

Finishing Tips for Outdoor Projects

AMERICAN WOODWORKER[®]

BUILD YOUR SKILLS • BUILD YOUR SHOP

Win-a-Tool
page 58

Low Cost, Big Capacity Shop Storage

**Hand Planes
Choose the
Right One**

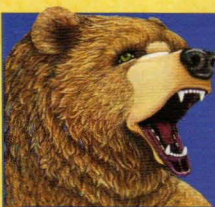
**Shop-Made
Arts & Crafts Knobs**

**Turn a Wooden
Cowboy Hat**

Relaxing Hammock Stand

Wooden Spring Tongs

**Woodworker's Showcase:
Poker Chair to Exploding Cabinet**



Grizzly Industrial

PURVEYORS OF FINE MACHINERY®, SINCE 1983!



VISIT US AT
2008 BOOTH #5435
AUG. 20TH THROUGH
AUG. 23RD

New!

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

Perfect for cutting panels and wide stock!

- Motor: 3 HP, 220V, single-phase or 5 HP, 220V/440V*, 3-phase
- Precision ground cast iron table
- Table size w/extension: 27" x 75 3/4"
- Max. depth of cut: 3 3/8" @ 90°, 2 1/4" @ 45°
- Arbor: 5/8"
- 52" rip capacity
- Approx. shipping weight: 514 lbs.

See it on
Page 23 of the
2008 Catalog.
*440V OPERATION REQUIRES
PURCHASE OF ADDITIONAL
COMPONENTS. CALL TECH.
SERVICE FOR MORE INFO.



Riving Knife
can be used with
quick release guard!
**EXTREME
SERIES**

G0651 3 HP, single-phase

INTRODUCTORY PRICE \$1695⁰⁰

G0652 5 HP, 3-phase

INTRODUCTORY PRICE \$1695⁰⁰

Includes 10" Blade
and side & rear
extension tables!
\$139⁰⁰
ANYWHERE IN
CONUS & CANADA

New!

8" Jointer w/Spiral Cutterhead!

Versatile parallelogram
table adjustment system!

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron tables
- Total table size: 8" x 76 1/2"
- Infeed table size: 8" x 43 3/4"
- 4 row spiral cutterhead
- Cutterhead speed: 5350 RPM
- Max. rabbeting depth: 1/2"
- Deluxe cast iron fence size: 35"L x 1 1/4"W x 5"H
- Approx. shipping weight: 597 lbs.



**MADE IN
ISO 9001
FACTORY!**

Spiral
Cutterhead
**BUILT-IN
MOBILE BASE**

**INCLUDES
FREE SAFETY
PUSH BLOCKS**

**EXTREME
SERIES**

G0490X

INTRODUCTORY PRICE \$1075⁰⁰

\$139⁰⁰
ANYWHERE IN
CONUS & CANADA

See it on Page 41
of the 2008 Catalog.

12" Baby Drum Sander

- Sanding motor: 1 1/2 HP, 110V, single-phase
- Conveyor motor: 1/10 HP, 110V, single-phase, variable speed 0-15 FPM
- Drum surface speed: 2300 FPM
- Max. stock dimensions: 12" wide x 3 1/2" thick
- Min. stock length: 8"
- Sanding drum size: 4"
- Sanding belt: 3" hook & loop
- Approx. shipping weight: 160 lbs.

**SIDE HANDLES
FOR PORTABILITY!**

2 ADJUSTABLE PRESSURE ROLLERS
& INDUSTRIAL-DUTY BELT



\$69⁰⁰
ANYWHERE IN
CONUS & CANADA



G0459 ONLY \$650⁰⁰

17" Heavy-Duty Bandsaw

- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 17" sq.
- Table tilt: 10° L, 45° R
- Max. cutting height: 12"
- 2 blade speeds: 1700 & 3500 FPM
- Blade size: 13 1/2" L (1/8" - 1" W)
- Euro-style roller disc blade guides
- Sealed & permanently lubricated bearings
- Approx. shipping weight: 342 lbs.

**Includes Fence, Miter Gauge
Quick Change Blade Release/
Tensioner & 1/2" Blade**

**MADE IN
ISO 9001 FACTORY!**

G0513 \$825⁰⁰ ONLY \$750⁰⁰

\$89⁰⁰
ANYWHERE IN
CONUS & CANADA



12" x 83 1/2" Parallelogram Jointer

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table size: 12 3/4" x 83 1/2"
- Cutterhead knives: (4) 12" x 1/8" x 1 3/8"
- Cutterhead dia.: 3 3/4"
- Cutterhead speed: 4950 RPM
- Max. depth of cut: 1/8"
- Max. rabbeting capacity: 3/4"
- Approx. shipping wt: 1059 lbs.

**INCLUDES
FREE SAFETY
PUSH BLOCKS**

**Handles Fold
In For Added
Safety**

G0609

ONLY \$1595⁰⁰

\$250⁰⁰
ANYWHERE IN
CONUS & CANADA



15" Planer w/Spiral Cutterhead

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

**Foot Operated Built-in
Mobile Base Provides
Versatile Positioning**



G0453Z

INTRODUCTORY PRICE \$1295⁰⁰

\$139⁰⁰
ANYWHERE IN
CONUS & CANADA

3 HP Shaper

- Motor: 3 HP, 220V, single-phase, w/reversing switch
- Precision ground cast iron table
- Table with standard wing attached: 30 1/2" x 28 1/4"
- Spindle travel: 3"
- 3 interchangeable spindles: 1/2", 3/4" & 1"
- Spindle openings on table: 1 3/8", 2 3/4", 4" & 5 1/2"
- Spindle speeds: 7000 & 10,000 RPM
- Approx. shipping weight: 357 lbs.

**Includes
miter gauge
& fence w/
hold-down
springs**



G1026 \$975⁰⁰ ONLY \$895⁰⁰

\$89⁰⁰
ANYWHERE IN
CONUS & CANADA

2 HP Cyclone Dust Collector

- Motor: 2 HP, 220V, single-phase, TEFC Class "F"
- Amps: 12.5
- Intake hole size: 7"
- Impeller: 13 1/2" steel
- Suction capacity: 1354 CFM @ 2.5" SP
- Max. static pressure: 10.4"
- Filter surface area: 96 sq. ft.
- Filter: 0.2-2 micron
- Collection drum: steel, 35 gallons
- Approx. shipping weight: 359 lbs.

**NEW! NOISE REDUCING KIT
H8166 ONLY \$39⁰⁰**

G0440 ONLY \$745⁰⁰

\$89⁰⁰
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3 GREAT SHOWROOMS!
BELLINGHAM, WA
MUNCY, PA
SPRINGFIELD, MO

Features

39 **Big Capacity Storage Cabinet**

A radically different way to build with plywood.

45 **Shop-Made Arts & Crafts Knobs**

Make your own hardware with a router and a bandsaw.

48 **Woodworker's Showcase**

An exploding cabinet, a chair that looks like a playing card and other inventive projects from our readers.

52 **Hammock Stand**

An 18-ft.-long bent lamination? No problem.

59 **Exterior Oil Finishes**

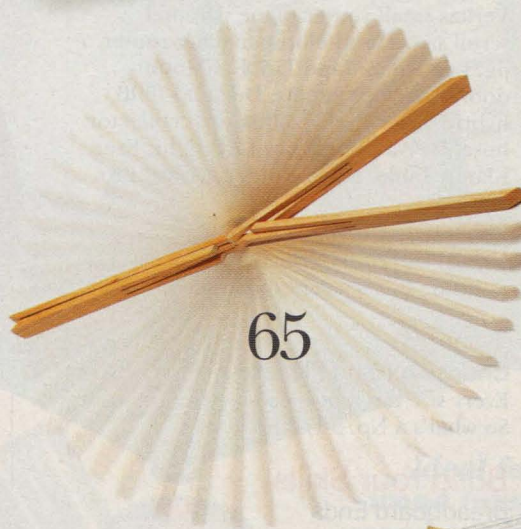
Tips for protecting your outdoor wood furniture.

65 **Wooden Spring Tongs**

Salad tongs with a clever spring action.



45



65

52



59



Departments

10 Question & Answer

Unravel the mystery of wood file names, pick the right hook angle on a tablesaw blade, prevent a bandsaw blade from popping out of the cut, and remove light rust using common materials.

14 Workshop Tips

Build a router table tenoning jig, design a mobile base that doesn't wobble, add a scale for your tablesaw's auxiliary fence, prevent your router from tipping on a dovetail jig, convert a pipe clamp to a work support, and make router wrenches more comfortable to grip.

20 Tool Nut

The Electric Carpenter is still going, 75 years later.

22 Well-Equipped Shop

Jet JFM-5 mortising machine, Carter bandsaw table zero-clearance inserts, Veritas small router plane, Dremel scroll saw, Trend ellipse-making router jig, Lee Valley Tape Tip, E-Z-Mount door-hanging systems, Delta 36-750B hybrid tablesaw, Flexadux dust collector hose, DeWalt miter saw LED light, Kreg Klamp Table, Eagle Router Wizard Pro.

29 School News

Urban Boatbuilders
Building boats teaches life skills.

32 ToolTalk

Choosing Hand Planes
Every size has a purpose.
So what's a No. 5-1/4 for?

69 Build Your Skills

Breadboard Ends
A clean look hides a sophisticated joint.

74 Turning Wood

Wooden Cowboy Hat
Watch the chips fly as a pro turns a ten-gallon hat.

86 My Shop

A new post and beam shop feels as familiar as an old barn.

88 Oops!

A toddler discovers a dust collector's remote control.





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WFA
2008
AUG. 20TH
THROUGH
AUG. 23RD
VISIT US AT
**BOOTH
#5435**

10" WET GRINDER KIT - 90 RPM

Made in Germany, this 90 RPM Wet Grinder with leather stropping wheel will sharpen just about any cutting tool to a razor sharp edge in no time at all. It is so versatile and simple to use, you'll wonder why you ever put up with dull edges before. Add the optional accessories for even greater sharpening convenience.

SPECIFICATIONS:

- 220 grit grinding wheel is specially made for wet grinding
- 90 RPM wheel speed
- Grinding wheel size: 10" dia. x 2" wide
- Water bath keeps tools cool while sharpening
- Leather stropping wheel size: 8" dia. x 1 1/4" wide

Standard equipment includes a universal jig, angle guide and polishing/honing paste.

MADE IN GERMANY!



New!

T10010

10" WET GRINDER KIT

AMAZING INTRODUCTORY PRICE

MADE IN GERMANY

\$169⁹⁵

OPTIONAL ACCESSORIES

T10023 Accessory Kit #1

Includes fixtures for sharpening small knives, large knives, scissors and axes. *Made in Asia.*



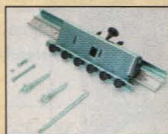
T10024 Accessory Kit #2

Includes a stone dresser and fixtures for sharpening scrapers, screwdrivers and hollow chisels. *Made in Asia.*

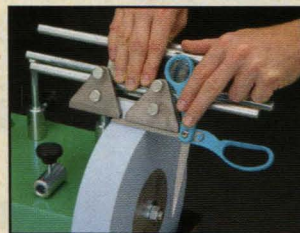


T10025 Jig for Sharpening 16" Planer Blades

Sharpens planer and jointer blades up to 16" long. *Made in Germany.*



**Ideal for
wood turners,
wood workers &
knife makers!**



T10023 Scissors Sharpening



T10024 Chisel Sharpening

MODEL T10023	Accessory Kit #1 for T10010 Grinder	ONLY \$59 ⁹⁵
MODEL T10024	Accessory Kit #2 for T10010 Grinder	ONLY \$44 ⁹⁵
MODEL T10025	Jig for Sharpening 16" Planer Blades	ONLY \$139 ⁹⁵

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EDITOR'S LETTER

It's Showtime!

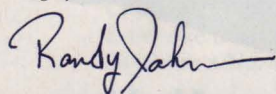
Now that school's out, my kids are busy plotting how to spend as many days as possible at both our county fair and the state fair. Although my days of spinning on the Flying Octopus with a stomach full of mini donuts and lemonade are past, I still enjoy going to the fair, taking in the various shows and exhibits...and consuming my annual corn dog.

My favorite places to visit are the 4-H and Education buildings, because that's where the woodworking projects are displayed. The projects are wonderfully varied, from grade-school kids' animal-shaped napkin holders to high school students' carefully detailed grandfather clocks, to adult enthusiasts' sophisticated furniture pieces. Even after years of building and writing about woodworking, wandering around the fair's woodworking exhibits still energizes and excites me. Encountering project builders at the fair is always a treat, because I get to hear the stories behind the pieces.

Traveling tool shows are another favorite of mine. When The Woodworking Shows visited St. Paul recently, associate editor Dave Munkittrick and I jumped at the opportunity to see some new tools, catch live woodworking demos, and talk with tool experts. To see video highlights of our day at the show, visit www.americanwoodworker.com/tws.

Now, if you want to see anything and everything related to woodworking tools and hardware, plan to attend the International Woodworking Machinery & Furniture Supply Fair (IWF) in Atlanta this summer. Show dates are August 20-23. With over 1200 exhibitors, IWF is the biggest woodworking show in the country. You can find out more by visiting www.iwfatlanta.com. If no woodworking shows are coming to your area, just sit back in your easy chair and turn to Woodworker's Showcase on page 48, to see what some of your fellow American Woodworkers have been busy building.

Enjoy the show!



Randy Johnson
rjohnson@americanwoodworker.com



PHOTO COURTESY OF IWF

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Copies of Past Articles

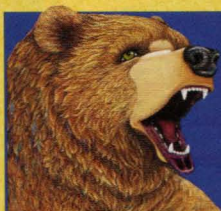
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2008
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THROUGH
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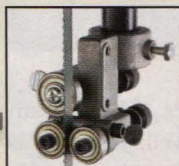
CHECK OUT OUR
SHOW SPECIALS!

**EXTREME
SERIES**

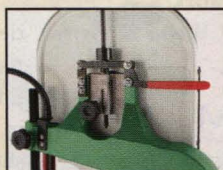
**1½ HP
MOTOR!**

GRIZZLY'S 14" EXTREME SERIES BANDSAW!

We have turned one of the most popular bandsaws into an Extreme machine. We made the stand heavier, the table bigger, and the cast iron wheels stronger to take on your toughest jobs. We've even added the Re-Saw Fence and a built-in light. And our ingenious 2-piece table extends all the way to the left yet allows the table to tilt to 45 degrees without removing anything. Just look at all these features and we think you'll agree, this is one awesome bandsaw.



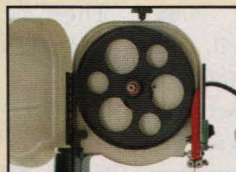
Ball Bearing Guides



Quick Release
Blade Change Lever



6" Re-Saw Fence Attachment
Included



Computer Balanced Cast Iron
Wheels w/ Lower Wheel Brush!

- Motor: 1½ HP, 110V/220V, single-phase, TEFC, 1725 RPM
- Precision ground cast iron table
- Extended table size: 14" x 20½" x 1½"
- Table tilt: 45° right, 10° left
- Floor to table height: 44"
- Cutting capacity/throat: 13½"
- Max. cutting height: 6"
- Blade size: 92½" to 93½" (⅛" to ¾" wide)
- 4" dust port
- Cast iron frame
- Deluxe heavy-duty steel stand with 2 shelves
- Upper and lower ball bearing blade guides
- All ball bearing construction
- Includes one ⅜" blade, fence and miter gauge
- Fence scale with magnifying window
- Powder coated paint
- Overall size: 67¼"H x 26"W x 30"D
- Approx. shipping weight: 252 lbs.



G0555X
**14" EXTREME SERIES
BANDSAW**
ONLY \$575⁰⁰ **\$89⁹⁹**
ANYWHERE IN
LOWER 48 STATES

6" Extension Block Kit

Increase your G0555 or G0555X 14" Bandsaw's cutting capacity to 12" high with this bolt-on 6" extension block kit. Includes all necessary hardware plus extended blade guard and 3/8" x 105" x 6 TPI blade.

H3051 ONLY \$59⁹⁵



Also Available



\$69⁹⁹
ANYWHERE IN
LOWER 48 STATES

G0555
1 HP, 14" BANDSAW
ONLY \$395⁰⁰

MESSY SHOP

We received lots of mail about "My Normal Workshop" (AW#134, March 2008). Here's a selection:

Words cannot express my thanks to the author for coming out of the closet and showing us a picture of his dirty shop. Now I can admit that I, too, am a slob at heart. Thanks to AW for having the courage to show what, in my experience, most shops look like.

Robert M Richter

That "Normal Workshop" is appalling. Wonder if the fellow's insurance agent has seen this article?

John Kautz

The electronics inside that microwave oven are probably covered by an inch of fine sawdust. With all that debris around the shop, it wouldn't take much of a spark to cause a lot of excitement.

Marshall Ketchum

I like the hospital light. That will make it easier for the Fire Marshall to determine where the blaze started.

Mark Ridl

I keep telling my wife that a clean shop produces nothing. I put my time in producing all the dirt and wood chips she dislikes so much, making the things she likes to see and have around the house and building gifts for her friends.

Bob Miller

By any measure that shop could only be described as a pigsty—if one didn't mind insulting pigs. Maintaining a clean shop is not only healthier and safer—it is more efficient. One always has time to clean—if one wants to.

Ira Penn



The author writes "Those clean shops scare me." Well, his shop is not only scary, but an extremely dangerous place to work.

Wayne E. Ferree

SIMPLY TOO MUCH

Eliminate the word "simple" from your magazine articles. This would save hundreds of gallons of ink and reams of paper.

Jack Riley

HARDWOOD SAMPLES

Here's an alternative source for a set of wood samples (Q&A, AW#133, January 2008): The Hardwood Council, www.hardwoodcouncil.com, (800) 373-9663. They have a boxed set of 20 domestic hardwood pieces for \$18. I show clients my sample box when talking about hardwood floors and kitchen cabinetry. I also bought one for my wife, who teaches first grade. She shares it with the kids in the classroom every year.

Greg S. Brown

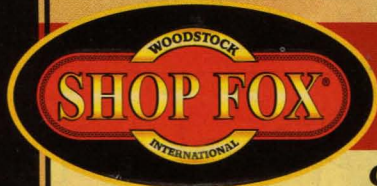
WHITHER THE PLANER SLED STOP?

Tom Caspar published a good design for planing wide boards using a sled (Q&A, AW#133, January 2008), but Tom is incorrect in recommending that the stop should go on the sled's trailing end. I put my stop on the leading end, because the feed rollers push the board forward.

Glenn MacRill

By golly, you're right! Here I've been using a sled like this for years and have never had a problem. After reading your letter I went back to the shop and planed a board that I made sure would slip. And you're correct, the feed rollers made it slide forward, not backward, on the sled. From here on out, I'll turn my sled around, and put the stop in front. -Tom Caspar



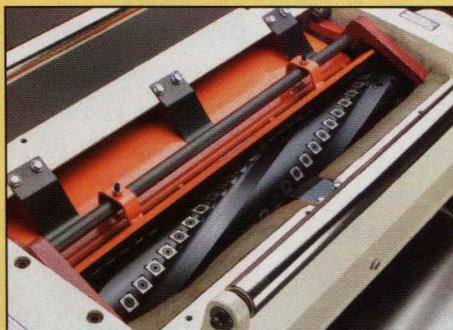


INNOVATIVE PRODUCTS

WOODSTOCK MACHINES AT **IWF**
BOOTH #5513
AUG. 20 - AUG. 23

OUTSTANDING JOINTERS & PLANERS

NOW FEATURING VERSATILE SPIRAL CUTTERHEADS!



ABOUT SPIRAL CUTTERHEADS

Spiral cutterheads reduce tear-out and leave a finish that is second to none. Our spiral cutterheads produce an incredible finish as well as reduce the sound level of the running machine! The German made indexable solid carbide inserts are extra heavy-duty and have four cutting sides that can be rotated to expose a new cutting edge when dull or chipped. The result is a consistently smooth finish with very little down time.

All **SHOP FOX®** machines are backed by a two year warranty!



New 15" PLANER with SPIRAL CUTTERHEAD

W1742S

- 3 HP, 220V, single-phase motor
- Precision ground cast iron table & extension wings
- Table measures 15" x 20"
- 15" x 8" capacity
- 2 speed gear box: 16 FPM & 30 FPM
- Carbide insert spiral cutterhead
- Pedestal mounted thermal overload safety switch

Built-in Locking Mobile Base



New 5 HP, 20" PLANER with SPIRAL CUTTERHEAD & MOBILE BASE

W1754S

- 5 HP, 220V, single-phase motor
- Precision ground cast iron table & extension wings
- Table w/wings attached measures 20" x 55 1/2"
- 2 feed speeds: 16 FPM & 20 FPM
- Carbide insert spiral cutterhead
- Pedestal mounted magnetic safety switch

Built-in Locking Mobile Base



New 6" SPIRAL CUTTERHEAD JOINTER with Parallelogram Adjustable Beds

W1755S

- 1 1/2 HP, 110V, single-phase motor
- Precision ground cast iron table measures 6" x 55 1/2"
- Carbide insert spiral cutterhead
- Rabbeting capacity: 1/2"
- Quick adjust levers
- Top mounted switch

Built-in Locking Mobile Base



8" JOINTER with SPIRAL CUTTERHEAD

W1705

- 2 HP, 220V, single-phase, TEFC motor
- Precision ground cast iron table measures 9 1/4" x 70"
- Center mounted cast iron fence tilts 90° to ±45°
- Carbide insert spiral cutterhead
- Rabbeting capacity: 1/2"
- Handwheel table adjustment

Carbide Insert Spiral Cutterhead



Pedestal Mounted Switch

New 8" SPIRAL CUTTERHEAD JOINTER with Parallelogram Adjustable Beds

W1741S

- 3 HP, 220V, single-phase, TEFC motor
- Precision ground cast iron table measures 8" x 76 1/2"
- Carbide insert spiral cutterhead
- Rabbeting capacity: 5/8"
- Quick adjust levers
- Large center mounted cast iron fence

Built-in Locking Mobile Base



Extra Long Infeed Table

New 12" HEAVY-DUTY SPIRAL CUTTERHEAD JOINTER with Parallelogram Adjustable Beds

W1744S

- 3 HP, 220V, single-phase, TEFC motor
- Precision ground cast iron table measures 13" x 83"
- Carbide insert spiral cutterhead
- Rabbeting capacity: 3/4"
- Deluxe cast iron fence
- Recessed handwheels with retractable handles

Pedestal Mounted Switch



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WHOLESALE ONLY

GRIT AND SWARF

In reference to the "Ultimate Sharpening Station" (AW#131, Oct. 2007), there is no way that the average woodworker is going to be able to keep the grinder's grit and swarf from contaminating the adjacent work surfaces or sharpening stones without meticulous cleaning after every grinding operation.

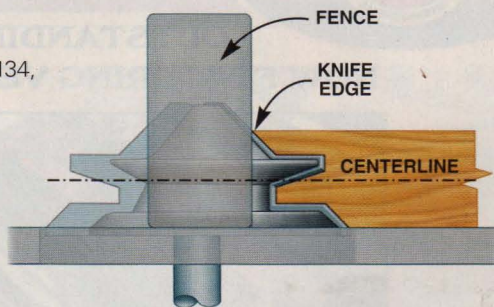
Having worked with machines for 40 years, I can tell you that this contamination is almost impossible to completely cleanup, even with the best vacuum. That's why grinders, sanding belts, and sanding discs are in relatively isolated areas in most machine shops and machine assembly areas.

Bill Camacho

Good point, Bill—that's why the sharpening station's honing surface is removable and stored in a side pocket.

CORRECTIONS

In "Lock Miter Joint" (AW #134, March 2008), the centerline shown in Fig. A is approximately 1/16-in. too low. Here's where it should be, for any double lock miter bit.



In "Do-It-All Combo Brush and Drum Sander" (AW#135, May 2008), the price of the SuperMax SuperBrush SB13 was incorrect. It should be \$3,800. Other updated prices: the Flatter-style brush head (\$950), the Wire or Nylon brush head (\$950), and the Drum sander head (\$300).

In our review of the CompuCarve computer-controlled carving machine (AW#132, Nov. 2007), we misspelled the name of the firm that developed the machine. The correct spelling is LHR Technologies.

DROP US A LINE

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Send e-mails to aweditor@american-woodworker.com. Send postal mail to AW Mailbox, American Woodworker Magazine, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.



