even though the trees rarely exceed 8" in diameter, they can grow to almost four times that size if the conditions are good. I was intrigued.

I like working with odd woods – they can be a challenge to dry, but it really beats the monotony of using red oak, yellow poplar, hard maple and black cherry all the time.

"Sure!" I shouted down the chute. "Just let me know when it's ready to saw."

Two days later Dick called. "I felled that ironwood log. I think you better take a look before I drag it over to Bruce's place."

I drove to Dick's farm. He led me behind the barn, unlatched the electric fence gate and closed it behind us. A large bull stared at us from a distant corner of the pasture.

"He dangerous?" I asked.

Dick looked around. "Oh, that's just Frosty. He's a big marshmallow," Dick said.

Strings of saliva dripped from Frosty's jowls. He lowered his head and shook his horns. Dick continued up the hill, swinging his walking stick. I thought the "marshmallow" looked more like a rabid rhinoceros as I turned to catch up with Dick.

Dairy farmers all seem to walk oddly, with kind of a slow, loose gait. Perhaps it's from bending under cows for hours every day. Or maybe it's from being charged from behind by mad bulls. Dick was still talking as I caught up with him.

"So I say to Bruce, 'I'll just chain the log to the bucket on the tractor and …'" He paused. I thought it was odd to hear loud thunder on such a sunny day. Dick swung his walking stick at me and I quickly ducked. But he wasn't aiming for me. "Frosty, you calm down!" he shouted.

Frosty swerved like a freight train as the stick broke over his withers. "Bad bull!" Dick said as he tossed the stump of his busted walking stick toward the bull. Then he turned to me apologetically: "Soon as we're out of sight he'll leave us alone."

Frosty glared sullenly after us. Once we entered the woods, I kept a tree between Frosty and me. Dick ignored him.

"Here it is," Dick said as he stopped at the felled ironwood. The outside looked beautiful; the inside was hollow. "You still want it or should I turn it into firewood?" he asked.

"Well, have them saw it up and see what it yields, I guess," I said.

Dick casually hefted a cudgel-shaped limb from the ironwood tree. "This would make a nice walking stick," he muttered, and we headed back towards home.

During the next week I spent a couple of hours with the farmers and sawyer as they set up the mill and sawed my ironwood log. It yielded about 40 board feet of lumber, plus some really nice crotch-figured sections. Dick asked for just $10, the cost of the sawing. I wrote him a check for $30.

He'd been limping badly and he winced as I handed him the check.

"What happened?" I asked.

"Frosty," Dick said as he gingerly patted his gluteus maximus, "is now in the freezer."

I took the lumber home and dried it in the kiln with some hard maple. Some of the large blocks I sold green or partly air-dried for turning bowls. The rest cracked and ended up in the wood stove. In total, I netted about $70, a lousy $5 an hour for all my labor.

But in the end, it all balances out, even with this story. Before I left Dick's dairy farm that day I wrote a second check to purchase 50 pounds of ground beef.

It turns out that Frosty wasn't such a bad bull after all. **PW**

by Peter Sieling

Peter Sieling runs Garreson Lumber Co., a small cabinetmaking hardwood supply firm in Bath, N.Y.

IT WILL DRILL THROUGH WOOD, CONCRETE AND TIME.

Volt for volt, no cordless drills offer more torque than Craftsman's new EX drills. So with one in your hand, you can carve through just about anything. And every EX drill has the longest battery life in its class. So you'll spend less time changing batteries.

Get yours at Sears or Sears Hardware Stores. Or order by phone at 1-800-437-9686 or online only at craftsman.com.

SEARS
Good life. Great price.

CRAFTSMAN®
MAKES ANYTHING POSSIBLE®