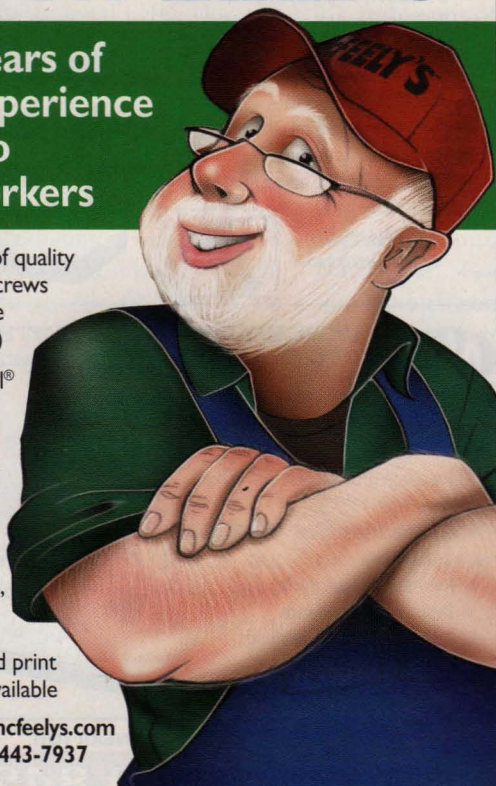
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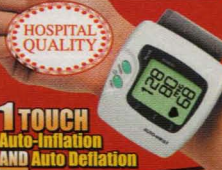
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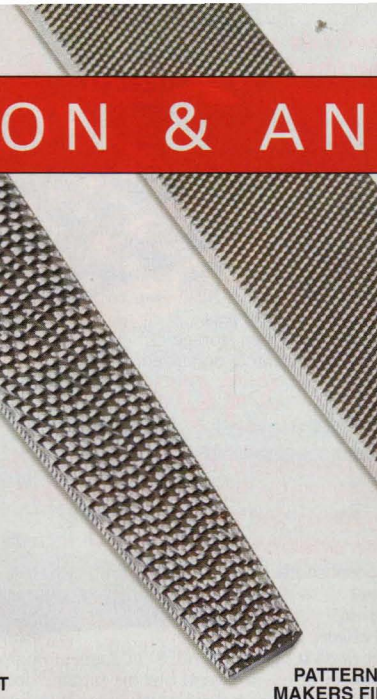
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QUESTION & ANSWER

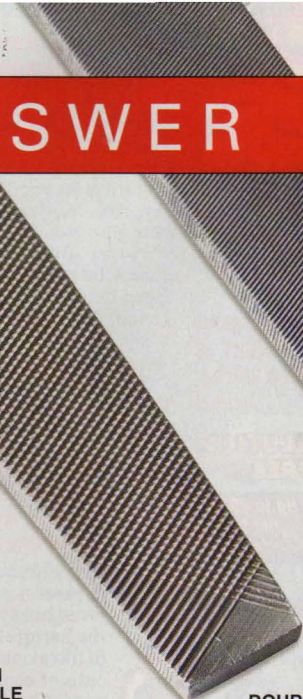
by Tom Caspar



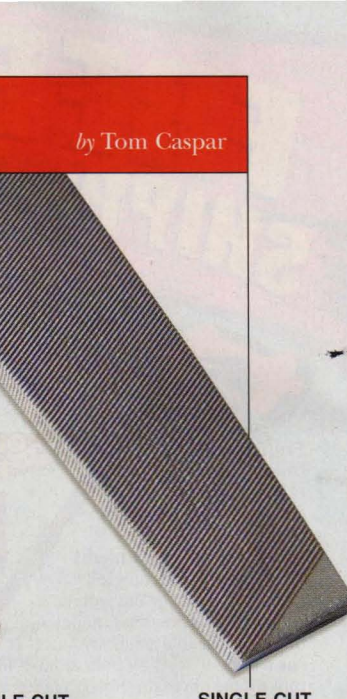
CABINET
RASP



PATTERN
MAKERS FILE



DOUBLE-CUT
FLAT FILE



SINGLE-CUT
MILL FILE

Filosophy

Q What are different kinds of files used for?

A There are four kinds that you'll find handy in your woodshop:

- **Cabinet Rasp.** Use this coarse tool with a heavy pressure to rapidly remove wood, such as shaping a rounded leg. Its teeth are individually formed and separate from one another, leaving behind a rough surface. A Wood rasp is similar to a Cabinet rasp, but has coarser teeth.

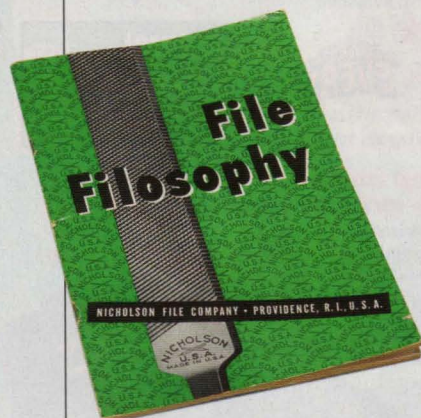
- **Pattern Makers File.** Use this specialist's tool with a light pressure to remove wood fast. It leaves a much smoother surface than a Cabinet rasp. Its teeth are also individually formed, but set in wavy rows.

- **Double-cut Flat File or Half Round File.** These tools, used with a heavy pressure, remove wood slower than a Cabinet rasp or Pattern Makers file. They leave a relatively smooth surface that requires further sanding. Both files have two rows of teeth set at an angle to each other. Flat files are rectangular in cross section; Half-round files have one flat side and one curved side.

- **Single-cut Mill File.** Used with a light pressure, this tool produces a very smooth surface. It's generally used on metal rather than wood, such as sharpening a scraper blade. It has a single row of teeth. Mill files are rectangular in cross section.

When buying a Flat, Half Round or Mill file, notice its *cut* and *length*. Both factors affect the coarseness of its teeth, and thus the smoothness of the surface it leaves behind. In order of coarseness, the various cuts you'll find are: Coarse, Bastard, Second Cut, and Smooth. A Flat Bastard file, for example, cuts faster but makes a rougher surface than a Flat Smooth file. Generally you'll find a file's cut marked just above the tang, next to the maker's name.

Within each type of cut, the longer the file, the coarser are its teeth (see photo, left.) A 10 in. Single Cut Mill Bastard file, for example, has coarser teeth than an 8 in. Single Cut Mill Bastard file. Files range from 4 in. long to 16 in. long, in 2 in. increments. Files that are either 8 or 10 in. long are about the right size for most jobs.



For more information, see the "Nicholson Guide to Files and Filing," a PDF available at www.cooperhandtools.com/brands/nicholson_files/. It's based on File Philosophy, an out-of-print 48-page booklet published in many editions since 1878 by the Nicholson File Co. Old copies are available through used-book stores and on the web.



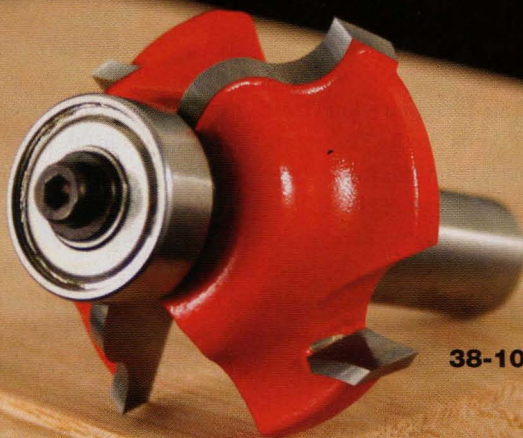
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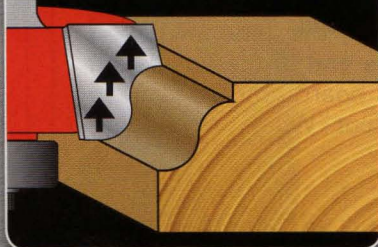
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Freud's New Quadra-Cut™ 4 Cutter Design

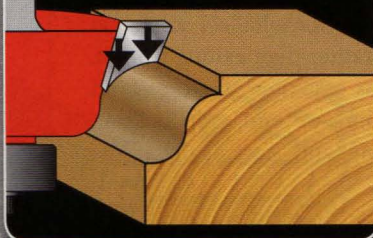


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What's the Hook?

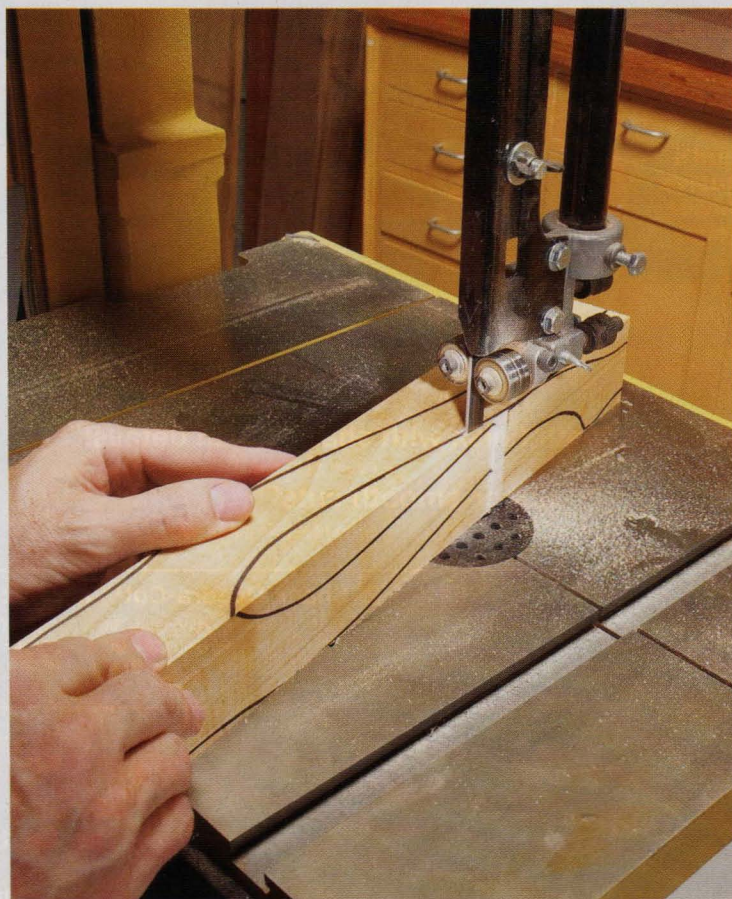
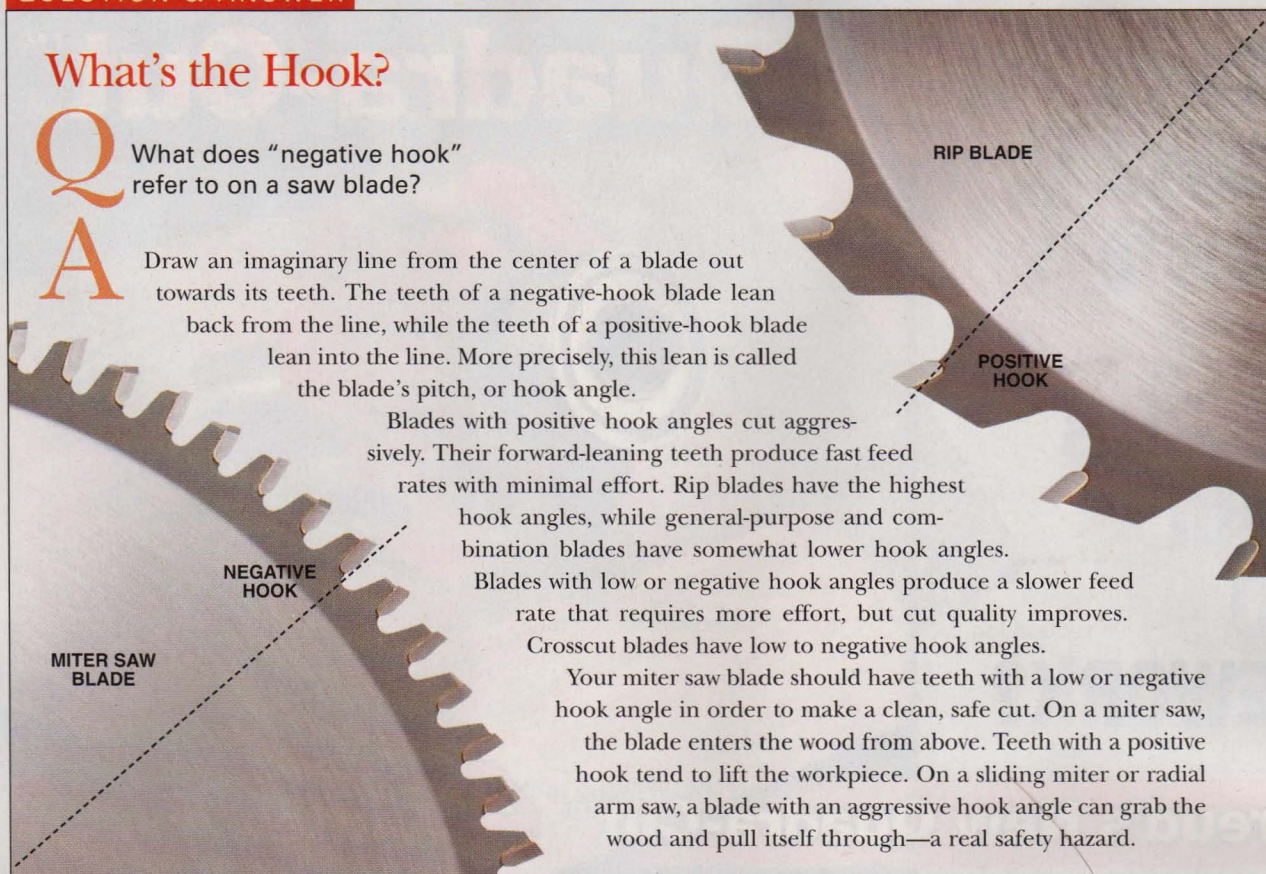
Q What does "negative hook" refer to on a saw blade?

A Draw an imaginary line from the center of a blade out towards its teeth. The teeth of a negative-hook blade lean back from the line, while the teeth of a positive-hook blade lean into the line. More precisely, this lean is called the blade's pitch, or hook angle.

Blades with positive hook angles cut aggressively. Their forward-leaning teeth produce fast feed rates with minimal effort. Rip blades have the highest hook angles, while general-purpose and combination blades have somewhat lower hook angles.

Blades with low or negative hook angles produce a slower feed rate that requires more effort, but cut quality improves. Crosscut blades have low to negative hook angles.

Your miter saw blade should have teeth with a low or negative hook angle in order to make a clean, safe cut. On a miter saw, the blade enters the wood from above. Teeth with a positive hook tend to lift the workpiece. On a sliding miter or radial arm saw, a blade with an aggressive hook angle can grab the wood and pull itself through—a real safety hazard.



Blade Pop-out

Q When cutting a shallow angle, my bandsaw blade won't follow the line. When I approach the end of the line at the edge of the board, the blade pops out of the cut. What am I doing wrong?

A A fresh, sharp blade shouldn't have this problem, but even a moderate amount of use can dull a blade sufficiently to cause it to pop out. The best solution is to make a habit of beginning the cut at the shallow angle, as shown at left, rather than exiting from it. If your cut has a shallow angle at both ends, start from one end, stop halfway, back out slowly, and start again at the other end.

Rust Removal

Q My shop's roof leaked and I've got a light coating of rust on my tools. How can I restore them?

A There are lots of ways to remove rust, but here's one that's inexpensive and uses materials you probably already have. Basically, you sand off the rust using light oil as a lubricant. WD-40 works great. It floats the swarf (the metal particles) so the paper doesn't clog up. Use a fine paper, such as 320-grit. Standard paper is OK; it doesn't have to be the wet/dry type.

The process is a bit messy, though, so you won't want to contaminate a good sanding block. Make a throwaway block from scrap and glue a piece of corrugated cardboard to its bottom (for all sanding, a block with a slight cushion works better than one with a hard bottom). Wipe up the rusty oil residue with paper towels.



American Woodworker JULY 2008 13



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edited by Tim Johnson

Terrific Tip!

ROUTER TABLE TENONING JIG

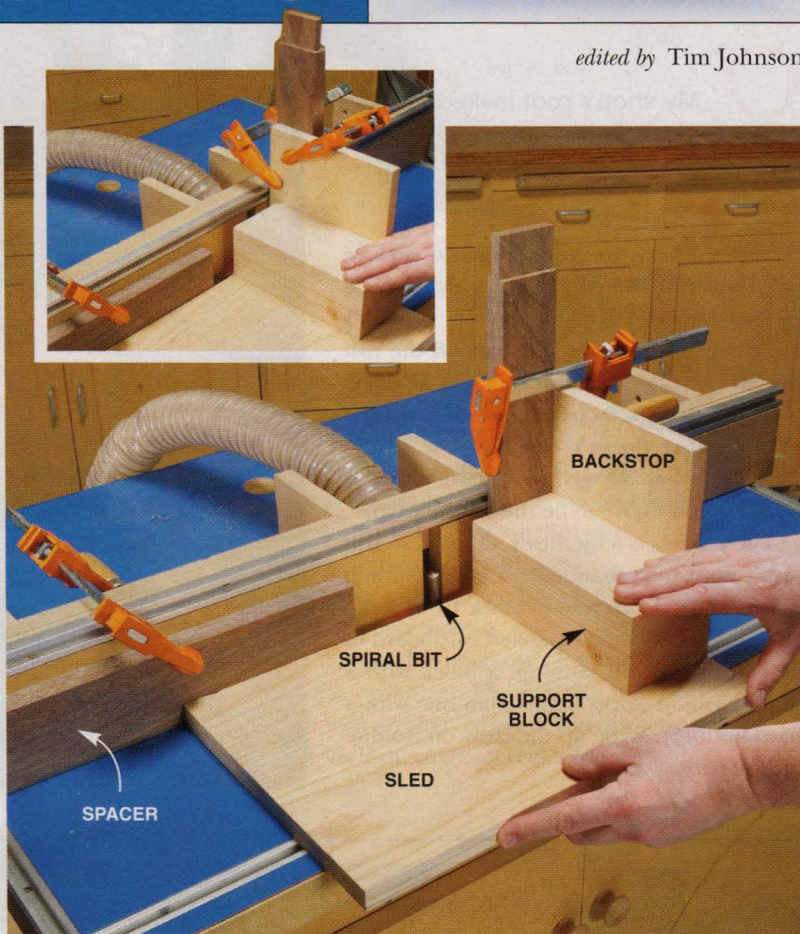
My simple tenoning jig produces flawless tenons in minutes—even haunched tenons. The jig consists of a sled with a glued-on support block and a

screwed-on sacrificial backstop. The sled and support block are flush on the work side and square. The back-

stop protrudes by the thickness of the workpiece, minus 1/16-in.

Before using the jig, install an upcut spiral bit and set its height to the tenon's length. Position the fence and clamp a spacer that's the same thickness as the workpiece against the outfeed end.

To rout the tenon cheeks, clamp the workpiece in the jig, flush against its support block and backstop. Then rout from right to left, while pressing the



sled against the outfeed spacer and the workpiece against the infeed fence. I usually make a light scoring pass before routing full-depth: I bear the sled against the spacer, but pull the workpiece away from the fence and guide it freehand through the cut.

To rout the tenon ends, I install the workpiece behind the stop (top photo). To create a haunch, I place an appropriately-thick shim beneath the workpiece before I clamp it to the stop.

Joseph Scharle

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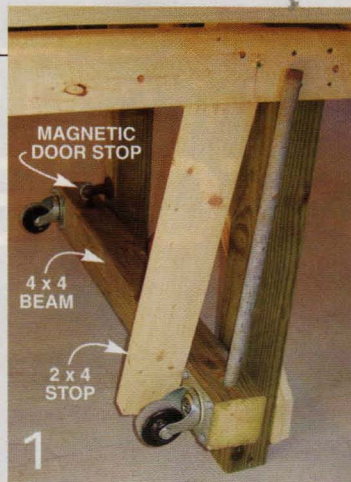
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Bob Turan

Source

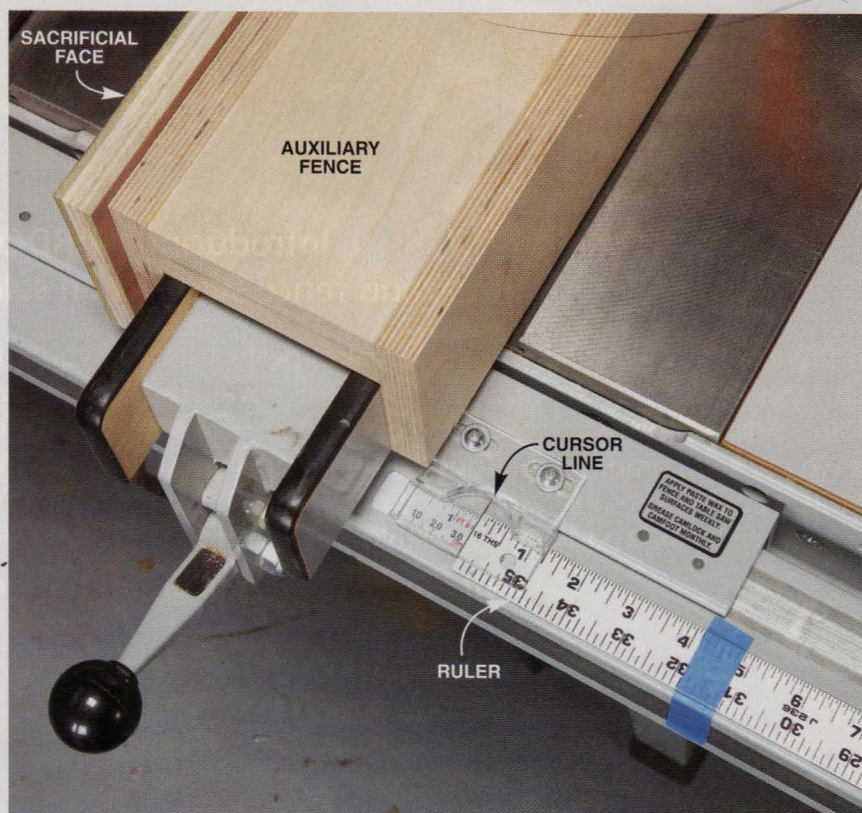
Woodworker's Hardware, www.wwhardware.com, 800-383-0130, Magnetic Door Holder & Stop, #SSMDH26DB, \$7.

AUXILIARY FENCE SCALE

I have difficulty making accurate measurements when I install my auxiliary fence, because the plywood is a weird thickness. My solution is to create a new scale based on the plywood.

Zero the sacrificial face next to the blade and slide a thin ruler under the plastic cursor (the ruler must rest under the cursor without touching). Once the cursor line is aligned with the ruler's zero mark, tape the ruler in place. Make sure the ruler is accurately scaled—inexpensive rulers may be inaccurate.

Rich Flynn



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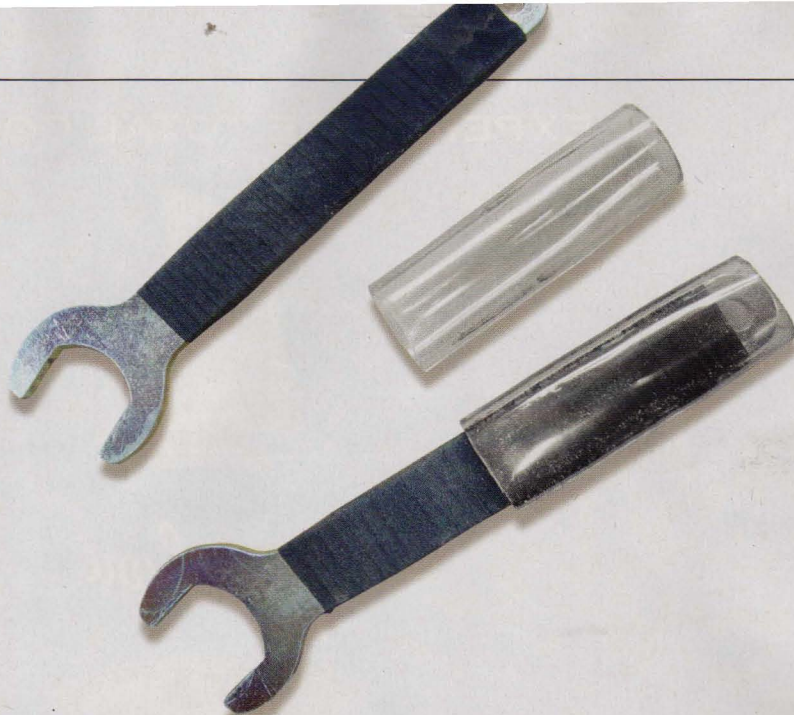
SUPPORT CLAMP

To support a large panel while I drilled holes in the edge for dowels, I added a second sliding clamp jaw to a pipe clamp and clamped it to the edge of my workbench.

Steve Keller



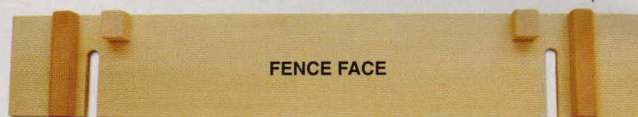
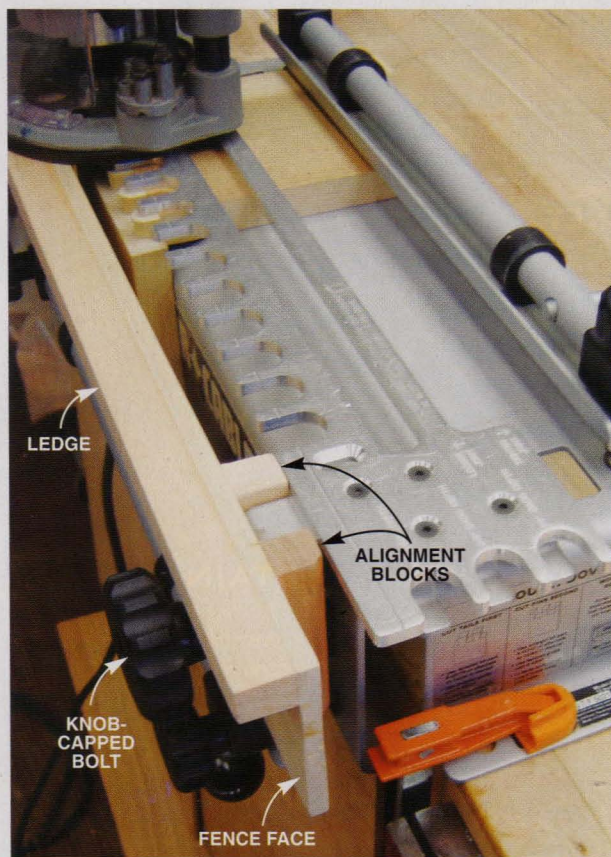
STAFF



EZ-GRIP ROUTER WRENCHES

I own several routers and they all have thin wrenches that are awkward to hold. To avoid frustration, I made the handles thicker by housing them in transparent plastic tubing from the hardware store. To keep the tubing in place, I wrapped the handles with athletic tape first.

Serge Duclos



DOVETAIL JIG SUPPORT FENCE

I love my dovetail jig except for one thing: If I forget to hold the router flat, it can tip backward off the front of the jig and ruin the job.

To solve the problem, I made my own L-shaped support fence that sits flush with the top of the jig. A 7/8-in.-wide ledge glued to the fence's 3/8-in.-thick face creates the "L" shape. Slots in the face allow slipping the fence over the two knob-capped bolts that secure some of the jig's templates. To lock the fence in position, I just tighten the knobs. Alignment blocks make installation easy and prevent accidental nicking of the jig's brackets.

Jim Reinhart

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THE ELECTRIC CARPENTER

As a teen, many years ago, I learned wood-working on my father's remarkable combination machine, The Electric Carpenter. It's a 14-in. band-saw, 10-in. tablesaw, 6-in. jointer, 4-ft. lathe, 3/4-in. shaper, and a mortising machine all rolled into one, belt-driven by a single motor. It was built in 1930 by the American Floor Surfacing Machine Co. of Toledo, Ohio, and sold for \$375.

The Electric Carpenter has served my family well for over 75 years. My Dad upgraded the motor to 1-hp in the early 40's and replaced the band-saw's jack shaft and bearings in the 60's. I've since passed the machine on to my brother-in-law, Dan Edgar, who has made four tables, two bookshelves and a four-drawer chest with it. He's promised to be extra careful, because this antique has virtually no safety guards—not even a cover under the table for the tablesaw blade (see bottom photo).

Some unsung hero really put a lot of thought into designing The Electric Carpenter. No part of the machine must be removed to run another operation—but you do have to switch belts.

Every part of the machine has a clever feature. The upper half of the bandsaw, for example, is hinged so it can be folded over when making wide cuts on the tablesaw. The tablesaw's arbor is very simple and trouble-free: it doesn't tilt or travel up and down. To lower the blade's height, you lift the table, which pivots at the far end (see bottom photo). (The table doesn't tilt, so you can't make beveled cuts.) The shaper spindle has a clutch that enables it to run clockwise or counterclockwise, depending on the grain direction. The shaper cutters are shaped like a butterfly, with cutting edges facing both directions. The mortising attachment employs a long handle and a scissor action to push the workpiece into the chisel.

The Electric Carpenter is a superb machine. If anybody has one that still works, I'd sure like hear about it! Just contact me through the Tool Nut (see box below).

Monroe J. Mechling

We'll pay you \$100 to share your favorite tools, new or old, with fellow readers. Contact us by e-mail at toolnut@americanwoodworker.com, or mail us at American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include digital photos of your tool if possible.



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THE WELL-EQUIPPED SHOP

MUST-HAVE MORTISER

The massive “X-Y” table on Jet’s new JFM-5 floor model mortiser (\$999) makes mortising a breeze. One hand-wheel moves the table laterally; another moves it forward and back. As a result, you can position workpieces and chop mortises much faster than on benchtop models.

Everything about the 291-lb. JFM-5 is big. The 20-in.-long table and 3-1/2-in.-high fence are machined from a single casting, so they’re dead square. The tables travel on dovetailed ways and features precise rack-and-pinion adjustment. The generously-sized hold-down has a pivoting handle. You make coarse adjustments in-line before pivoting it 90 degrees for clamping. The head travels 8 inches and features a quick-adjust depth-stop system. The extra-long handle provides excellent leverage and the 1-hp., 1725 rpm motor has the power to drive large mortising bits. The JFM-5 comes with 5/8 in., 3/4 in. and 1-1/8 in. chisel bushings, a chuck extension adapter and an adjustable stop for repeated cuts.

Source

Jet Tools 800-274-6848, www.jettools.com
JFM-5 Floor Mortiser with Closed Stand, \$999.



BANDSAW INSERTS

If there’s one thing that can really slow you down when bandsawing, it’s stopping the blade to fish out little cutoffs that get stuck in the table insert. The answer: a zero-clearance insert, similar to one on a tablesaw. Carter now sells blank inserts for Delta and Jet 14 in. saws, three to a package so you can swap them out for different-sized blades. They’re plastic, so they can’t dull your blade’s teeth. They’re a practical, convenient, and inexpensive upgrade to your saw.

Source

Carter Products, www.carterproducts.com, 616-647-3380, AccuRight Bandsaw Table Inserts, \$10 for three.



MINI ROUTER PLANE

Sometimes setting up a big electric router to do a small job is like swatting flies with a backhoe. What you may prefer, of course, is a simple hand tool that gets the job done with a minimum of fuss. The Veritas Small Router Plane, is just such a tool: elegant, well-designed, and a pleasure to use.

So what would you actually use it for? Hinge and lockset mortises, for example. Often, you only have a few of these to make, so using a chisel to outline the mortise and a router plane to clean out the mortise’s bottom can be faster than using power tools. Plus, you can easily make square corners.

The Veritas small router plane is a much nicer tool than the old Stanley 271, which it’s modeled after. Its base measures 3-1/4 in. wide by 2-1/4 in. deep. The blade may be reversed for bullnose work.

Source

Lee Valley, 800-267-8735, www.leevalley.com, Veritas Small Router Plane, #05P38.50, \$49.



TOP NOTCH FEATURES AT A GREAT VALUE

The new Dremel Scroll Station model 1830 combines the most sought after scrolling features into one affordable tool. Up-front user controls for variable speed, power on/off and blade-tensioning help novice and master scrollers alike make precise cuts for fretwork, intarsia, marquetry and inlay. The 18-in.-deep throat and 20 in. by 14 in. work surface provide ample swing room and support for large projects. In addition the blade can be rotated 90 degrees to allow for an infinite cutting length. A tool-less blade holder makes for fast and easy changes of the 5-in. pin- or plain-end blades.

Source

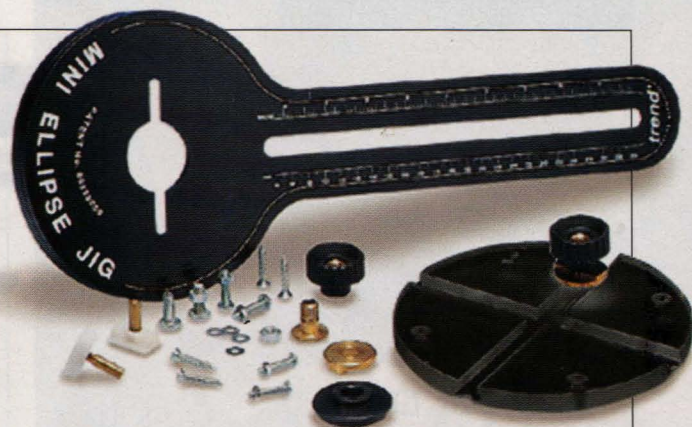
Dremel, www.dremel.com, 800-437-3635, Scroll Station model 1830, \$200.

THE TAPE TIP

Here's an inexpensive gadget to soup up your tape measure. It's an ingenious plastic tip that instantly snaps onto the tape's end using rare earth magnets. The Tape Tip helps solve many small measuring problems. For starters, it aids in making accurate inside measurements when you're squaring a drawer or a case, as shown at right. Put a nail through a hole in the tip's center and you can turn your tape into a compass. Turn the tip around, hold a pencil against its concave surface, and your tape's now a marking gauge. There's plenty more that the Tape Tip can do: experiment and have fun!

Source

Lee Valley, www.leevalley.com, 800-871-8158, Tape Tip, #50K58.01, \$4.



ROUT ELLIPSES WITH EASE

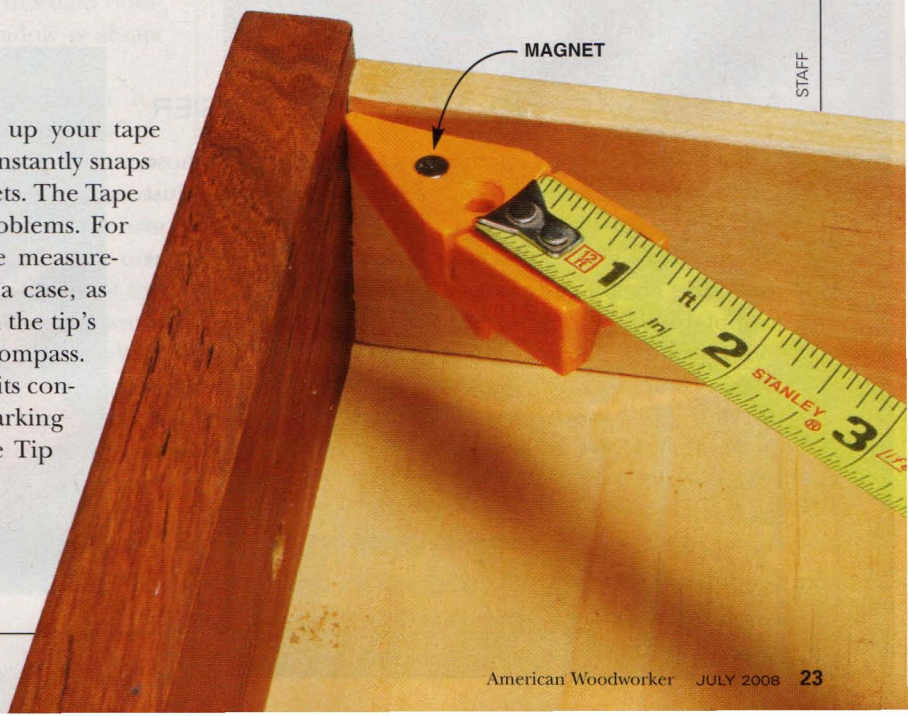
Two new jigs from Trend make routing ellipses as easy as routing circles. Actually, these jigs rout circles, too. The Mini Ellipse Jig (shown above) is designed for use with a light-duty plunge router. It allows routing ellipses from 9-in. by 7-in. to 23-in. x 20-1/2-in. Install the pencil plug and you can also use the jig to draw ellipses and circles.

The jig consists of a plate that attaches to the router and a cross frame that attaches to the bottom of the workpiece. A pair of pivot points that slide in the cross frame's perpendicular T-slots connect these two pieces. To determine the size of the ellipse, you simply adjust and lock the pivot points on the router plate.

The Ellipse Jig works the same way, but features an aluminum cross frame and trammel rods in lieu of the Mini's router plate. It allows routing ellipses up to 72 in. by 66 in.

Source

Trend Routing Technology, www.trend-usa.com, 270-872-4674, Mini Ellipse Jig, ME/JIG, \$149, Ellipse Jig, ELLIPSE J/A, \$239.





STAFF

HANG A DOOR IN A MINUTE

Cabinetmakers use shop-made or commercial drilling jigs to speed the mounting of Euro hinges on their doors. What sets the EZ-Mount apart from basic drilling jigs is that it also holds the hinge in place, allowing you to use the hinge plate itself as a guide. With the EZ-Mount you can drill the pilot holes with one drill and screw the plate to the cabinet with another. The jig comes as a set of two: one jig for inset doors and one for full overlay doors, and are available for Salice and Blum brand hinges.

Source

EZ-Mount Hardware Mounting Systems, www.ez-mount.com, EZ-Mount #SSP-0105 for Salice stamped steel clip-on hinge plate BAV3L09 or BAV3L69; EZ-Mount #SCP-0105 for Salice cast steel clip-on hinge plate BAR3R09 or BAR3R69; EZ-Mount #BSSP-0104 for Blum stamped steel clip-on hinge plate 173H7100 or 173H7130; EZ-Mount #BCCP-0104 for Blum Cast steel clip-on hinge plate 175H7100, 175H7130 or 175H7190; all models \$20.

HIGHLY COMPRESSIBLE HOSE MAKES MOVING MACHINES EASIER

The Flexadux PVR-4 is a medium weight clear PVC hose reinforced with a spring steel wire helix. Designed for dust and light woodchip collection, the ribbed construction on the outside of the hose leaves a smooth interior wall that minimizes airflow resistance. The clear plastic allows you to spot an obstruction should the hose get plugged. The PVR-4 features exceptional compressibility and flexibility. With a compression ratio of 4:1, the hose is less likely to interfere when moving machines for storage or use. The Flexadux Flexadux PVR-4 hose is offered in 2 in. to 12 in. I.D. sizes and standard 10, 25, and 50 ft. lengths.

Source

Flexadux, www.flexadux.com, 800-343-0428, Flexadux PVR-4, \$4 per foot.



FEATURE-PACKED HYBRID

Want a cabinet saw but don't have 220-volt power? Here's the next best thing: a hybrid saw, which only requires a standard 115-volt outlet. Delta's new 36-750B hybrid saw has a 1-3/4-hp motor, which for all practical purposes gives you the most power you can get from a 115-volt circuit.

This saw has all the features we've rated most important in a hybrid. The 36-750B comes with a top-of-the-line Biesemeyer fence, 50 in. rails, two cast iron wings, and a miter gauge that's more accurate than the kind that's standard on most saws. Its bar has expansion slots for fine-tuning the fit in the table's slot and positive detents for five commonly used angles. The saw's blade tilts left, which helps avoid kickback, and the OFF switch has an oversized paddle, making it easier to locate in a pinch. Hybrid saws have enclosed cabinets to help contain sawdust and have a smaller footprint than a contractor's saw, whose motor sticks out the back.

Source

Delta Machinery, www.deltaportercable.com, 800-223-7278, 10" Deluxe Hybrid Saw, #36-750B, \$1,400.





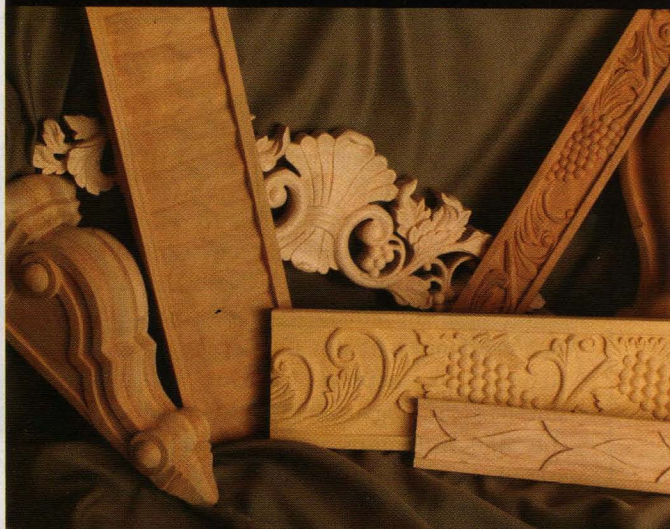
THE SHADOW KNOWS

Miter saws equipped with lasers to indicate the line of cut have become commonplace, but DeWalt has a new twist: instead of a laser, DeWalt has developed a super-bright LED light to cast a distinct shadow of the blade on your workpiece. Like many lasers, the shadow shows you exactly where the blade is going to cut. But there's a catch with lasers: most of them only show you where one side of the blade will cut. The shadow shows the entire kerf, so it doesn't matter whether your waste piece is on the left or right side of the blade. And unlike some lasers, this light doesn't have to be aimed—the blade's shadow is always right on the money.

DeWalt calls this feature the XPS Worklight. It's available as an accessory for the DW713, DW715, DW716 and DW718 miter saws. Mounting is a cinch; it only takes a few minutes. The light has a separate on/off switch, so the blade doesn't have to be running while you position your workpiece. The one downside—and this is really a minor point—is that the blade must be placed an inch or so above the workpiece for the shadow to pop into sharp focus. DeWalt says that the light bulb should last up to 5 years. That's great, because even if you don't use the shadow technique, the light really illuminates the cut zone, making it much easier to see a fine pencil mark on your work.

Source

DeWalt, www.dewalt.com, 800-433-9258, Miter Saw LED Worklight System, #DWS7085, \$60.



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KREG KLAMP TABLE

If you've ever struggled to get perfectly flush pocket-screw joints, Kreg's new Klamp Table may be the perfect helping hand you need. The Klamp Table combines several of Kreg's Klamp System components into one amazing clamping station. In addition to the table, you get Kreg's Bench Klamps, Klamp Blocks and Klamp Trak sections. Utilizing a simple technology called Inter-Lok, the Bench Klamps can be quickly added almost anywhere you need them.

You can also buy Klamp components separately: add a Klamp Trak to the entire length of your workbench and start clamping where you've never been able to clamp before.

Source:

Kreg Klamp Table, 800-447-8638, www.kregtool.com, \$400
Includes 2 Bench Klamps, 5 Klamp Blocks, 2 lengths of Klamp Trak, a durable melamine surface, 4 leveling feet, and assembly hardware.



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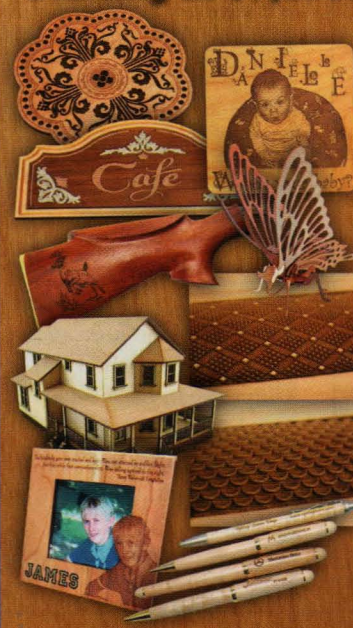
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BETTER BASEPLATE

Yes, the world does need a better router baseplate. How about one that's a terrific guide for cutting dados, rabbets, grooves, mortises and circles? The Router Wizard Pro from Eagle Jigs is just the ticket. It's composed of two interlocking plates: an upper plate, which fastens to your router in place of its standard baseplate, and a lower plate, which slides inside the upper plate. The lower plate's position is adjustable side-to-side using a rack-and-pinion mechanism.

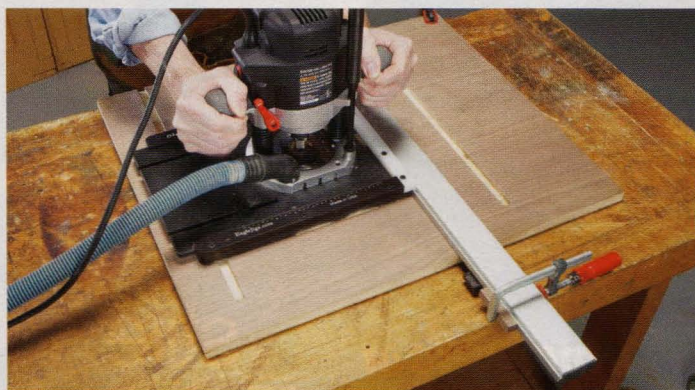
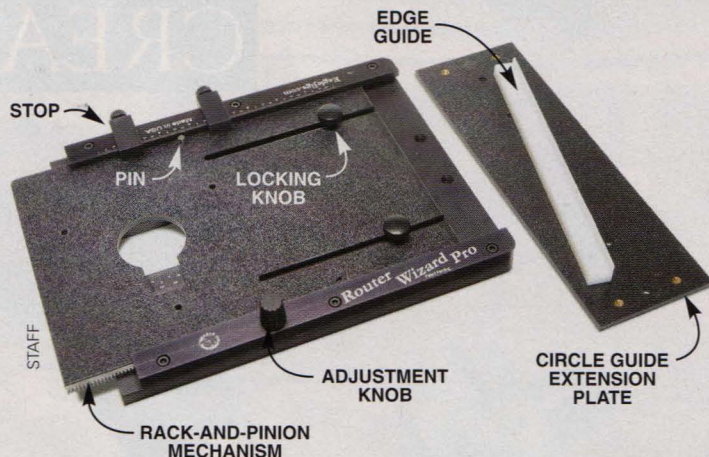
The Router Wizard Pro delivers accuracy when you need it the most. Take cutting shelf dados, for example. Here, a little bit of wander in the cut can really ruin your day. This baseplate solves that problem by using a white nylon edge guide whose lip fits precisely into the groove of a straightedge clamping guide. (A clamping guide is not provided with the Router Wizard Pro.) Three different edge guides are available to fit various clamping guides. Fasten the edge guide to the Router Wizard Pro, place it in the clamping guide's groove, and you're all set to dial in the distance from the dado to the fence using the knob connected to the rack and pinion mechanism. Tighten two locking knobs and you're ready to go.

For making stopped grooves or mortises, you adjust two stops on the lower plate. They butt against a pin located on the upper plate. For making circles, you attach one or more extension plates to the main baseplate, install a pin or screw into the extension to make a pivot point, and dial in an exact distance using the adjustment knob, as above.

This is just a small taste of what the Router Wizard Pro can do. For videos showing more applications, visit the website below.

Source

Eagle Jigs, www.eaglejigs.com,
816-331-6093, Router Wizard Pro,
#EJRW-02, \$210.



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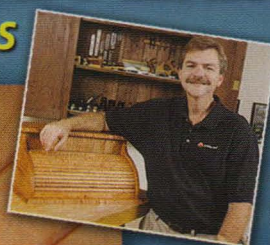
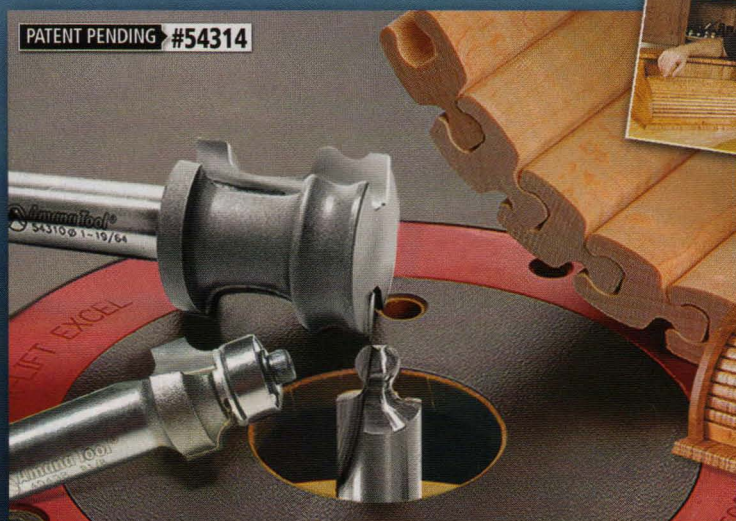
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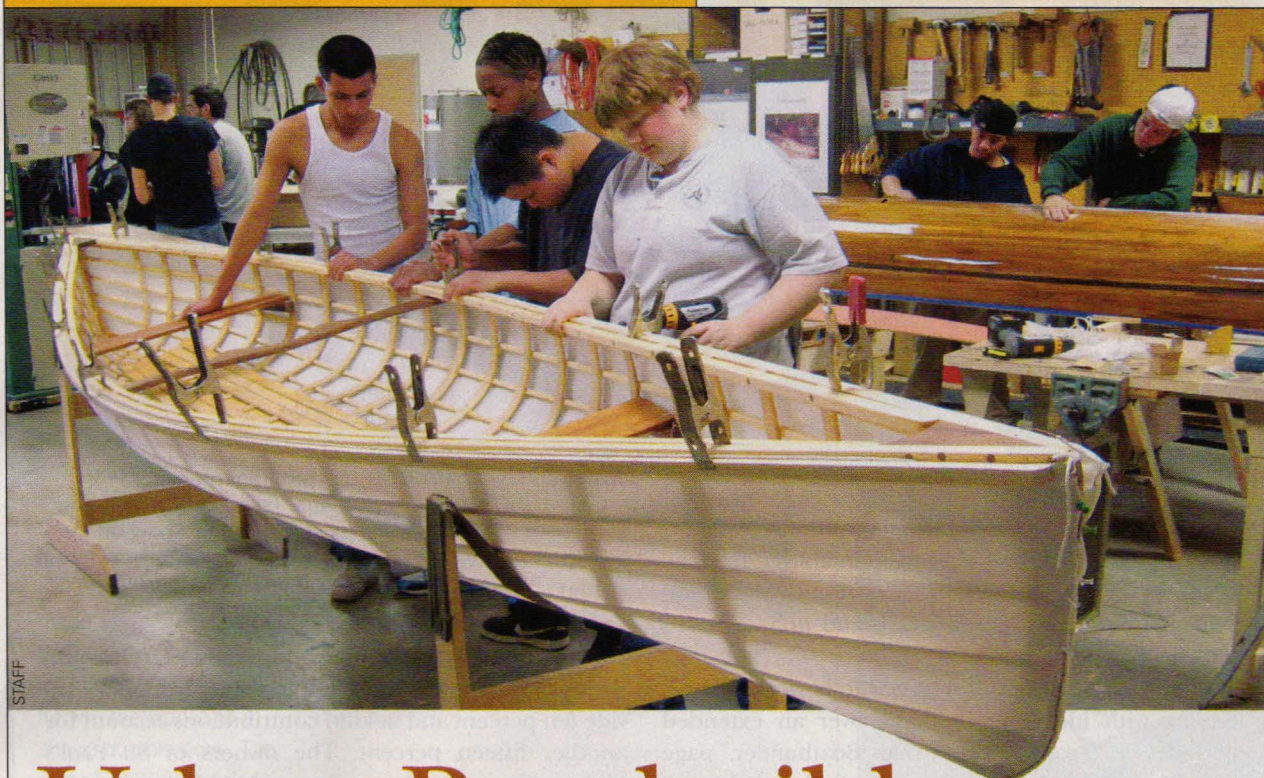
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STAFF

Urban Boatbuilders

by Phil Winger

Traditional wooden boatbuilding is uncommon, even here in Minnesota, the “Land of 10,000 Lakes.” The handful of woodworkers that practice boatbuilding are often drawn to its unique challenges: almost none of the angles are simple, many of the boards are curved, and every joint has got to be watertight. These demands are enough to intimidate experienced woodworkers, and that’s just the beginning. Let’s not even get into steam bending or rolling bevels.

This list of complexities is exactly what makes wooden boatbuilding such an excellent medium for youth development: It presents continuous challenges for individuals who want to test and develop their skills. Boatbuilding invites young people to excel.

Urban Boatbuilders in St. Paul, Minnesota evolved from a group of amateur boatbuilders who gathered to share their experiences. Inspired by the success of a similar program in Alexandria, Virginia, their meetings eventually turned into discussions on boatbuilding’s relatively untapped potential for youth-centered programming. Funds were raised, a board of directors was established, and in late 1995, Urban Boatbuilders (UBI) was incorporated as a 501 (c) (3) nonprofit organization.

UBI’s mission is to reconnect disconnected teenagers, so they can succeed in school, at home, at work and in their personal lives. The young people we work with develop technical and problem-solving skills that deepen their sense of capability and improve their self-esteem. They experience firsthand the value of teamwork and the importance of trust and accountability.

I’ve worked with UBI for the last eight years. My background is in youth development; when I learned what UBI was doing here in Minnesota, I decided to enroll in a formal wooden boatbuilding school in Port Townsend, Washington, so I could participate in the most beneficial way. Currently, I serve as UBI’s Program Manager. Instructor Brian Thorkildson and Executive Director Dave Gagne round out UBI’s full-time staff.

MAKING CONNECTIONS

To accomplish our goals, UBI has built relationships with community-based organizations and schools that work with at-risk youth. We operate two primary outreach programs. The first is called “Project Partnership,” wherein one of the organizations or schools mentioned above (we call them our “community partners”) contacts us to arrange for a group boat-

building project. Project choices include canoes, kayaks and various types of rowing and sailing skiffs. Each boat has unique challenges, allowing us to tailor the project to suit the participants. We build boats at schools, in our workshop and in correctional settings.

Our group projects usually last about twelve weeks, and to conclude each one, we all go boating! This fun event is often the first experience of its kind for our students. It's also one of our key motivational tools for teaching the importance of accountability: In boatbuilding (and in life), the quality of our work determines whether we sink or swim—and nobody wants to drown!

Our Apprenticeship Program allows working one-on-one with individual students over an extended period (see "Profile of an Urban Boatbuilder," page 31). This after-school program provides real work experience: The schedule is demanding and the work is challenging. Apprentices are invited to stay with UBI for up to a year, providing they work hard and meet attendance requirements (it takes discipline to consistently report for work after school). Applicants are recruited from Project Partnership groups—participants who demonstrate aptitude with woodworking tools and techniques, and are willing to make a commitment to continue developing these skills as part of the UBI team.

STAYING AFLOAT

UBI board members have volunteered enormous amounts of time and effort to submit countless grant



UBI program manager Phil Winger (second from left) and his crew proudly show off the "Wee Lassie" lapstrake canoe they built during a group boatbuilding experience.

proposals and generate an extensive individual donor list. Currently, sixty per-

cent of our annual operating budget comes from foundation and corporate grants. Individual donors provide ten percent and in-kind contributions account for another fifteen percent. The owners of St. Paul's Midway Shopping Center donate our shop space, for example. The last fifteen percent of our budget is earned income, which is generated by fees from our Project Partners programs (group boatbuilding projects cost a community partner from \$3000 to \$5000), individual boatbuilding commissions, restoration contracts and retail sales. We sell paddles and woodworking tools built by our apprentices, as well as new and restored boats. Most of these items are available through our website: www.urbanboatbuilders.org.

UBI's vision for the future includes developing solid relationships with employers who recognize the value of our apprentices' experience during their tenure here. We have already entered into conversations with the local carpenters' union, trade schools, and a few

other trade-oriented businesses. Someday, we want to see every apprentice leave this shop with solid opportunities for employment doing something they enjoy.



Floating her boat: Can you think of a better way for a teenager to develop self-confidence? Over 2500 teenagers have partnered with UBI to build boats.

STAFF

PROFILE OF AN URBAN BOATBUILDER

Sixteen-year-old Mario is our most experienced apprentice. We met at his school while building a traditional lapstrake canoe. Since applying for an apprenticeship, Mario has become a valuable part of our team. He has built and restored a variety of boats, using both traditional and modern construction methods, including lapstrake, skin-on-frame, stitch-and-glue, and cedar-strip. He has built two wooden planes, using a shop-made forge to temper their blades, and he is improving his skills at honing the blades to a sharp, durable edge. The most highly-skilled paddle-maker I've met, Mario now holds the position of Lead Apprentice in our shop.



Mario fitting steam-bent rib into canoe.

"At UBI, I get to use my hands. And when I work on wood, I forget about everything else. Sometimes I don't have good days at home. If I didn't have Boatbuilders, I'd probably be going crazy. At this time of year (winter) I usually get locked up, 'cause I'm at home inside with nothing to do and I do something crazy. Coming here broke that pattern."

As Lead Apprentice, Mario trains other apprentices in many aspects of boatbuilding. He also models the less tangible, although arguably more important values that UBI is about: perseverance, craftsmanship, teamwork and responsibility. He comes to the shop early, stays focused on his work, and is one of those rare woodworkers whose sanding jobs are worthy of six coats of varnish. "I work hard at what I do; I put everything into my work, and I persevere: When I get stuck, the next day I come back and just keep doing it—before Boatbuilders, I would just quit when it got tough. People from my past think I'm going to fail, but I want to overcome what the statistics say about me. I have a lot of dreams in my head that I want to do, that I push myself to do."

For more information about Urban Boatbuilders, visit www.urbanboatbuilders.org or call Executive Director Dave Gagne at (651) 644-9225

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by Tom Caspar

Choosing Hand Planes

MATCH THE SIZE TO THE JOB—THAT'S THE KEY

Hand planes come in a bewildering variety of sizes. Why are there so many? I'll help explain this mystery by dividing the field into four groups, in order of size: block planes, smoothing planes, jack planes, and leveling planes. I'll show you what the planes in each group are used for, and recommend two different starter sets.

Each group best serves a particular purpose. Smoothing planes, for example, are specifically designed to make wood as smooth as silk, ready for a finish. In general, length is the key to understanding a group. Picking a plane at random, you could use it for most any task, but pick a plane that's the correct length and you'll get the job done much faster, with better results.



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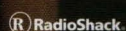
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BLOCK PLANES



Block planes are often associated with carpenters and do-it-yourselfers because they're inexpensive and small enough to fit in a toolbox or toolbelt. They have important roles in the woodshop, too. A high-quality block plane can do amazing work, and may become one of your favorite tools.

Types. Standard-angle block planes are the most common. Their blades are bedded at about 20 degrees, with the bevel facing up. If the blade is sharpened at 25 degrees, its effective cutting angle is 45 degrees, which is similar to larger planes. In a low-angle block plane, the blade is bedded at about 12 degrees, resulting in a much lower cutting angle. Pocket-sized planes have a standard bedding angle; what distinguishes these planes is their ultra-small size and light weight.

Uses. Block planes are well-suited for planing end grain or for fitting drawers and doors, where part of the assembly is end grain. Planing end grain requires more force than planing face grain and puts more stress on the blade. Block plane blades chatter less because their bevels face up, not down, as is the case with most larger planes. Bevel up, the blade's tip has additional support from the plane's body. Planing end grain using a low-angle block plane requires less force than using a standard-angle block plane.

Block planes have more uses beyond planing end grain, though. They're very comfortable to hold in one hand for shaping parts and chamfering edges. A pocket plane is easy to carry around in your apron.



Block planes are designed for cutting end grain, such as the stile of this door frame. Their compact size also makes them perfect for planing with one hand.

SMOOTHING PLANES



A smoothing plane is a serious hand-tool user's best friend. Set to cut a tissue-thin shaving, it can make a board feel smooth as silk. The wood's grain will pop in a way that you can't achieve through sanding alone.

Types. The No. 4 size is the type most commonly used, although the larger No. 4-1/2 is gaining in popularity. The 4-1/2 is heavier than the 4, and that added mass makes it easier to maintain momentum while planing difficult woods. A No. 4 blade is 2-in. wide, while a No. 4-1/2 blade is 2-3/8-in. wide. A No. 3 smoothing plane is lighter and narrower than a No. 4. It's perfect for a user with less muscle power because its shavings are narrower. The blade of a No. 3 is 1-3/4-in. wide.

Uses. Smoothing planes prepare boards for finishing. Their relatively short length makes them ideal for planing a wide board or a glued-up top because they can follow slight irregularities in a board's surface and still make a long, continuous thin shaving, the gold standard in smoothing work. Longer planes require a board to be flatter in order to make continuous shavings (flatter than need be, quite often), so these planes are less practical to use in preparing wood for finishing. Fine-tuning a smoothing plane can really pay off: on many woods, you can make a surface so smooth that little or no scraping or sanding is required.



Smoothing planes take the place of power sanders. They're used for making a surface ultra-smooth and ready for finishing.

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Reference Guide

Glue comparison

What woodworkers need to know!

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Easy Water Cleanup	✓	
Much Safer To Use	✓	
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No Foam - Less Mess	✓	
Shorter Open Time	✓	✓
Doesn't Stain Skin	✓	✓
Bonds Most Materials	✓	
Bonds Oily / Exotic Woods	✓	
Lower Cost - Better Value	✓	
Longer Usable Shelf Life	✓	

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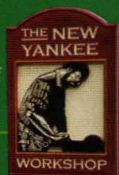
Titebond® III is THE ultimate choice for bonding wood to wood. Period.

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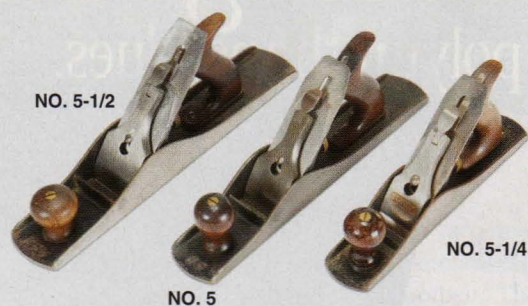
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JACK PLANES



"He's a jack of all trades, but master of none." That expression perfectly describes a jack plane, and helps explain the origin of its name. A jack plane is longer than a smoothing plane, so it's not as efficient in smoothing a large top because it takes more strokes to cut down to the low spots. It's shorter than a leveling plane, so it's more difficult to use in making an edge straight or truing a large surface. But it can smooth or level reasonably well.

Types. The classic jack plane is a No. 5. Its blade is 2 in. wide, the same as a No. 4, but its body is about 5 in. longer. A No. 5-1/2 is longer, wider, and heavier than a No. 5. Like a No. 4-1/2, this additional mass makes it easier to plane difficult woods. The No. 5-1/4 is shorter, narrower and lighter than a No. 5. It was designed for youngsters learning to work wood in shop classes, and is often referred to as a manual-training plane or a junior jack.

Uses. You can smooth or level with a jack plane—it just takes a bit longer than using a more specialized smoothing or leveling plane. If you sharpen a jack plane's blade with a pronounced curve, this tool is perfect for hogging off a lot of wood fast, in any situation. A jack plane is also useful for evening joints, such as a table leg and rail, because this operation combines both leveling and smoothing.



Jack planes can both level and smooth a surface. They're useful for evening up one piece with another, such as this breadboard end on a tabletop.

LEVELING PLANES



Leveling planes are long, wide, and heavy. They have two specific purposes: straightening edges and flattening large surfaces. Accuracy is the goal in both situations, and that requires a plane with a long, flat sole.

Types. The leveling plane most often used these days is the No. 7, more commonly known as a jointer plane. As its name implies, a jointer is best suited for straightening edges prior to joining them together. A No. 6 plane is the same width as a No. 7, but about 4 in. shorter. The No. 6 is best suited for leveling the majority of a large surface (see Breadboard Ends, page 69). It's commonly known as a fore plane (because it's used before a smoothing plane, which finishes the job) or a trying plane (because it makes a surface true and flat). A No. 8 plane is a behemoth: it's longer, wider, and heavier than a No. 7.

Uses. One plane, either a No. 6 or a No. 7, can be used for jointing and truing, although having both is ideal. If you have only one, it's best to have two blades. Jointing requires a blade that is sharpened dead straight across; truing is most efficiently done with a blade that's sharpened with a slight curve. A No. 8 is so large that it can be a bit unwieldy, but it's the perfect plane for jointing a long, wide edge, and useful for big jobs such as fitting an entryway door.



Leveling planes are used to make edges straight, such as these two boards, which will be glued together. Leveling planes are also used to make large surfaces flat and true.

STARTER SET RECOMMENDATIONS



BASIC TWO-PLANE SET

A No. 5 jack plane and a standard-angle block plane will serve you well in most situations. You'll find dozens of uses for the block plane, taking off a little bit here or there on your projects. With the jack, you can do everything a smaller or larger plane can do, such as straightening an edge, smoothing a surface, or evening up a joint. The job will just take a bit longer.

ADVANCED THREE-PLANE SET

This is a good starter set for a woodworker who wants to really enjoy what hand planes can do. Each plane has a specialized purpose. The low angle block plane excels at cutting end grain; the leveling plane (which can be either a No. 6 or a No. 7) joints edges and flattens a large surface; the smoothing plane (either a No. 4 or a No. 4-1/2) can make wood look so good that it hardly needs a finish.

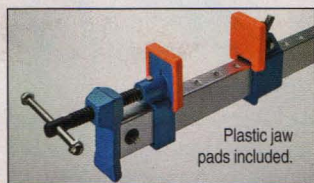


American Woodworker JULY 2008 37

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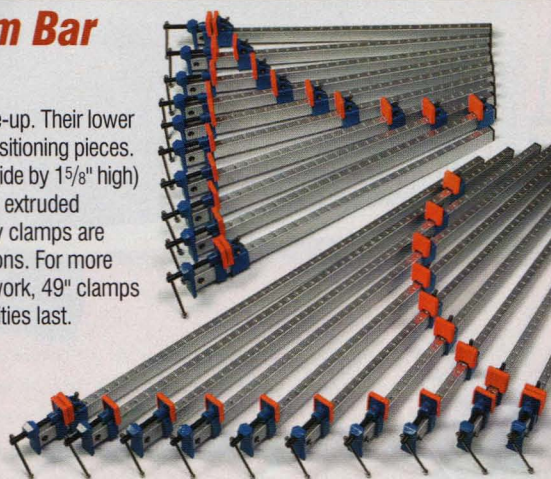
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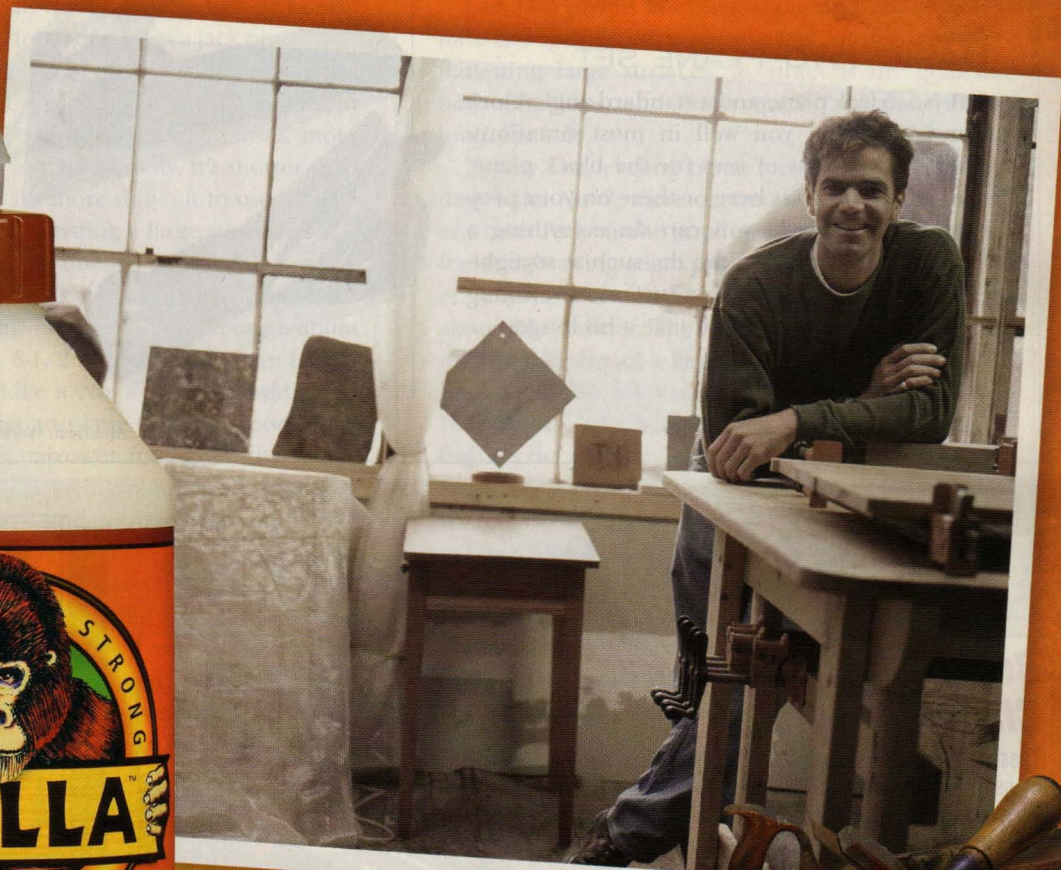
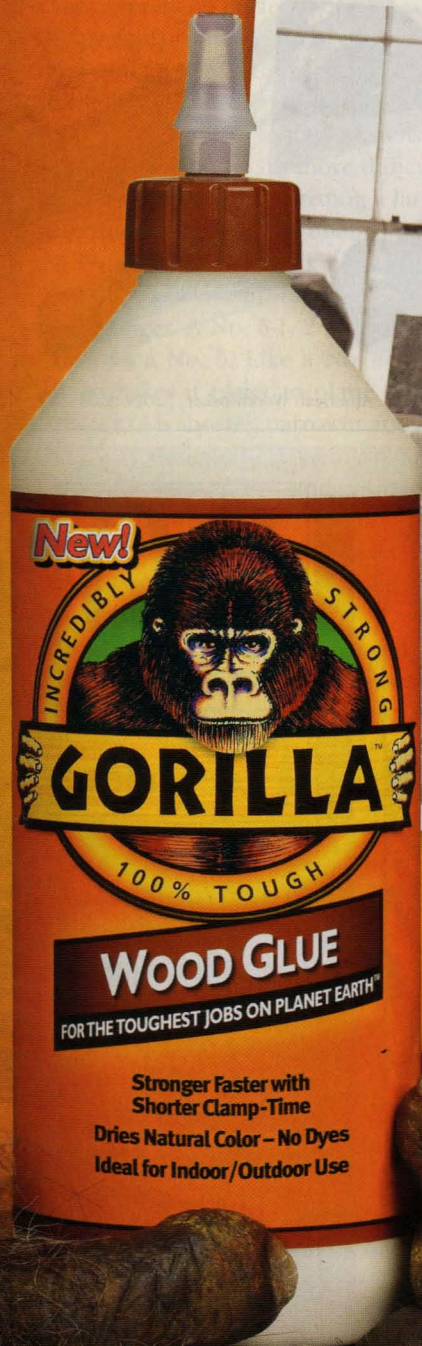
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by Dave Olson

When I worked in a restaurant as a teenager, I hauled dirty dishes in plastic bus boxes. Using them to organize my shop is much more pleasant. Bus boxes are light in weight and strong enough to hold all kinds of shop essentials, including most of my portable power tools. This 6-ft.-long cabinet holds up to twenty 5 in. by 15 in. by 20 in. bus boxes (Fig. A, page 40 and Sources, page 42). I built it in a weekend, using an unusual construction method: Instead of using solid pieces of plywood for all the elements, I cut the plywood into narrow strips and glued them back together into structural frames.

This method requires less plywood, because so little is wasted. It's also a great way to use scrap plywood, because most of

the pieces are relatively short and narrow. The plywood does not have to be perfectly flat, either, for the same reason.

This method is also versatile. For example, it's easy to change the cabinet's height, the number of storage compartments or the spacing of the bus boxes. Vary the size of the frames to create built-in closets and bookcases. For a bedroom, upgrade to wooden drawers and replace the runners with full-extension hardware.

This cabinet is made from two 4x8 sheets of 3/4 in. plywood (I used exterior grade fir). You'll also need a piece of 1/4 in. plywood or hardboard for the back, an 8 ft. 1x10 to face all the plywood edges and a 12 ft. 1x12 for the bus box supports.



1 This storage cabinet is primarily made from plywood—even the frames that support the bus boxes. The first step is to cut the plywood into narrow strips to make stiles and rails for the frames.

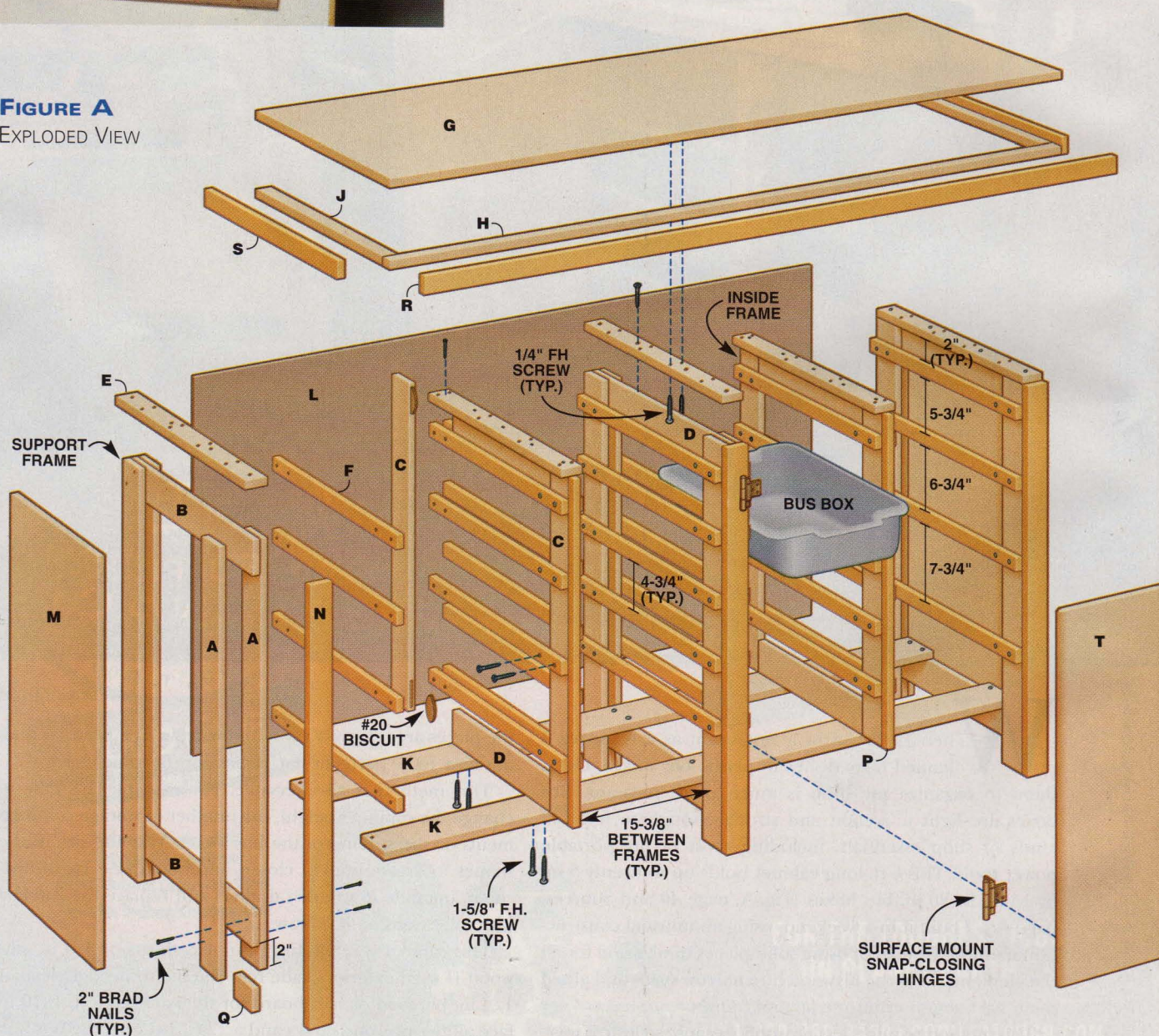
RIP THE PLYWOOD PARTS

1. Lay out all the pieces on the plywood sheets (Fig. C, page 43, Cutting List, page 42 and Photo 1).
2. Crosscut both plywood sheets into smaller, more manageable pieces.
3. Cut the stiles, rails and cleats for the structural frames to final size (Parts A-E, Fig. A). Make accurate rip cuts; when you add the saw kerfs, some pieces contain very little waste.

BUILD THE FRAMES

4. This cabinet includes three support frames that extend to the floor and two inside frames. Build the support frames by stacking four stiles

FIGURE A
EXPLODED VIEW



and two rails (Photo 2). Use a jig to hold the parts square during assembly (Fig. B, page 43). Glue and nail the frame's top inside corner while holding both stiles against the long fence and the rail against the short fence. Use 2 in. nails. Secure the bottom inside joint while holding the rail against both the fence and the rail alignment block. Make sure the stiles and rails are flush on the outside when you glue and nail the outside joints. After nailing all the joints on one side, flip over the assembly and nail the joints from the opposite side. Wipe off squeezed out glue.

5. Assemble the inside frames with biscuits and glue (Photo 3). Just pull the joints together and let the frame sit; clamp pressure may distort the frame.

MAKE CLEATS AND BOX SUPPORTS

6. Drill and counterbore the cleats. All of the cleats are glued and nailed to the top of the frames. The support frame cleats are also screwed to the stiles for extra strength.

7. Rip the bus box supports (F) slightly oversized, joint one edge, plane (or rip) them all to the same width and then cut them all to the same length. Assembling the cabinet is easier when the supports are interchangeable: Use a drill press with a fence and stop blocks to drill the counterbored screw holes, so they're centered and identically located on both ends of each support.

8. Fasten the supports to the frames, using spacers for easy and accurate positioning (Photo 4). To graduate four bus boxes, use 5-3/4 in., 6-3/4 in. and 7-3/4 in. spacers. To space five boxes evenly, use a 4-3/4 in. spacer. Always use a 2 in. spacer to position the top cleat.

3/8" x 3/8"
RABBETS
(TYP.)

1-1/2" DIA.
KNOB

FASTEN THE FRAMES TO THE TOP

9. Cut the top (G) to final size and glue fill strips (H and J) on the bottom. Mark the center of the top and the center of one support frame. Line up the marks to locate the frame, so it's perfectly centered and perpendicular to the top's front edge. Butt the frame against the front fill strip—the top should extend 1/4 in. beyond the frame at the back—and fasten it to the top

with 1-1/4 in. screws.

10. Use a 15-3/8 in. by 22 in. spacer to locate the remaining frames—my spacer is 1/4 in. MDF (Photo 5). You have to remove the top pair of bus

2 Stacked support frames, with rails sandwiched between the stiles, go on the ends of the cabinet and in the middle. They go together quickly, thanks to an assembly jig.



3 The two inside frames are biscuited. To keep the frames square, pull the pieces together while holding the stiles and top rail against the assembly jig's fences.



4 Attach a cleat on the top of each frame. Then attach the bus box supports. Position all the top supports 2 in. from the cleat. The rest of the supports can go wherever you want, depending on the height of the items you'll be storing.





5 Attach one support frame exactly centered on the top. Then use a spacer to locate and attach the remaining frames, so they're evenly spaced and parallel. You have to remove the top bus box supports to install each frame.



6 Tie the frames together by installing the stretchers. They pass under the bottom rails of the support frames and over the inside frame rails. Use the spacer from the previous step to align the frames before fastening them to the stretchers.



7 Fasten the back after clamping it flush with the cabinet's edges and top.

box supports to fasten each frame. As the supports are interchangeable, reinstalling them is a simple task.

11. Cut the stretchers (K) to final length. The Cutting List dimensions assume that plywood is exactly 3/4 in. thick, which is rarely true. So measure the actual rail-to-rail distance on your cabinet to determine the correct length for the stretchers.

12. Install the stretchers flush with the outside edges of the bottom rails and fasten them (Photo 6).

13. Use the 15-3/8 in. spacer to position the remaining frames before fastening the stretchers. Again, some supports have to be removed and reinstalled.

FINAL ASSEMBLY

14. Fasten the back (L) with screws (Photo 7).

15. Glue on the end panels (M and Photo 8). Complete the cabinet base by gluing on the frame faces (N and P) and foot fillers (Q).

16. Finish the top by gluing on the front and side faces (R and S). The side faces butt against the front face, which extends beyond the top.

17. Cut the doors (T) to size and round over the edges. Then saw or rout 3/8 in. by 3/8 in. rabbets on the long edges only. Install the knobs and mount all the hinges (see Sources). Then mount the doors on the cabinet; use seven or eight playing cards to create a consistent 1/16 in. gap at the top (Photo 9).

18. Bus up your shop (Photo 10).

Sources

Next Day Gourmet, www.superprod.com, 800-328-9800, Heavy-Duty Bus Box, 5" x 15" x 20", #810619, \$10 each; Case of 12 Bus Boxes, #812113, \$94.
Rockler, www.rockler.com, 800-279-4441, 1-1/2" Beech Knobs, #23093, \$3 per pair, 2 pair req.; 3/8" Inset Hinges, #32122, \$2.30 per pair, 4 pair required.

CUTTING LIST		Overall Dimensions: 24" W x 38" T x 73" L		
Part	Name	Qty.	Material	Th x W x L
	Support Frame	3	Plywood	2-1/4" x 21-3/4" x 36-1/2"
A	Support Frame Stile	12	Plywood	3/4" x 3" x 36-1/2"
B	Support Frame Rail	6	Plywood	3/4" x 3" x 21-3/4"
	Inside Frame	2	Plywood	3/4" x 21-3/4" x 30-3/4"
C	Inside Frame Stile	4	Plywood	3/4" x 3" x 30-3/4"
D	Inside Frame Rail	4	Plywood	3/4" x 3" x 15-3/4"
E	Cleat	5	Plywood	3/4" x 2-1/4" x 21-3/4"
F	Bus Box Support	36	Pine	3/4" x 1-1/4" x 21-3/4"
G	Top	1	Plywood	3/4" x 23-1/4" x 71-1/2"
H	Front Fill Strip	1	Plywood	3/4" x 1-1/4" x 71-1/2"
J	Side Fill Strip	2	Plywood	3/4" x 3/4" x 21-3/4"
K	Stretcher	2	Plywood	3/4" x 3-1/2" x 68-1/4"
L	Back	1	Plywood	1/4" x 34" x 69-3/4"
M	End Panel	2	Plywood	3/4" x 15-3/4" x 34-1/2"
N	Support Frame Face	3	Pine	3/4" x 2-1/4" x 36-1/2"
P	Inside Frame Face	2	Pine	3/4" x 3/4" x 30-3/4"
Q	Foot Filler	6	Plywood	3/4" x 2" x 3"
R	Front Face	1	Pine	3/4" x 1-1/2" x 73"
S	Side Face	2	Pine	3/4" x 1-1/2" x 23-1/4"
T	Door	4	Plywood	3/4" x 15-7/8" x 33"

All dimensions are calculated using 3/4" as actual plywood thickness.

FIGURE B
ASSEMBLY JIG

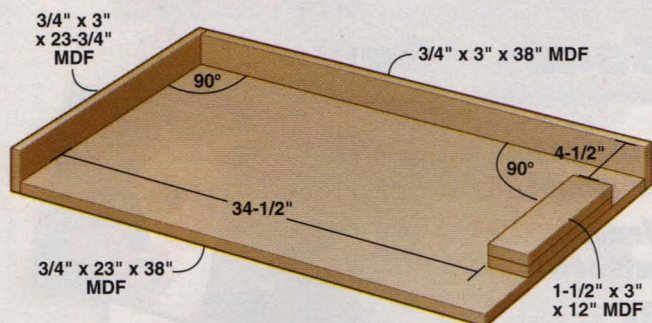
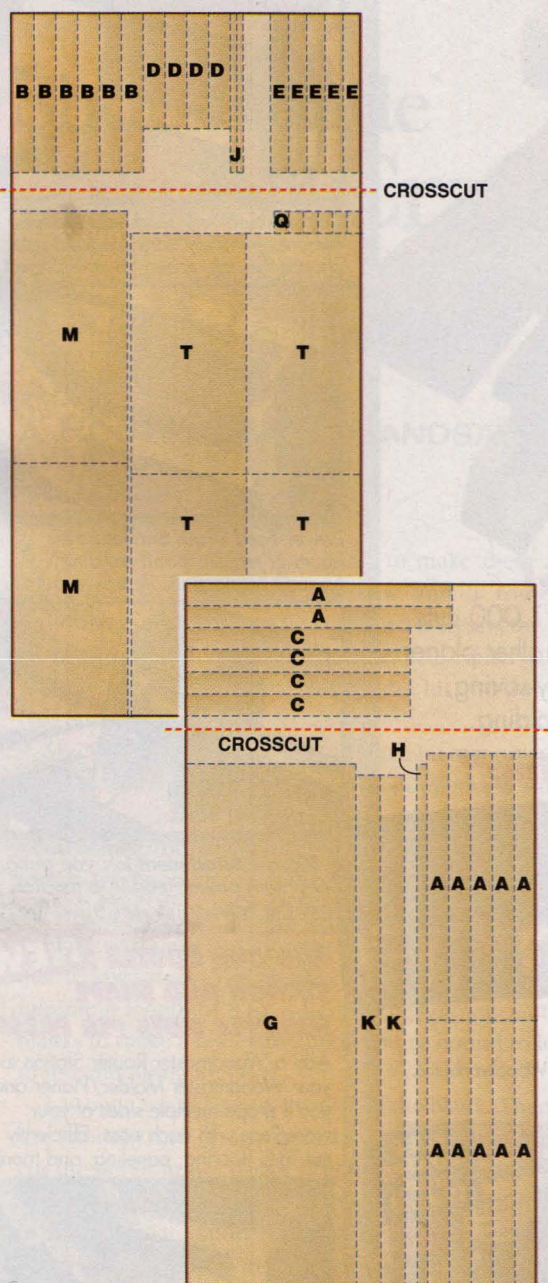


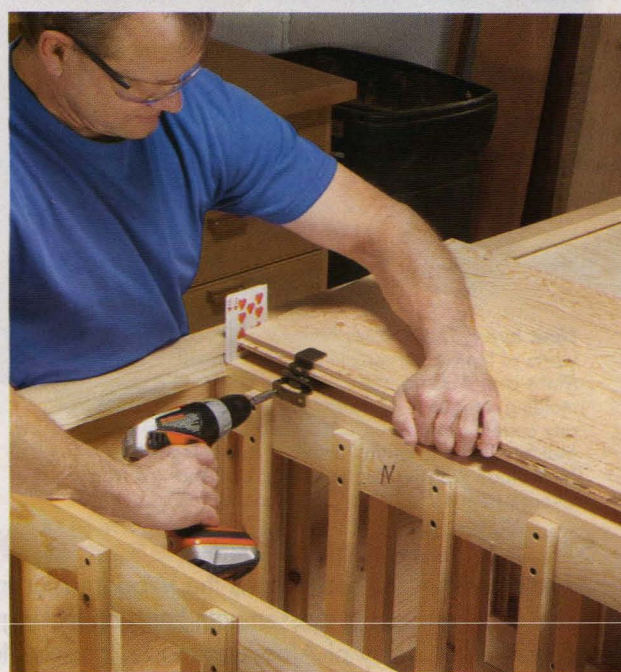
FIGURE C
PLYWOOD CUTTING DIAGRAM



8 Install the end panels to create a flush surface (or use thinner plywood to mimic a recessed panel). Glue solid-wood faces on the fronts of each frame and plywood filler blocks in all the feet.



9 Mount the lipped doors, using a stack of playing cards to create adequate clearance between the doors and the top. Only the doors' long edges are rabbeted, as the cabinet has solid-wood facing, rather than a traditional face frame.



10 Install the bus boxes. Durable and portable, they're great for organizing all kinds of tools.



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Shop - Made Arts & Crafts Knobs

ALL IT TAKES IS
A ROUTER AND A BANDSAW

by Dave Eklund

You'll only need two machines to make these Arts and Crafts style knobs: a bandsaw and a router table. Although the saw cuts can be done on a tablesaw, the bandsaw keeps the operation safe and simple. The router table work requires two bits: a 5/8 in. round nose bit and a straight bit (see Source, page 47).

Shop-made knobs may not save you a lot of money, but they offer a wealth of advantages over the store-bought variety. For starters, the knobs will better match the project because the wood comes from the project's scrap. In addition, you can customize the knob's size to fit the scale of the piece. Plus, making your own knobs is a satisfying project in itself.

Start by ripping 1-1/2 in. strips of wood from 1-1/4-in.-thick quartersawn stock. The blanks can be any length, although a minimum length of 8 in. is best for machining. Cut enough blanks to make a few extra knobs; you're bound to lose a few to test cuts along the way.

Lay out a centerline on the face of the blank. Then head to the bandsaw and tilt the table 15 degrees. Set the fence and cut the bevels in two passes (Photo 1).

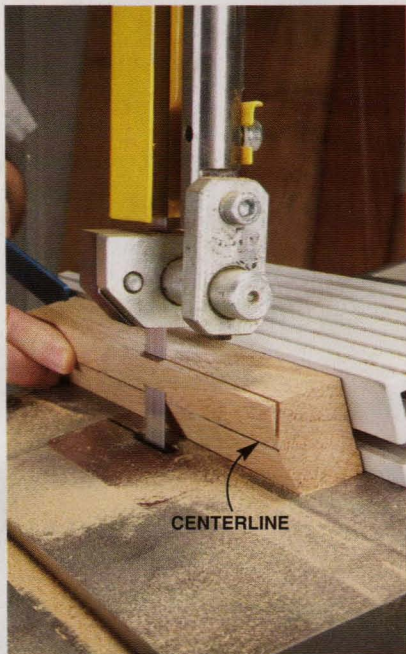
Take the beveled blank to the router table. Chuck a 5/8 in. core box or round nose bit in the router. Set the bit's height just shy of 3/8 in. for the first pass. Position the fence

to leave a 3/16 in. edge below the bevel (Fig. A, p.47). Rout a groove along each edge (Photo 2). Head back to the bandsaw and crosscut the blank into 1-1/2 in. squares (Photo 3).

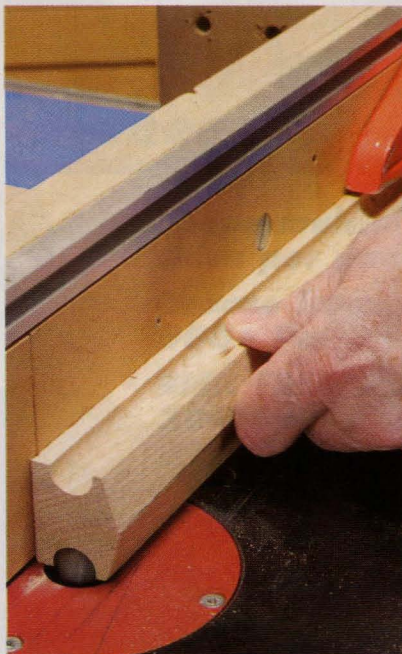
Machining the remaining bevels and grooves on short little pieces, of course, is a bad idea. The solution is to reassemble the knobs in a line as before, but with their grain running in the opposite direction (Photo 4). Make a sled to hold the knobs from a piece of 2x4 squared-up and ripped to the same width as the knobs. Make sure the knobs line up perfectly flush with each other. Mark the center of each knob face again to help set the bandsaw fence. Cut the bevels and grooves as before (Photos 5 & 6). Cut the knobs free of the sled (Photo 7).

The knobs look their best when the base is smaller than the face. Trim back the base on the router table (Photo 8). A notched 2x4 that's been jointed flat makes the perfect guide block. Blowing out the back edge is a real issue on these cuts. Start with an end grain cut. Then, rotate the knob 90 degrees counterclockwise, and cut the first long grain edge. Keep rotating the knob 90 degrees clockwise after each cut. If tearout is still a problem, make smaller incremental cuts.

Finally, sand the knobs, starting with 120-grit paper. Round the corners and soften the sharp edges until the knob feels comfortable.



1 Start the knobs by cutting a pair of 15 degree bevels on the face of the blank. Set the fence so the bandsaw blade exits just above the marked centerline.



2 Rout finger grooves along both sides of the blank. Make one heavy pass then a light clean-up pass to avoid tearout.



3 Crosscut the blank into 1-1/2 in. squares. A miter gauge insures a square cut. There's no risk of a kickback when you make this cut on the band-saw.

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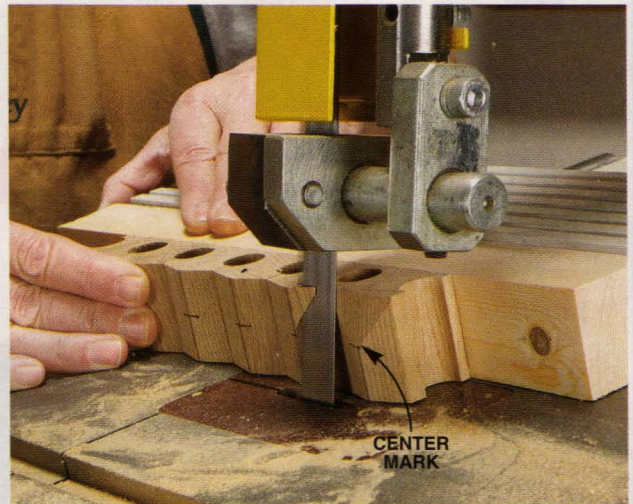
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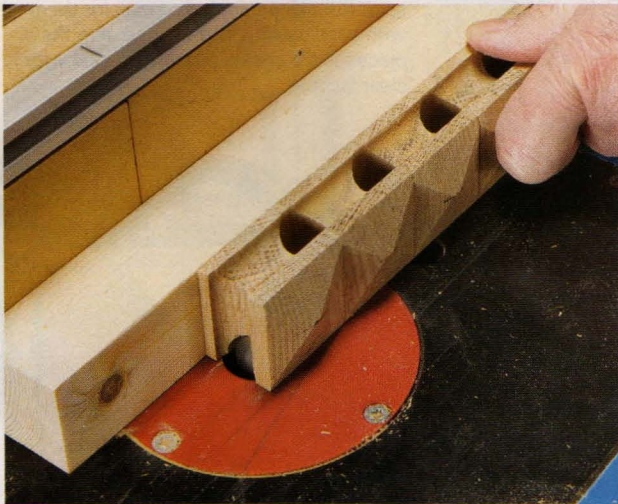
What would you make today?



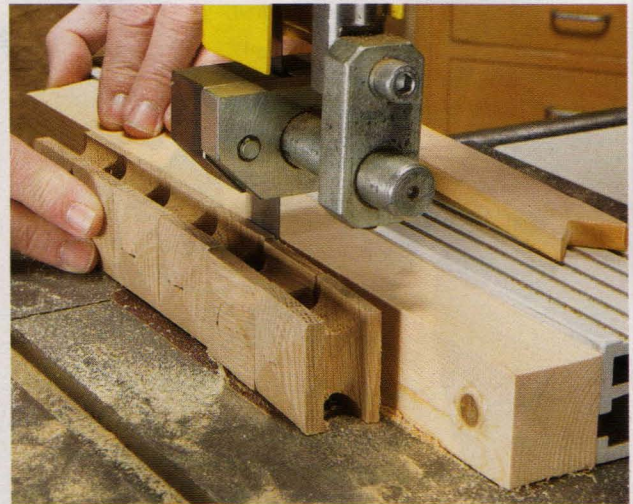
4 Glue the knobs onto a milled sled to machine the end-grain faces. Rotate each knob 90 degrees from its original orientation and use a small dab of glue.



5 Cut the remaining two bevels on the knob faces. Once again, position the fence so the blade just misses the center mark.

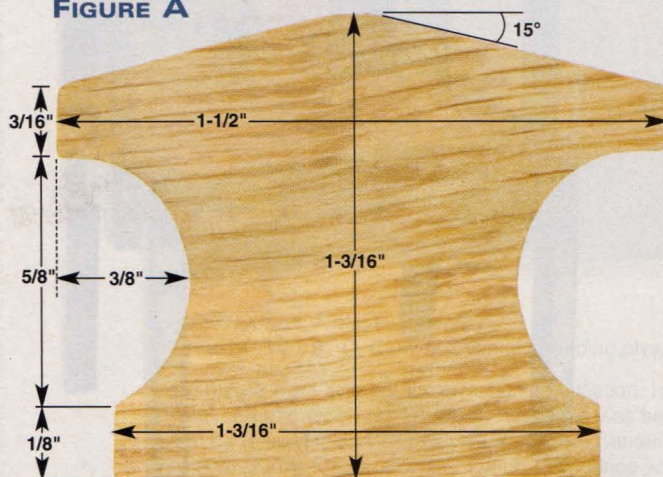


6 Rout the remaining grooves in the knobs. Take light passes and use a slower feed-rate to avoid tearout as the bit enters and exits the cavities between the knobs.



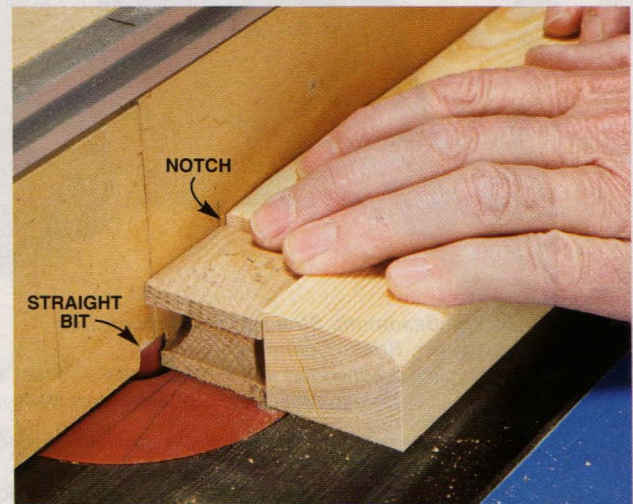
7 Slice the knobs free of the sled. Set the fence so the blade is centered on the glue line.

FIGURE A



Sources:

MLCS, www.mlcswoodworking.com 800-533-9298, 3/4-in. Straight Bit, #7779, \$11; 5/8-in Round Nose Bit, #8746, \$15.



8 Trim down the base with a straight bit and a zero-clearance fence. A block of wood with a notch slightly smaller than the knob guides the knob safely through the cut.

Woodworker's



Boom Cabinet

Judson Beaumont, Straight Line Designs, Inc.
Vancouver, British Columbia

1/4 in. birch plywood ribs and skin with maple veneer and solid maple drawer fronts, clear coat finish over stain

"I wanted to give the illusion that this cabinet exploded. The 'broken' pieces contain working drawers and are hung on the wall. The rest of the cabinet sits on the floor. I love it when someone tells me, 'You can't build that' or 'No one would want that.' These words only encourage me. My rule is: if you can draw it, you can build it."

Poker Chairs

John Capotosto, Dix Hills, NY

Poplar, pine, red Naugahyde, resin gold, acrylic paint and black lacquer

"I made these full-sized chairs with King, Queen, Jack and Joker intarsia images that are exact replicas of those found in a deck of playing cards. After scrolling the figures, I sand the pieces smooth and color them with acrylic paint. Then I assemble the pieces like a jigsaw puzzle and seal with clear lacquer."



Showcase



Elliptical Jewelry Case

Roger Knudson, Finlayson, MN

24" H x 16" W x 9" D, Curly ash veneer, bending plywood, shellac

"I am retired from a career in correctional education. I build furniture for fun and sometimes on commission. This piece was begun in a class taught by Ross Day and Thomas Hucker at the Center for Furniture Craftsmanship in Maine. It was my first experience with veneering and the use of a vacuum bag. I had always considered myself a 'solid wood man' before. More veneering to follow!"

Mountain Dulcimer: The Gryphon

**Ronald Cook,
Coog Instruments,
Santa Cruz, CA**
Eastern black walnut, maple, salvaged Douglas fir, tung oil

"I primarily use recycled, salvaged and sustainable harvest woods for my instruments. The sides, back, head, tailpiece, fingerboard surface, and lower sound hole rosettes on this dulcimer are Eastern black walnut. I made the tuning pegs and binding from maple scraps. The top is salvaged first growth Douglas fir. It was resawn from large 14 in. x 14 in. columns rescued from a demolished warehouse. The wood was milled approximately 125 years ago."



PAUL SCHRAUB

Woodworker's

Fish Chest Of Drawers

John Boudreau, Fort Lauderdale, FL

65" H x 20" W x 18" D, Tiger maple veneer, poplar, plywood, satin lacquer and wax

"When I combined my love of fishing with my woodworking skills, the 'Fish Chest of Drawers' was the result. The chest features a stack of 5 drawers with a single drop-down door at the bottom. It's been a great conversation piece."



Musician's Bench

John Ebinger, Phoenix, AZ

19" L x 18" W x 19" H, claro walnut, white ash, tung oil

"I am a musician by profession and a woodworker for fun. The bench was made for musicians to sit upon while playing their instruments. The bench top is a solid piece of 5/4 claro walnut and the sides are 7/4 white ash. The three pieces of wood are joined with hand-cut dovetails to form an asymmetrical cube. The leg stock is glued up using blind splines."



Monsoon

William Wyko,

23-1/2" T x 13" diameter, 1,495 pieces of monterillo, curly maple, hard maple, wenge, black limba, walnut, black ebony and turquoise

"I had 25 years of woodworking under my belt when I was introduced to the lathe in December of 2006. Turning quickly turned into a passion and segmented turnings must have been in my blood. This vase was only the 15th piece I mounted on a lathe. In the end, I think I devoted over 200 hours towards its completion."

Showcase

Bassinet

Don Kriner, LeRoy, NY

Black walnut and maple with wipe-on polyurethane

"This bassinet is based on plans I drew from a picture in an antique magazine. The feet are dovetailed into the two main posts and the connecting frame is mortised into the posts. I made a form to laminate six layers of 1/8 in. thick stock for the racetrack-shaped upper rail. I made the slats by laminating two 1/8 in. layers of stock around a circular form. The mobile arm is removable. It has a brass screw holding it into the post."



Table

Rob Porcaro, Medfield, MA

29-5/8" T x 21-1/2" W x 17-1/2" D, Walnut with wenge accents and wiping varnish

"I have been drawn to the sight and feel of wood for as long as I can remember. I am a doctor of optometry by day and woodworker by night (and weekend). I wanted a fairly simple but satisfying design for a multi-use small table. Once I had worked out the leg contour I knew I was almost home. The top does not touch the legs but floats on stretchers that run between the aprons."

The Iron Horse

Jim Eder, Baltimore, MD

8-1/2" W x 48" L, 14 board feet of wood including: purple heart, black walnut, red oak, poplar, and maple, lacquer finish

"I've been woodworking for about 40 years. Recently, I began making models. I discovered that models demand very precise joinery, mistakes are hard to hide and details are everything. The 'Iron Horse' train was a gift for my Dad on Father's day. In 1869, the East met the West in Utah via the railroad. This three-car train is inspired by the styling of that era. Despite it's size, it was not a cheap project and took six weeks to complete."



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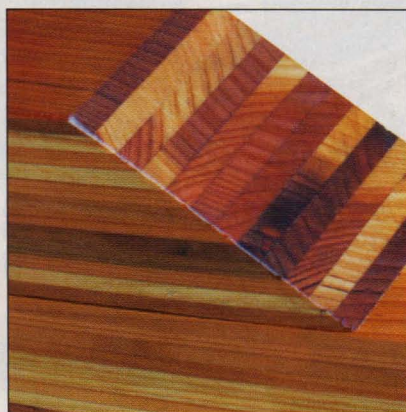
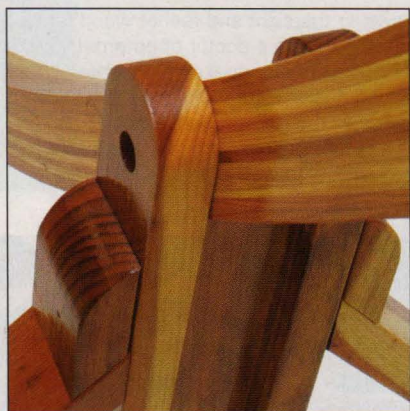
Hammock Stand

MAKE BENT LAMINATIONS ON A BIG SCALE.

by John English

One sweeping curve, 18-ft. long: that's the essence of this dramatic stand. Making up that curve are dozens of thin pieces of construction-grade redwood, all glued together to make an extremely strong beam.

The beam is composed of three identical pieces: two are butted end-to-end to make the lower curve, while a third piece bolted on top binds the two together. I'll show you how to build an inexpensive bending form to create the three sections, how to cut the laminations and glue them together, and how to make the beam's edges smooth and even.





You'll need twelve 10 ft. redwood 2x4s to make the laminations. (You could substitute western red cedar, as long as the pieces are fairly free of knots.) You'll also need about 62 lineal feet of 2x4's, including one 14-footer, to make the stand's other parts.

BUILD THE BENDING FORM

1. To build the form, you'll need one 4 ft. x 9 ft. sheet of 1/2-in.-thick house siding (hardboard or plywood). You'll also need two 1x4s (one 10-footer and one 12-footer) to make a very large beam compass, also known as a trammel. Screw or clamp the 10-footer to the siding (Photo 1 and Fig. B).

2. Attach the 12-ft. 1x4 to the end of

the 10-ft. 1x4 with a bolt and nut, so the 12-footer will pivot as a swinging arm. Drill a hole to fit a pencil in the other end of the arm. Screw a short piece of 1x4 to the bottom of the arm, just inside the pencil hole, so the arm glides easily across the siding. Draw the arc, then disassemble the trammel.

3. Cut the arc using a jigsaw. Screw the trammel's 10-footer to the long, straight side of the siding, to stiffen it.

4. Cut 68 blocks from 2x4 stock (you'll need 18 lineal feet; Fig. C). Drill a 1/8-in.-dia. pilot hole in the center of each block. Glue and screw the blocks in pairs along the curved edge of the siding (Photo 2). Position each block so that the middle of its top edge is flush with the curve.

5. Cut two strips from the discarded portion of the siding. Glue and screw the strips to the top of the 2x4 blocks, butting the strips end-to-end (Photo 3). Apply wide masking tape to the form's top surface to prevent the lami-

nations from adhering after a glue-up. Wrap the tape over the form's edges and down an inch on both sides.

RESAW THE LAMINATIONS

6. Make laminations for the beams (A, B) by resawing redwood 2x4s (Photo 4). You can do this using a bandsaw, but it's just as easy using a tablesaw equipped with a rip blade. Attach a 3-3/4-in.-high subfence to your saw. Clamp or screw a board on top of the subfence to prevent the 2x4s from climbing up the blade. Position the subfence about 7/16 in. away from the blade in order to rip the 2x4 into three equal pieces. Raise the blade 2 in. above the table. Install a featherboard to hold the stock tight against the subfence.

7. Make the first cut. Turn the 2x4 over and make a second cut. Turn the



FIGURE A EXPLODED VIEW

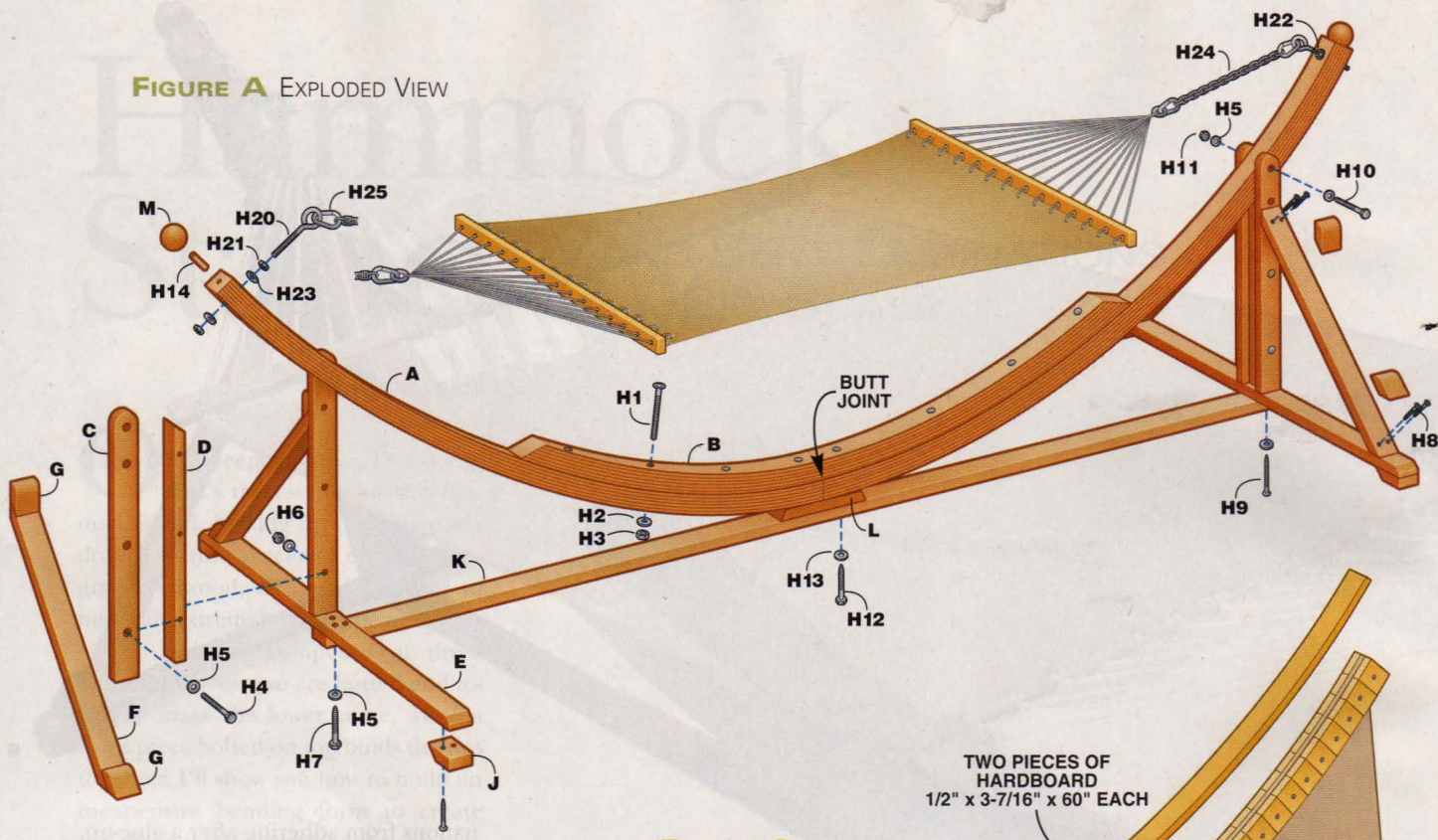


FIGURE B
BENDING FORM
LAYOUT

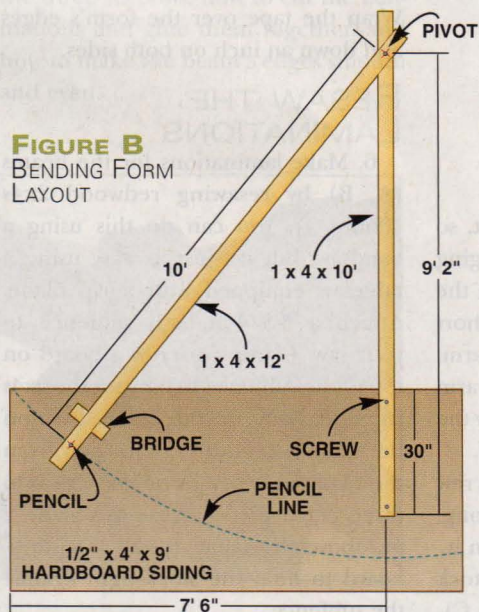
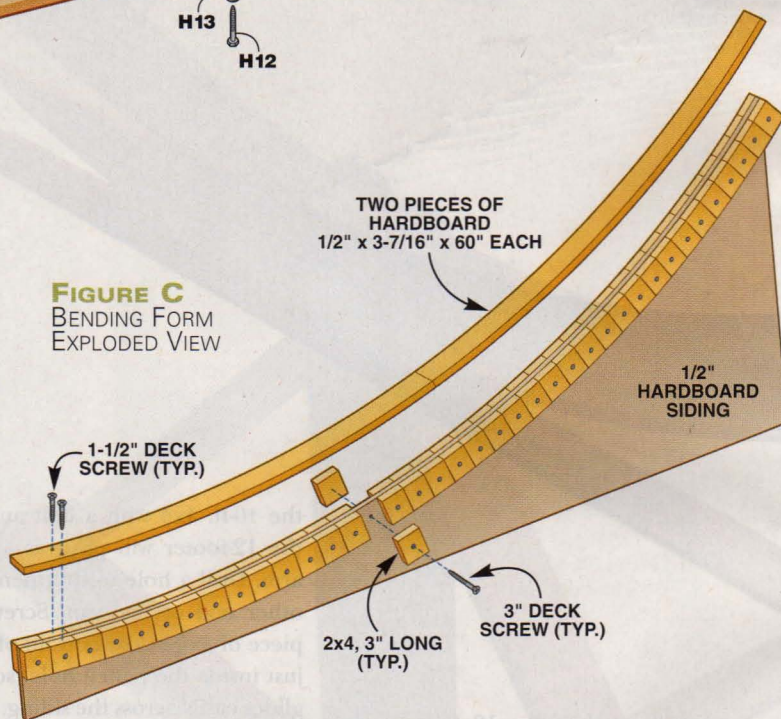


FIGURE C
BENDING FORM
EXPLODED VIEW



CUTTING LIST		Overall Size: 16' 4-1/2" L x 70-1/2" W x 53-58" H		
Part	Name	Qty.	Th x W x L	
A	Bottom beam	2	3" x 3-1/8" x 112" (a)	
B	Top beam	1	3" x 3-1/8" x 112" (a)	
C	Post	4	1-1/2" x 3-1/2" x 36"	
D	Leg spacer	2	1-1/2" x 3-1/8" x 36"	
E	Base	2	1-1/2" x 3-1/2" x 70-1/2"	
F	Brace	4	1-1/2" x 3-1/2" x 40"	
G	Corner block	8	1-1/2" x 3-1/2" x 4-1/2"	
J	Foot	4	1-1/2" x 3-1/2" x 4-1/2"	
K	Stretcher	1	1-1/2" x 3-1/2" x 168"	
L	Beam spacer	1	1-1/2" x 3-1/2" x 15"	
M	Ball	2	3" dia.	

(a) composed of 12 laminations; each lamination is 1/4" x 3-1/2" x 120"

Hardware			
Part	Name	Qty.	Size
H1	Bolt	8	3/8" x 6-1/2", carriage style
H2	Washer	8	3/8" ID
H3	Nut	8	3/8" nylon locking
H4	Bolt	6	5/16" x 5", hex head
H5	Washer	24	5/16" ID
H6	Nut	6	5/16" nylon locking
H7	Lag screw	8	5/16" x 5"
H8	Screw	16	2-1/2" deck screw
H9	Screw	2	6" deck screw
H10	Bolt	2	5/16" x 6", hex head
H11	Nut	2	5/16" nylon locking
H12	Lag screw	4	1/4" x 5"
H13	Washer	4	1/4" ID
H14	Dowel	2	5/16" x 2"
H20	Eyebolt	2	Parts from a 1/2" x 13" turnbuckle
H21	Nut	1	1/2", standard thread
H22	Nut	1	1/2", left-hand thread
H23	Washer	2	1/2", fender style
H24	Chain	2	36" each, 500 lb. minimum rating
H25	Link	4	3/8" spring snap

2x4 end-for-end and make a third cut. This cut releases one lamination. Set the boards aside and repeat these three cuts on all of your 2x4s. Move the feather-board toward the fence and make the fourth and final cut in each board, releasing two more laminations.

8. Allow the laminations to acclimate in your shop for a week or so, then plane them 1/4 in. thick.

GLUE THE BEAMS

9. Sort through the laminations and select the most attractive pieces for the top and bottom of each beam (Photo 5). Strips with knots or defects are OK for middle pieces.

10. Use a weatherproof glue for the laminations. I prefer Titebond III because it allows very little cold creep (which means the edges of the laminations will stay even over time). A dense-foam roller works well for spreading the glue. Keep the roller in a large, sealed plastic bag between applications, so you won't have to wash it out every time. Select four laminations and pour glue in a wavy pattern on top of three of them. Spread the glue thick enough to obscure the wood's grain pattern (Photo 6).

11. Clamp the four laminations to the bending form (Photo 7). Place blocks under each clamp head to avoid denting the top lamination. Before applying final pressure, align the laminations with quick-action ratcheting clamps. Start at the center of the curve and work towards each end, placing a clamp on every other 2x4 block attached to the form. Alternate the clamps side-to-side to evenly distribute pressure. Inspect for gaps between the laminations before you let the assembly dry overnight. Use more clamps to close gaps as needed.

12. Repeat this procedure three times to complete one beam, which contains a total of twelve laminations. To remove the beam from the form, score through the glue run-off with a utility knife and push the beam sideways. Avoid prying it up. Glue together two more beams the same width and length.

DRESS THE BEAMS

13. Use a paint scraper and jack plane to remove the dried glue from one side of each beam. Make sure that the side is square to the top (Photo 8). Scrape glue from the opposite side and run the beams through the planer. Make all three beams the same thickness.

14. Cut both ends of two beams at 90 degrees using a miter saw with added outboard support. These pieces become the bottom beams (A). Cut the other beam's ends at 45 degrees. This piece becomes the top beam (B).

15. Mark the center of the top beam and clamp it to one of the bottom beams (Fig. A). Use a 3/8-in.-dia. extra-long drill bit to bore four holes through both pieces (Photo 9). Assemble the beams using carriage bolts, washers and nuts. Clamp the other bottom beam to this assembly, drill holes,

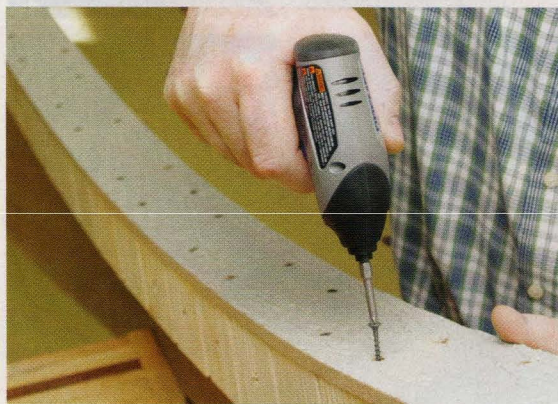


1 The stand's curved beams are made of many thin laminations, glued together over a bending form. Begin making the form by laying out an arc on a large sheet of hardboard siding material, using a long board as a trammel.

2 Cut the hardboard using a jigsaw, then fasten pairs of short 2x4 blocks along the entire curve.



3 Screw a long piece of hardboard to the blocks. This creates a wide support for the laminations. You're done making the bending form.



4 Resaw 10-ft.-long redwood 2x4's into three pieces to make the laminations.



Caution: You must remove your guard for this operation.



5 Plane the laminations 1/4 in. thick, then sort through the pile to select the best-looking pieces. Use these for the top and bottom faces of each beam.



6 Spread glue on the laminations with a dense-foam roller.



7 Clamp four laminations to the bending form, then let the glue cure. Each beam consists of twelve laminations.



8 Make three beams. Level and square one side of each beam using a jack plane. Then mill the beams to final thickness using a planer.



9 The stand's bottom curve consists of two beams butted end-to-end, with the third beam fastened on top. Clamp the top beam to one of the bottom beams and drill holes through both pieces. Fasten the beams with carriage bolts.

and bolt the pieces together, making one long beam.

16. Chamfer both ends of the long beam using a block plane or a bearing-guided chamfering bit in a router. Prepare two redwood balls (M) to decorate the beam's ends. (These balls are available at most home centers. They're used on decks.) Clamp each ball between the jaws of a handscrew and clamp this assembly to a drill press table. Bore a 5/16-in.-dia. hole 1 in. deep into each ball. Glue dowels into the holes. Bore a matching hole in each end of the beam and glue the balls in place.

BUILD THE LEG STANDS

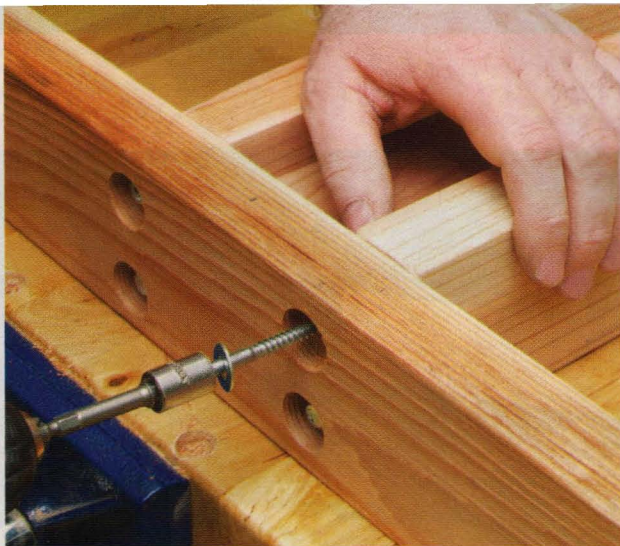
17. Cut the leg posts (C) to size and mark their round tops. Cut the ends using a bandsaw and smooth them using a belt sander. Joint and rip two leg spacers (D) the same width as the beam. Miter the top of each spacer at 45 degrees. Counterbore holes in the leg posts using a Forstner bit for the leg-to-spacer bolts and the leg-to-beam bolts. Fasten two posts to each spacer.

18. Cut the base pieces (E) to length and chamfer the ends using a miter saw. Center the leg-and-spacer assembly on each base and mark the location of the lag screws that go into the end of each leg post. Counterbore and pre-drill holes for the screws and washers. Fasten the legs to the bases (Photo 10).

19. Cut braces (F) with 45 degree ends to stiffen this assembly. Fasten them to the posts. Reinforce these joints with corner blocks (G). Make the blocks in pairs, starting with 12 in.-long pieces mitered at both ends. Cut the blocks to length, then bandsaw and sand their rounded ends. Install the blocks with glue and galvanized finish nails (Photo 11). Screw and glue a pair of feet (J) to the bottom of each leg base.

20. Make the stretcher (K) from a 14 ft. 2x4. Counterbore holes and drill pilot holes in the center of the stretcher for the stretcher-to-beam bolts. Attach the stretcher to the legs (Photo 12). Use a framing square to make sure that each leg is 90 degrees to the stretcher (Photo 13).

21. Cut the beam spacer (L) to length and chamfer its ends. Leave a blunt edge about 1/2 in. wide. Place the spac-



10 From here, building the stand is just a matter of screwing, bolting, or nailing pieces together. These pieces form one of the two leg stands supporting the beams.

er in the center of the stretcher. Drop the beam in place between the leg posts. It should rest on top of the leg spacers (D). If it doesn't, adjust the beam spacer's thickness or the length of the stretcher (K). Center the beam on the stretcher and clamp it so that it rests in the same location on both leg posts. Attach the beam to the legs. Raise one end of the hammock stand and support it with some low sawhorses or boxes. Fasten the stretcher and spacer to the beam (Photo 14).

HANG THE HAMMOCK

22. This stand will handle hammocks up to 14-ft. long (most hammocks are 10 to 12 ft. long). Look for a hammock with spreader bars at the ends (see photo, page 53)—it will sag less in the middle and is easier to climb into (see Source, below).

23. You'll need two 1/2 in. eyebolts to connect the hammock to the beam (Fig. A). These bolts must be threaded the full length of the shaft, which isn't how they're typically made. My solution is to disassemble a 1/2 in. turnbuckle, which provides two eyebolts with complete threads. One eyebolt has a left-hand thread, which requires two left-hand nuts. You should be able to find these nuts at a well-stocked hardware store. Spread the pressure from the eyebolts by using fender washers on both sides of the beam. Connect the hammock to the eyebolt with a short length of chain. Use spring snaps with the correct weight rating or threaded chain links to attach the chain to the eyebolts and to the hammock's steel rings.

24. Remove the hammock hardware from the beam. Remove the beam from the stand and apply three coats of marine spar varnish or a similar weather-resistant coating to all of the wooden parts (see Exterior Oil Finishes, page 59). After the last coat dries, reinstall the beam, hang the hammock...and take a well-deserved nap!

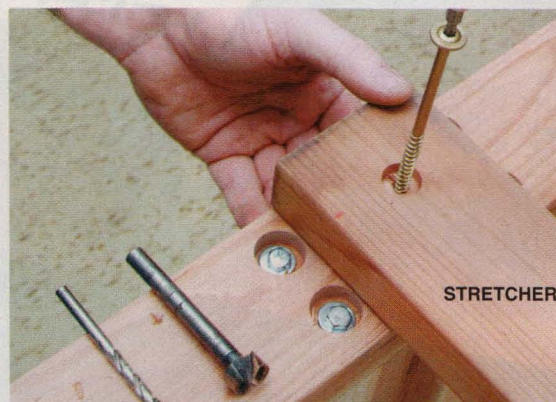
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Hammocks.com, www.hammocks.com, 866-577-3529, Tropico Poolside Quick Dry Hammock, #AL028, \$120.

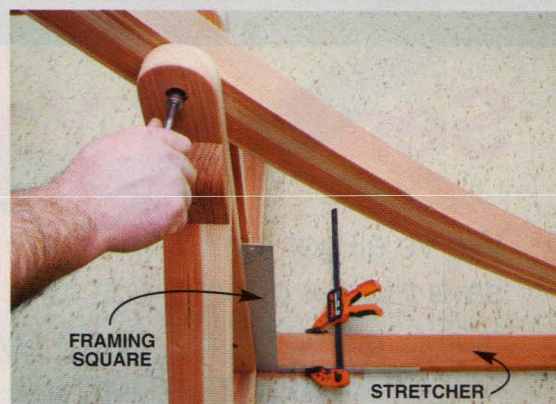


11 Reinforce the triangular braces of each leg stand with short blocks, glued and nailed in place.

12 Connect the leg stands with a 14-ft.-long stretcher. Use extra-long deck screws to fasten the stretcher to the posts.



13 The beams nest inside the leg stands. Fasten the beam to each stand with a single long bolt. This allows the joint to flex under pressure.



14 As the last step, fasten the beams to the stretcher in the middle of the stand.



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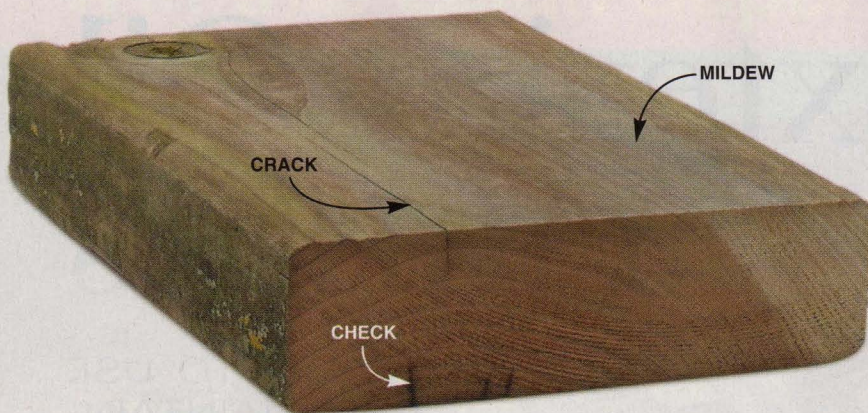
A close-up photograph of a hand holding a wooden-handled brush with dark bristles, applying a liquid finish to a light-colored wooden chair seat. The chair is made of cedar or a similar softwood. The background is a plain, light color.

Exterior Oil Finishes

by Randy Johnson

EASY TO USE
AND MAINTAIN,
THEY KEEP
OUTDOOR WOOD
FURNITURE
LOOKING
LIKE NEW.

You've spent the winter building a set of cedar Adirondack chairs—or maybe you've purchased a teak garden bench. You love the look of the natural wood and you want to keep it that way. Now you're wondering what finish to use. I asked myself similar questions after completing a mahogany Craftsman-style outdoor chair. Initially, I planned to use exterior varnish, but without regular maintenance—sanding and re-varnishing every couple of years—varnish finishes crack, peel and end up looking awful. The thought of stripping and starting over made me cringe.



Wood's arch enemies are sunlight and water. Exposure to the sun's ultraviolet light degrades the wood's surface, causing it to turn gray. Exposure to water promotes mildew, causes cracks and checks and eventually leads to rot.

OIL FINISH VIRTUES AND VICES

Exterior oil finishes are a good alternative to exterior varnish. Exterior oils are very easy to apply—just brush or spray them on, let them soak into the wood and then wipe off the excess. Unlike varnish, exterior oils don't form a film on the surface, so there's nothing to crack or peel. Modern exterior oil finishes provide good water repellency. Most offer resistance to ultraviolet light (UV) and mildew.

On the other hand, exterior oil finishes must be reapplied as often, if not more often than film finishes. This can range from every couple of months to



Exterior oil finish formulations include clear, toned, semi-transparent and opaque, depending on how much pigment they contain. Clear finishes (which add an amber color to the wood) need to be reapplied every couple of years, because they afford limited resistance to the sun's ultraviolet light. Opaque finishes last the longest, because they contain the most pigments, but they also obscure most of the grain.

every couple of years. But since exterior oil finishes are so easy to apply, maintaining them is not difficult. Some exterior oil finishes should not be used on outdoor furniture, because they can rub off on clothing. Before you buy, double-check the product's label, or ask your paint dealer to make sure it's appropriate for furniture use.

Finishing your outdoor project with exterior oil has three benefits. First, an exterior oil finish seals the wood so it repels water. Water repellency stabilizes the wood by minimizing the rapid swelling and shrinking that's caused by the periodic absorption of rainwater. Repeated wood movement inevitably leads to checks and cracks—even in rot-resistant woods such as cedar, white oak and teak. Checks and cracks hasten decay by allowing water to penetrate deep into the wood.



Pigmented exterior oil finishes come in a wide array of colors.

Second, most exterior oil finishes contain an additive to prevent mildew (called "mildewcide;" check the label). Mildew causes unfinished outdoor wood to turn blotchy, especially in humid climates or in shaded, wind-protected areas that are slow to dry out. Mildew is mainly a surface problem, but it makes wood look dirty and it will rub off onto clothing.

Third, most exterior oil finishes contain additives that keep outdoor wood from turning gray by blocking the sun's ultraviolet light. The sun's ultraviolet light is the culprit that grays wood. UV-blocking additives also protect the finish itself from degradation. Generally, UV resistance increases with the amount of pigment an exterior oil finish contains; in other words, the more opaque the finish, the better its UV resistance. That's why paint is the ultimate in UV protection. Here's a tip: Who says you can't have your cake and eat it too? If you like the gray, weathered look, choose a gray-pigmented oil finish. Then you'll still get the other benefits of having a finish on your outdoor wood.



Apply exterior oil finish with a brush or spray. Thoroughly saturate the surface and then brush out or rag off any finish that doesn't soak in.

Revitalize Gray Weathered Wood

If your furniture has turned gray or dull, you can restore its natural beauty by using a wood cleaner before you stain. Wood cleaners are often called "deck cleaners." They're available at most paint stores and home centers. Apply the

cleaner with a brush or sprayer and let it soak awhile. Then scrub briskly and hose it off. When the wood is thoroughly dry, it's ready for a fresh coat of finish.



Weathered and gray, this redwood board has gone through many seasons without being finished.



Cleaned and brightened, this section of the board appears much lighter.



Finished with pigmented exterior oil, this section of the board looks virtually brand-new.



An easy test determines the condition of an exterior oil finish. If the water soaks in, it's time to recoat.



SHOW THE GRAIN

You have several choices if you want the wood's grain to show. Exterior oil finishes are available as clear oil or with pigments added. Clear finishes are actually amber-colored, because of the oil they contain—they give the wood a rich, oiled look. Pigmented oil finishes add color to the wood. They're generally available in three formulations: toned (or transparent), semi-transparent or opaque, depending on the amount of pigment they contain.

As you can probably guess, there's a tradeoff between an exterior oil finish's clarity and its longevity: longevity increases—and clarity decreases—according to the amount of pigment a stain contains.

SOAK, THEN WIPE

The best way to apply an exterior oil finish is with a brush; you can also use a hand-pump-style sprayer (available at garden stores and home centers for about \$15). Saturate the surface with finish and keep it wet until the oil stops being absorbed. This process can take from five minutes to half an hour, depending on the type of wood and the brand of finish. Some brands recommend two or more coats. Pay special attention to the end grain, as it will

absorb more finish than face grain. Brush out or rag off any oil that remains on the surface of the wood to avoid sticky, shiny spots.

MAINTENANCE IS MANDATORY

Knowing when to re-apply an exterior oil finish is the key to keeping outdoor wood looking good. If you wait until the finish breaks down, the wood will turn gray, and cracks, checks and mildew may appear. Fortunately, there's an easy way to tell when it's time to recoat. It's called the splash test. You simply splash some water onto your furniture. If it soaks into the wood, it's time to recoat.

Most clear exterior oil finishes are warranted by the manufacturer to last a couple years. However, a clear oil finish that's constantly exposed to intense sunlight will likely need to be renewed more often. Semi-transparent oil finishes may be warranted up to 5 years; opaque finishes are usually warranted even longer.

Outdoor furniture will accumulate a layer of dirt and grime over time, so hose it down and scrub it a bit prior to recoating. Let the wood dry thoroughly before applying the fresh coat of finish.

User-Friendly Oil Finishes

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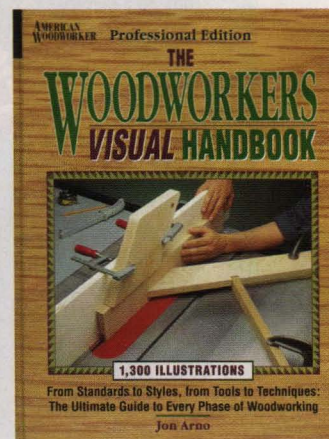
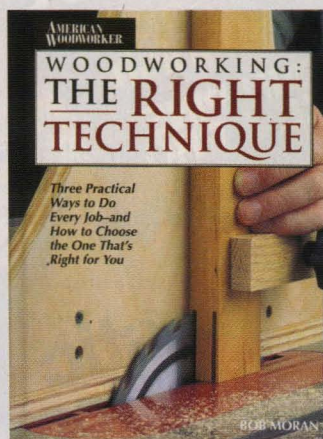
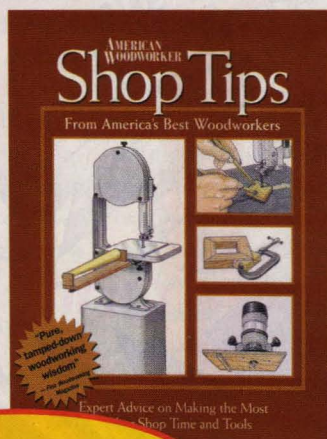
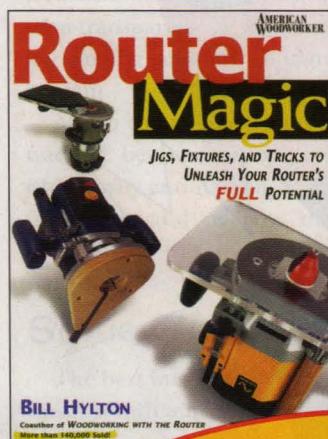
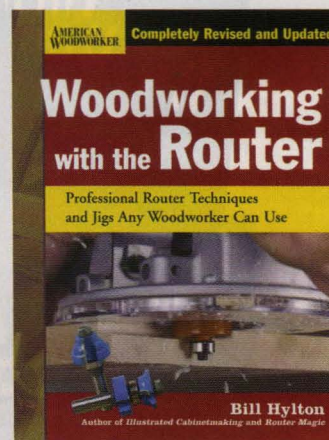
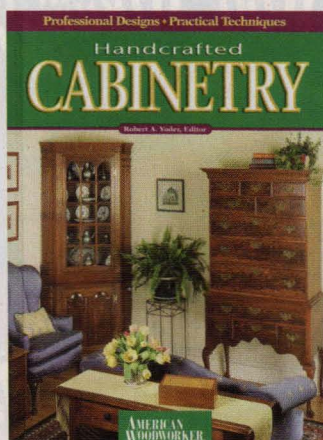
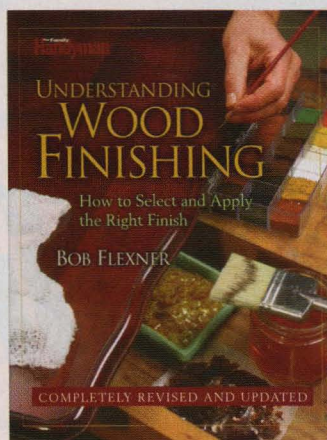
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Wooden Spring Tongs

by David Radtke

Here's a great kitchen utensil you're sure to find indispensable. These wooden tongs feature a unique spring tab mechanism built into a knuckle joint. The joint allows the tongs to be folded flat for storage. When the tongs are opened up, the spring tabs contact each other so the tongs want to spring back open (Fig. A, page 66).

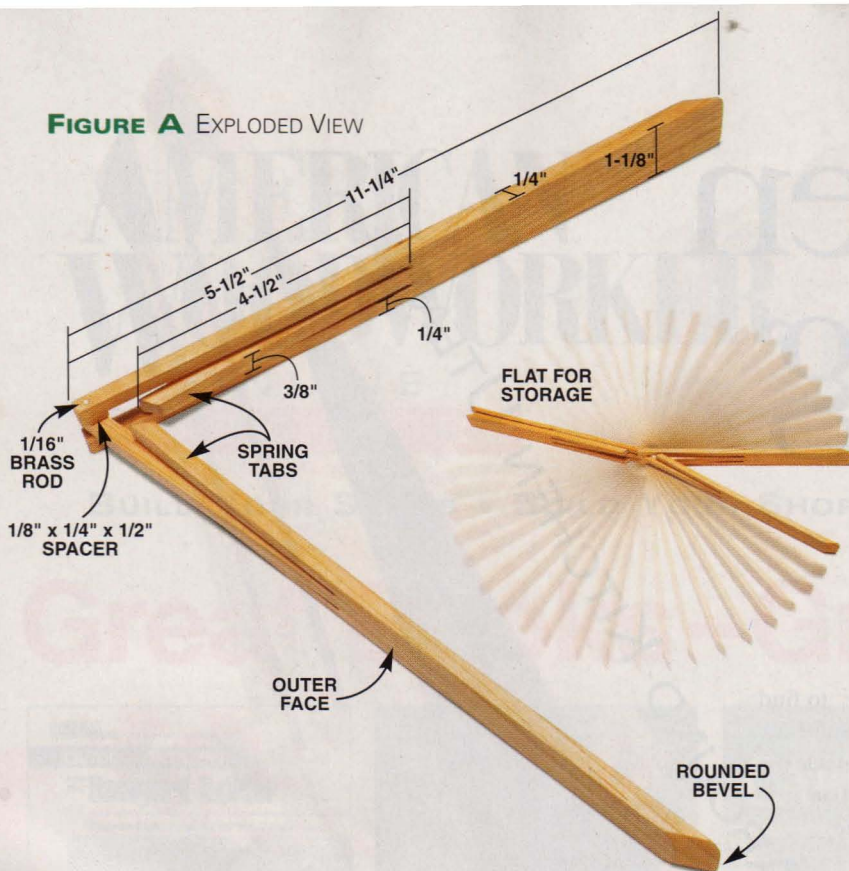
This is the same action found in those metal tongs used by chefs the world over. Tongs are perfect for everything from plucking corn-on-the-cob out of boiling water to fetching a trapped piece of toast from a toaster. Of course, they also shine as a salad server. It's one of those projects you'll enjoy using so much you'll want to make more as gifts for friends and family.

A GREAT ALL-AROUND KITCHEN UTENSIL

EDITOR: DAVE MUNKITTRICK



FIGURE A EXPLODED VIEW



No doubt there's lots of scrap wood in your shop just looking to be fashioned into something useful. Closed grain or semi-porous woods like cherry, walnut and maple make good tong material. The tongs are easy to make. There's a little bit of steam bending, but even that is low tech and straight forward. Feel free to experiment with the length and width of the tongs for a variety of uses.

CREATE THE SPRING TABS

Each half of the tong starts out exactly the same. Cut the two tong blanks (Fig. A.). Next, set your table saw to rip tabs on each blank (Photo 1). Mark the outer face on each blank and rip the tabs with the outer face up.

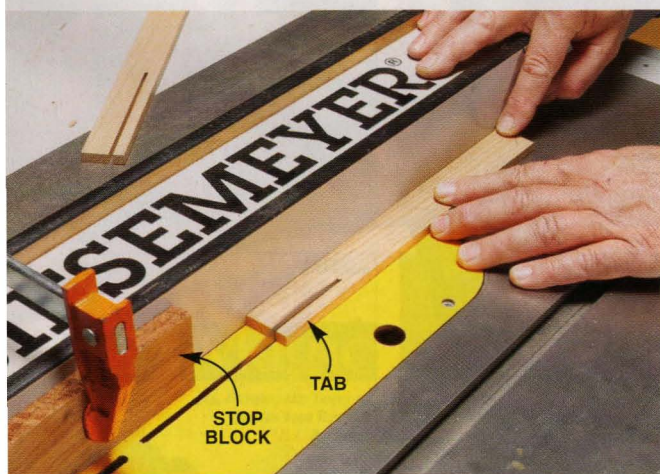
Cut two 1/2 in. long spacers to fill the saw kerfs at the end of one of the tongs. Glue and clamp them to the outer tabs only (Photo 2). Let the glue cure.

Measure down one inch from the end of each blank and mark the starting point of the bearing angles on each tab. Use a small handsaw to cut a 45-degrees angle on the center tab of the tong with spacers. Then cut the two outer tines on the other blank (Photo 3). It's necessary to insert a spacer to cut the center tab. Take care not to push the tab up too far or it may crack.

Next, fill a tray with two inches of hot water and submerge the blanks (Photo 4). Let the blanks soak for about half an hour. Pull the blanks out of the water and separate the tabs with a spacer (Photo 5). Apply heat with a heat gun set on high for about 1-1/2 minutes. Keep the heat gun moving on all sides of the tabs to avoid scorching and to heat the tab uniformly. Leave the spacers in place and let each piece cool to room temperature. The spring tabs are now permanently set.

ASSEMBLE THE KNUCKLE JOINT

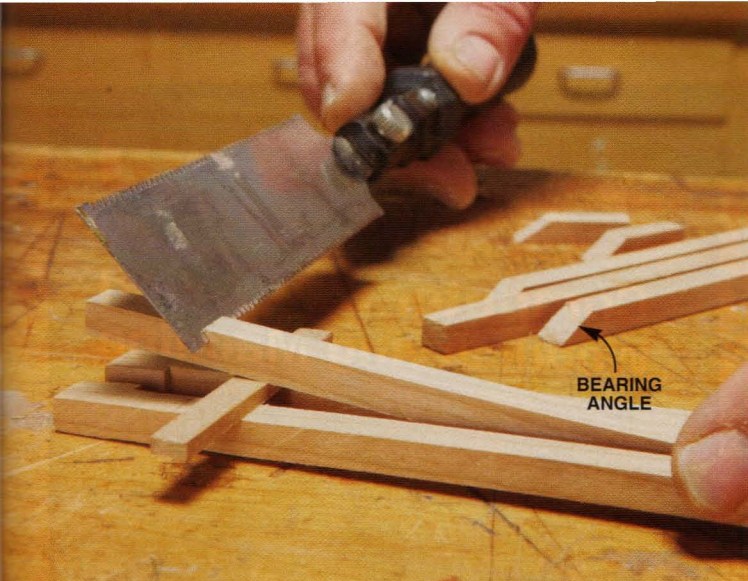
Clamp the two blanks together with the bent tines facing out (Photo 6). Measure down 1/4 in. from the end and then drill a 1/16 in. hole through



1 Cut saw kerfs in each blank to create the spring tabs. Set the fence to cut the outer kerf on each blank first. Then, reset the fence to cut the inner kerfs. Clamp a stop to the fence and keep the same face up for both cuts so each tab is equal in length.



2 Glue spacers to the outer tabs. Place small pieces of paper next to the spacers to avoid accidentally gluing them to the middle tab. Use water resistant glue.



3 Cut 45-degree bearing angles for the spring tabs with a fine crosscut saw. Cut the middle tab on the tong with the spacers and the two outer tabs on the other tong. Use a piece of scrap to lift the middle tab for cutting.



5 Set the spring in the tabs by inserting a 1/8 in. spacer between them and applying heat. Use a heat gun on high and keep rotating the tong to prevent scorching.

all the tines. Push a 1/16 in. brass rod (available at hardware stores) into the hole and cut it flush with a side cutter (Photo 7).

FINISH THE TONGS

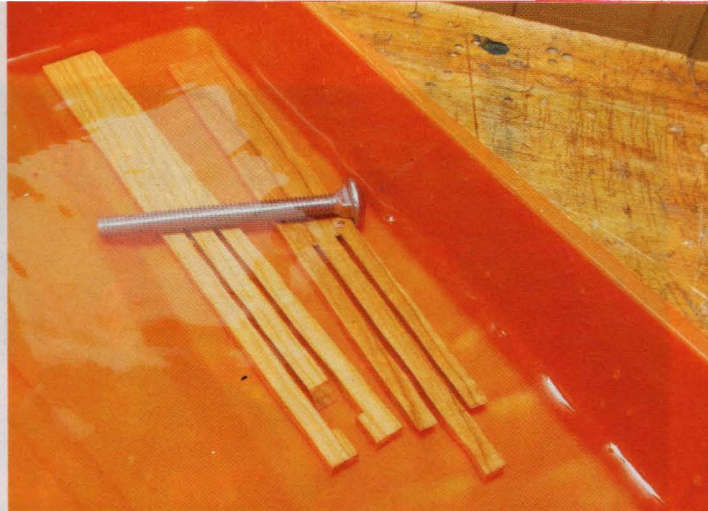
Shape the round beveled end of the tongs with a belt or disc sander (Photo 8). Finish sand the tongs' surfaces to 220-grit. Brush a liberal coating of walnut oil (available at health food stores) onto the tongs. Let it soak for 10 minutes or so and wipe it dry. Walnut oil is a completely non-toxic drying oil.

Unlike metal tongs, wooden tongs should never soak in hot soapy water or be put through a dishwasher. Just rinse with warm water and wipe them dry. Recoat with oil whenever they start to look "dry."

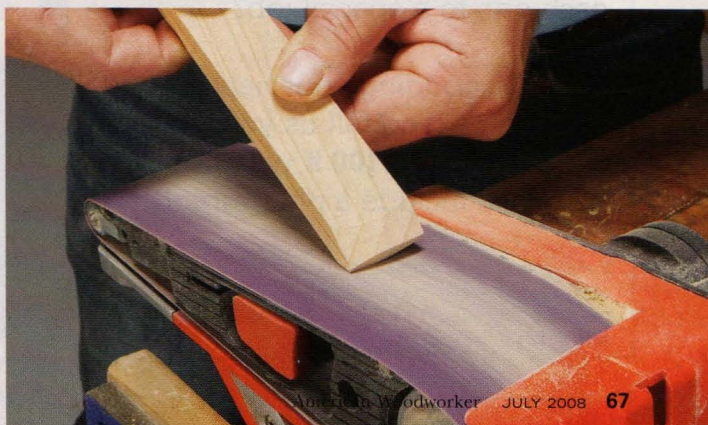
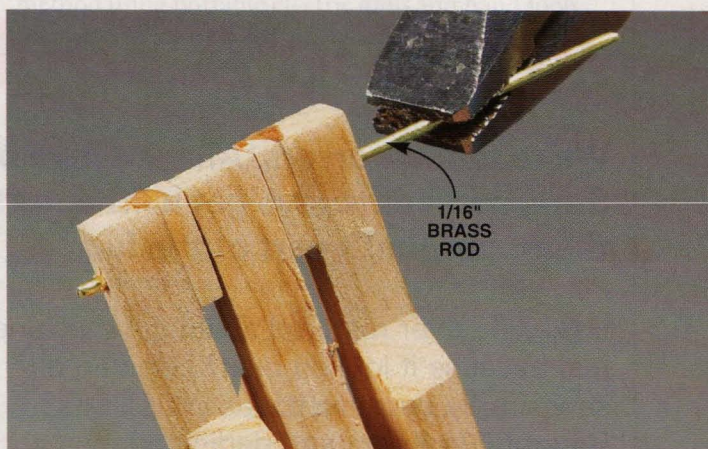
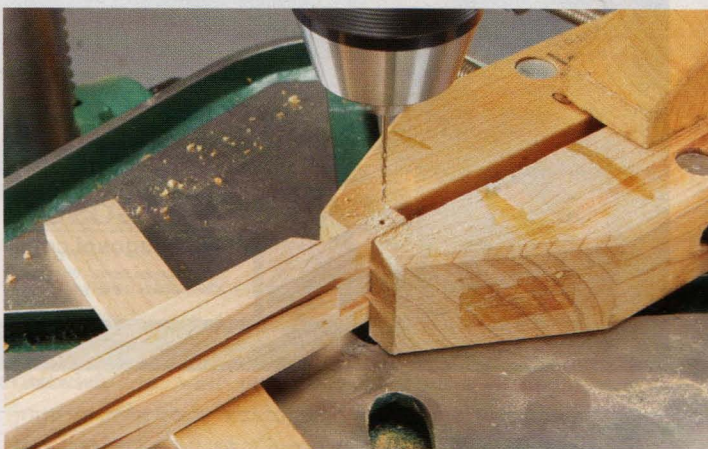
6 Clamp the end of the tongs together with the bent tabs facing out. Drill a 1/16-in. dia. hole through the tabs to create a pivot point for the knuckle joint connecting the tongs.

7 Push a brass rod into the hole to hinge the knuckle joint. Cut the excess rod to length with a wire cutter. File the ends flush. This will flare the ends of the rod and lock it in place.

8 Open the tongs so the spring tabs are engaged. Then push the tong halves together. Shape the outside faces on a belt sander. Gently rock the tongs as you sand to produce a slightly rounded bevel on the ends.



4 Soak the blanks in hot water for about 30 minutes. Place a weight on the wood to keep it submerged.



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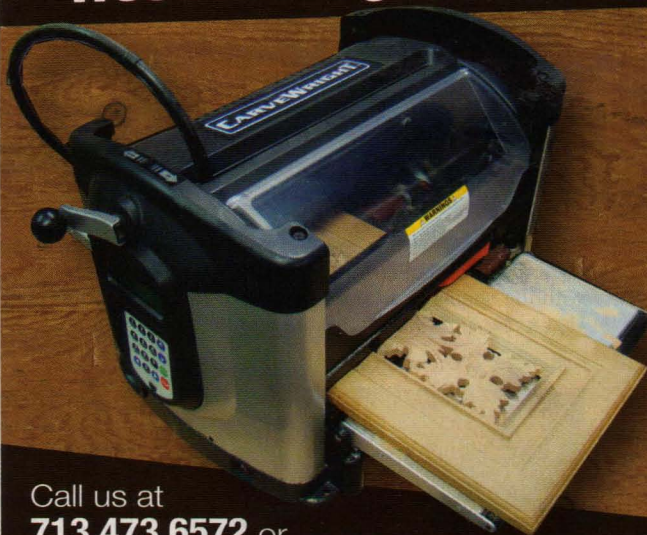
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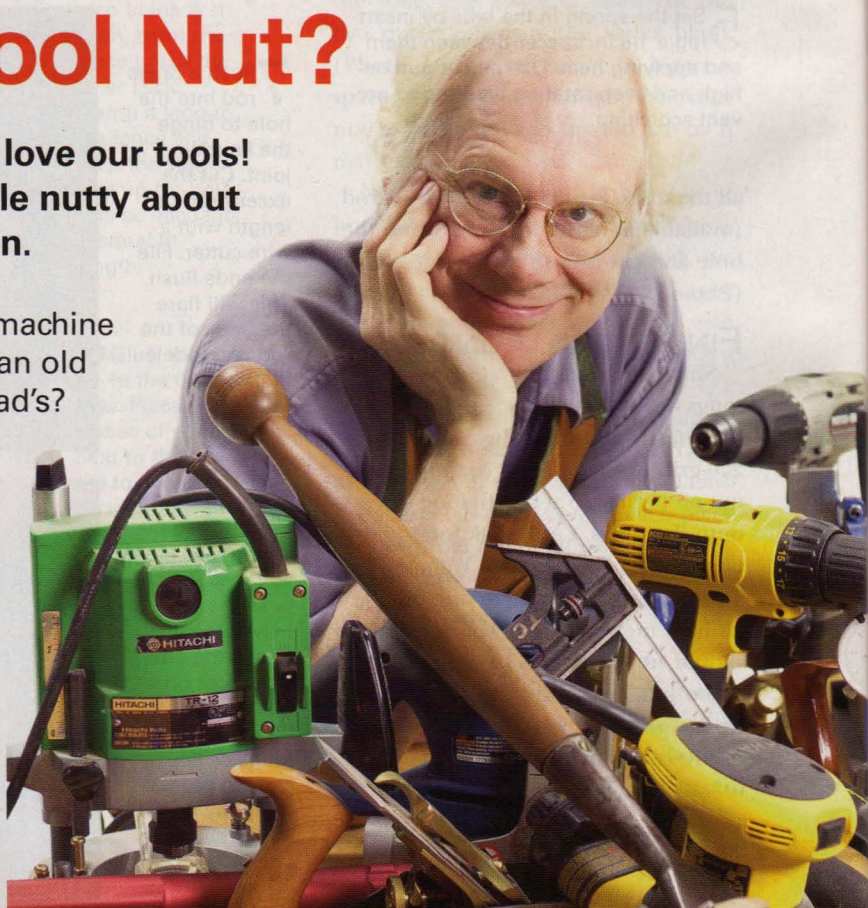
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Breadboard Ends

Cut precision joints on a large top.

Breadboard ends are old devices for improving a solid-wood top. They act like cleats to hold the top flat, which is particularly important when there's minimal understructure, such as on a trestle table. Breadboard ends also cover end grain, which can help prevent a top from cracking. They're often used on boards for kneading dough or cutting bread (thus the name), but breadboard ends have also traditionally been used on dining tables, kitchen work tables, desks, library tables, and workbenches.

Cabinetmakers realized long ago that breadboard ends add visual interest, too. As your eye scans down the length of a top with breadboard ends, it stops at an end piece, turns, follows it, and returns down the

tabletop.

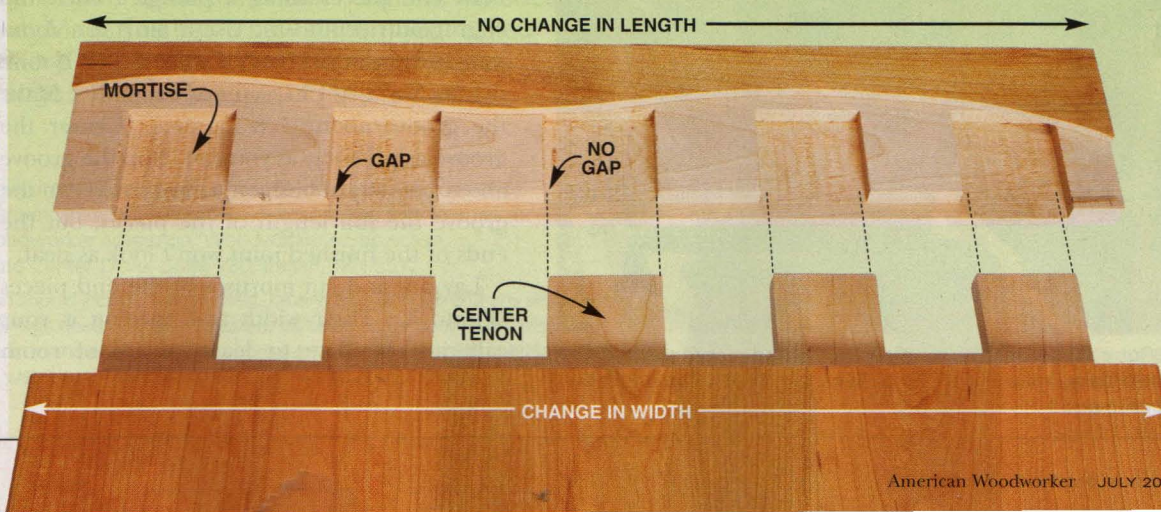
The ends keep your eye moving, making a top look more dynamic.

Narrow breadboard ends, like those used on cutting boards, are usually held on with a simple tongue and groove joint. Breadboard ends that are over 1-1/2-in. wide or so benefit from a stronger joint (see below). Making this joint on a big tabletop can be a bit of a problem, though. Here's a method using portable electric tools and hand tools that will work with a top of any size.

INSIDE A BREADBOARD JOINT

A wide breadboard end needs plenty of support, so it won't break off if somebody leans on it. That support is provided by a series of long tenons, which fit into deep mortises.

The trick in designing this joint is to accommodate wood movement. As humidity changes with the seasons, a tabletop expands and contracts across the grain. The breadboard end won't get shorter and longer, though: its length stays the same. To allow the top to move inside the breadboard end, most of the tenons are 1/16-in. to 1/8-in. narrower than their mortises. The center tenon is the same width as its mortise. This equalizes the amount that both sides of the top will move.





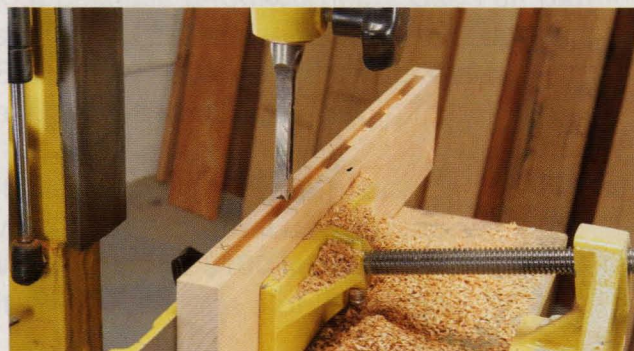
1 Your top must be flat before cutting breadboard-end joints. If it's cupped, plane across the grain to remove the high spots. This advanced technique requires skill and practice.



2 Rout a square, straight end on the tabletop using a guide board and a top-bearing flush trim bit.



3 Make the end pieces next. Use a plunge router to cut a shallow, stopped groove down the length of each piece. Make sure the groove is centered side-to-side.



4 Cut a series of deep mortises in the end pieces using a mortising machine. The mortising bit is the same width as the groove.

PREPARE THE TOP

Breadboard end joints are very difficult to make if your top is slightly cupped. It pays to do whatever you can to ensure that the top is flat when you glue it up, such as clamping heavy battens across the ends. If your top is still cupped, despite your best efforts, you can clamp it flat to a workbench while you make the joints. You'll be flipping the top over now and then, though, which will be awkward.

You may also use a belt sander or a large plane, such as a No. 6 or a No. 7, to flatten a cupped top (Photo 1). This requires skill and practice, whichever tool you use. It's important to flatten both sides, because they will be reference surfaces for making the tenons. Measure the thickness of your top at both ends when you're done. It should be the same all the way across, to make the joints easier to fit. It also helps if both ends are the same thickness.

Next, make the ends straight and square. The easiest way to do this is to use a router, a wide guide board, and a top-bearing flush trim bit (Photo 2, and Sources, page 73). Make the guide board from 1/4- or 1/2-in.-thick hardboard or MDF, about 12 in. wide and 3 to 4 in. longer than the width of your top. Clamp a sacrificial piece to the right side of the guide board to prevent tearout on the top's edge.

MORTISE THE ENDS

Mill the breadboard ends the same thickness as the top. Make an extra piece to test your setups along the way. Their width is up to you; on a long or wide top, such as a dining table, ends that are 2-1/2 in. to 4 in. wide look about right; the ends shown here are 3-1/2 in. wide.

Cut a stopped groove down the length of both end pieces using a plunge router and edge guide (Photo 3). Use a bit that's about one-third the thickness of your top (a 1/4-in. dia. bit for a 3/4 in. top, for example). Make the groove about 3/8 in. deep. Center the groove as precisely as you can. Stop the groove about 1-in. shy of both ends. You could run the groove the full length of the pieces, but the ends of the finished joint won't look as neat.

Lay out and cut mortises in the end pieces (Photo 4). Their width and spacing is your call; just be sure to leave plenty of room

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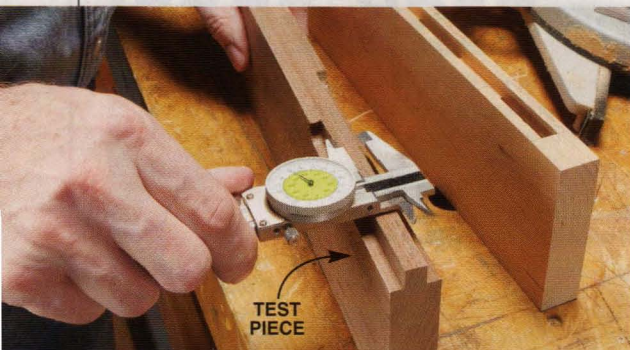
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The description should include woods used, joinery, type of finish and any story behind the piece. Only high quality digital images will be selected for publication. Make sure you put some time and effort into your photography. For tips on taking better photos, check out our web page: (www.americanwoodworker.com/phototips).

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5 Mill a test piece that's the same thickness as your top. Use a router and edge guide to form a tongue on the test piece. Make the tongue the same width as the groove.

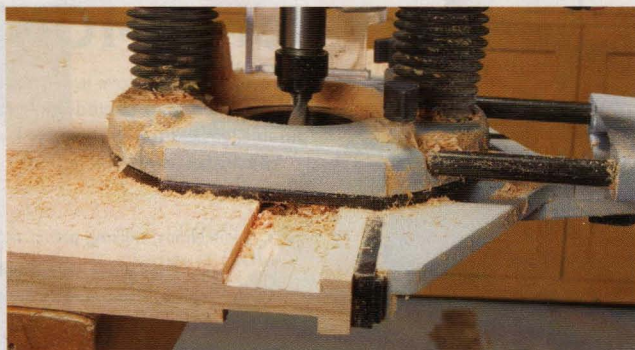
between them, so as not to unduly weaken the end pieces. Make the mortises 1-1/2 in. to 2 in. deep (the ones shown here are 2 in. deep).

CUT THE TENONS

Chuck a 1/2 in. or 3/4 in.-dia. bit in your router. Set the depth of cut equal to the distance between the face of the end piece and the groove. Place the router on the top of the test piece (not on its edge), and rout a tongue (Photo 5). Check the tongue's thickness—it should be equal to the width of the groove and mortises. If you readjust the router's depth of cut, be sure to rout from both faces of the test piece.

Rout the ends of the table top (Photo 6). This requires a series of overlapping cuts, on both sides of the top. Start with the outermost cut, then flip the top to repeat the same cut on the opposite side. Reset the edge guide and work your way in. The last cut, which creates the tenons' shoulders, must be absolutely straight. Shift the router's edge guide only 1/16 in. or so to make this cut—that should do the trick. Saw off the support piece (Photo 7). The resulting tenon should be 1/16 in. shorter than the depth of the mortises.

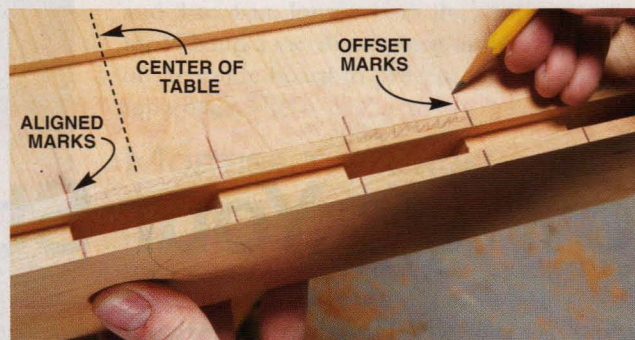
Lay out the individual tenons (Photo 8). Mark the center tenon the exact width of its corresponding mortise. Mark the next tenons about 1/16-in. narrower, on both sides, than their mortises. This offset should get larger as you go, depending on how wide your top is, how much your species of wood moves, the humidity range in your area, etc. As a general rule, an 1/8-in. offset on both sides of the tenon should be sufficient for most tops.



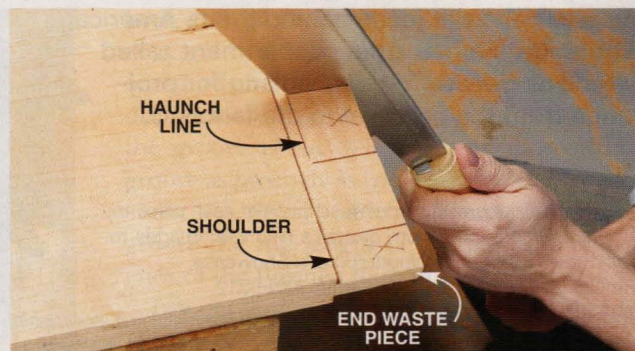
6 Rout wide dados across both sides of the top to start forming the tenons. Leave a strip of wood uncut to support the router.



7 Saw off the support piece by hand or use a jigsaw. It doesn't matter if the sawn edge is a bit uneven or out of square.



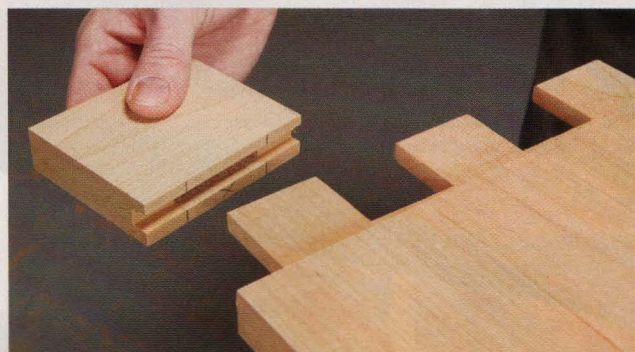
8 Place an end piece next to the top. Mark the center tenon exactly in line with its mortise. Mark the other tenons narrower than their mortises.



9 Cut the tenons. Stop most of the cuts at the haunch line. At the outer ends, saw full depth, then saw near the shoulder to remove the end waste piece.



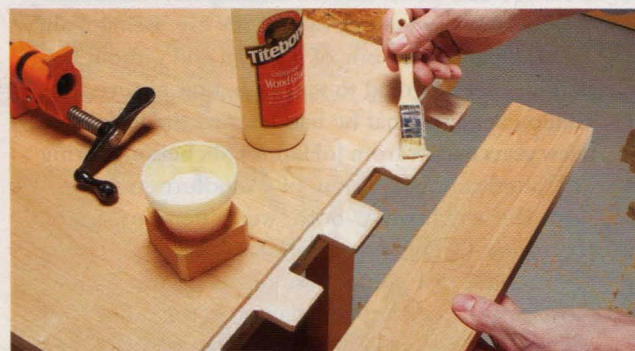
10 Cut the waste between the tenons using a coping saw. Twist the blade so it's at a right angle to the saw's frame.



11 Test each tenon's fit using a short piece of wood that has the same groove and mortise as the end pieces. Ideally, this test piece should slip over the tenon with very little effort.



12 Use a router plane or rabbet plane to pare the tenons thinner, if necessary. Support the router plane with the test piece you made that's the same thickness as the top.



13 Apply yellow glue across the entire joint. When dry, this glue has enough give to allow the top to slowly expand and contract with the seasons.

Draw a line across the top to lay out the haunches (the short segments between the tenons). Make the haunches 1/16-in. shorter than the depth of the grooves in the end pieces to ensure that the joint's shoulders fit tight. Saw the tenons (Photos 9 and 10). After removing the end waste pieces, pare the shoulders even using a chisel or a trim router and a flush-trim bit.

FIT THE JOINT

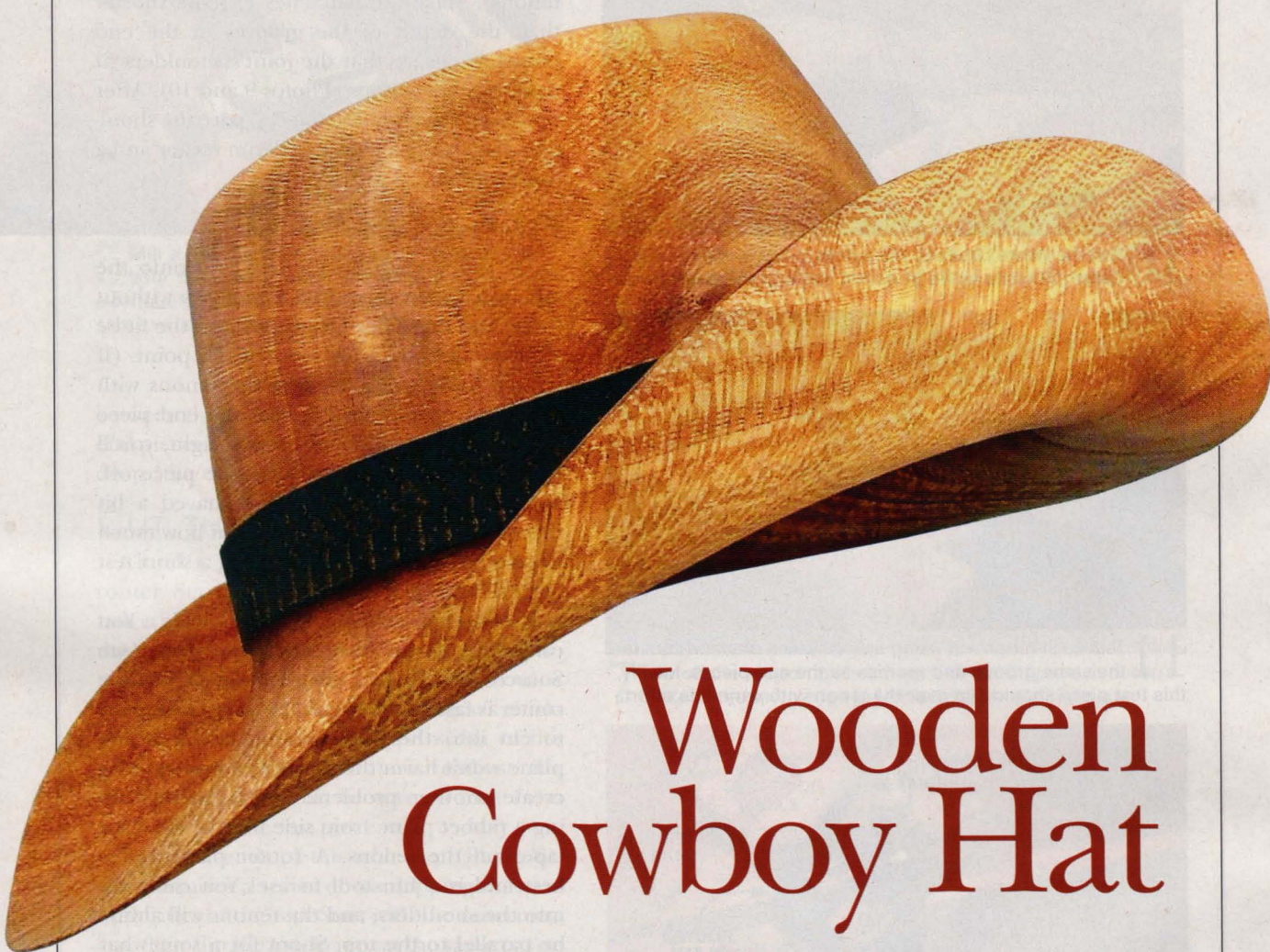
Try fitting each breadboard end onto the tabletop. Chances are that it won't go without force, and that's fine. It's better that the fit be a bit too tight than too loose at this point. (If it's too loose, you can shim the tenons with glued-on veneer.) Don't strike the end piece with a hammer; if the fit is that tight, you'll have a very hard time getting the piece off. Typically, the tenons must be shaved a bit thinner. The best way to figure out how much to take off, and where, is by using a short test piece (Photo 11).

Pare the tenons as needed (Photo 12). You can use an electric router, a router plane (see Sources, below), or a rabbet plane. An electric router is fast, but you must be very careful not to cut into the joint's shoulders. A rabbet plane won't harm the shoulders, but you may create another problem: inadvertently leaning a rabbet plane from side to side will cut a taper on the tenons. A router plane works best—and is a fun tool to use! You can't cut into the shoulders, and the tenons will always be parallel to the top. Shoot for a somewhat loose fit for the breadboard ends. You should be able to push them home with hand pressure alone.

Use yellow (PVA) glue to secure the breadboard ends to the top (Photo 13). In the Titebond series of glues, use Titebond Original, which may provide more stretch than Titebond II or III. If you expect a large amount of movement in your top, don't glue the outermost mortises and tenons. Even up the top and breadboard ends using a hand plane, scraper plane, or random-orbit sander.

Sources

Freud, www.freudtools.com, 800-334-4107, Top bearing flush trim bit, 1" dia., #50-112, \$30.
Lee Valley, www.leevalley.com, 800-871-8158, Veritas Router Plane, #05P38.01, \$135.



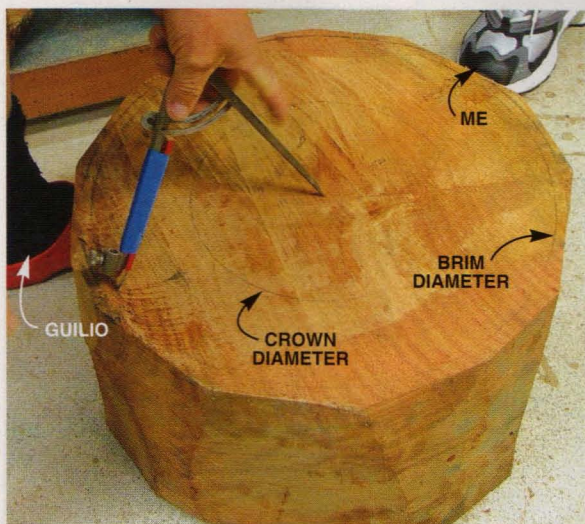
Wooden Cowboy Hat

A TEXAS TURNER TRAVELS "DOWN UNDER"
TO FIND THE PERFECT CHAPEAU.

From the time I turned my first bowl over 40 years ago I've been captivated by the spiritual nature of creating art on the lathe. I met many talented woodturners during the '70s and '80s, when I taught woodworking in Sydney, Australia, but at the time, I didn't take the initiative to learn from them. Big mistake! Woodturning was about to experience phenomenal innovation and tremendous growth, and Australian woodturners and manufacturers were to be enormously influential. When I returned to visit Australia in 2002, the advances in techniques and equipment were so dramatic, I felt as if I was discovering woodturning for the first time.

Guilio Marcolongo is one of the Australian wood-

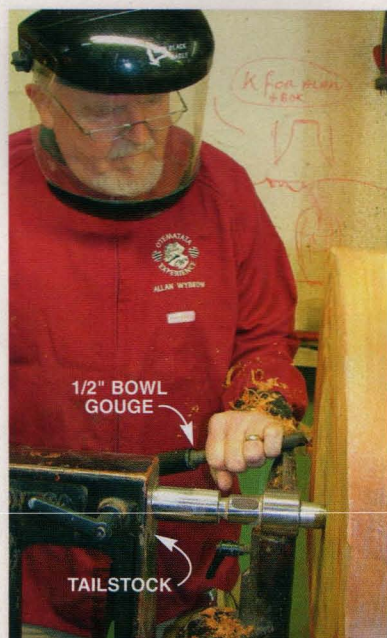
turners who inspired me and helped develop my turning skills. When I visited his shop last year, a striking wooden cowboy hat caught my eye. Being from Texas, I had to have one of my own, and without hesitation, Guilio agreed to teach me how to turn one. Guilio explained that he had learned the technique a few years earlier from JoHannes Michelson, during an American Association of Woodturners symposium at which they both were demonstrating. JoHannes, of Vermont (www.woodhat.com), is one of America's two premier hat-turners. Chris Ramsey of Kentucky (www.knot-head.com) is the other. This is the story of my own hat-turning experience.



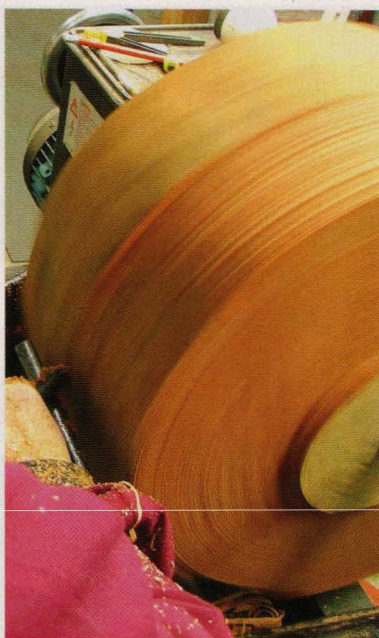
1 My hat starts out as a green wood, 100-lb. slab of Australian Coastal Banksia, a gift from my instructor, Guilio Marcolongo. The first step is to establish the hat's crown and brim diameters.



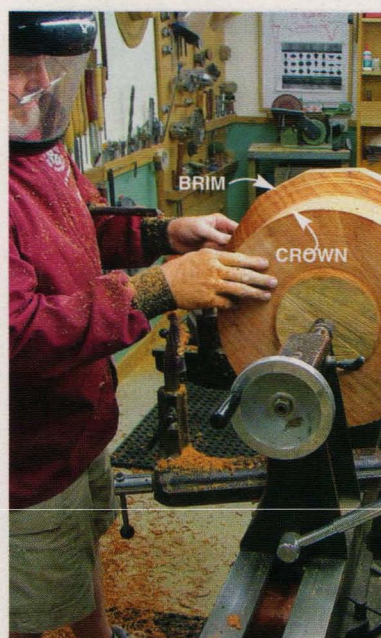
2 A slab of this size and weight requires a heavy-duty lathe. I attach a faceplate so I can mount the slab on the headstock. Eventually, the area around the faceplate will be hollowed out to fit over my head.



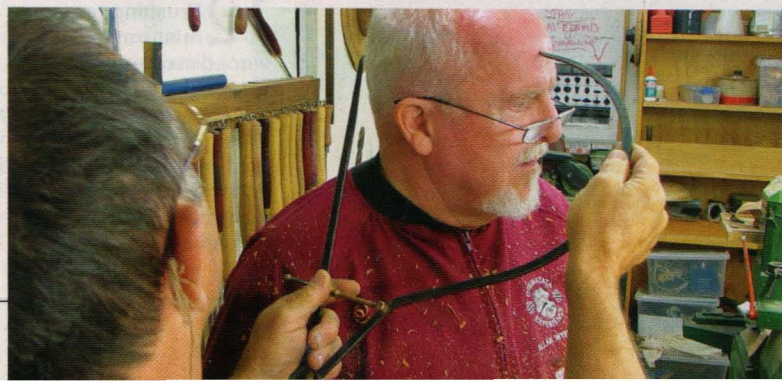
3 I discover that "facing off" (leveling) the end of that huge hunk of wet, spinning wood takes nerves of steel. The rough, unbalanced slab requires support from the tailstock as well as the headstock.



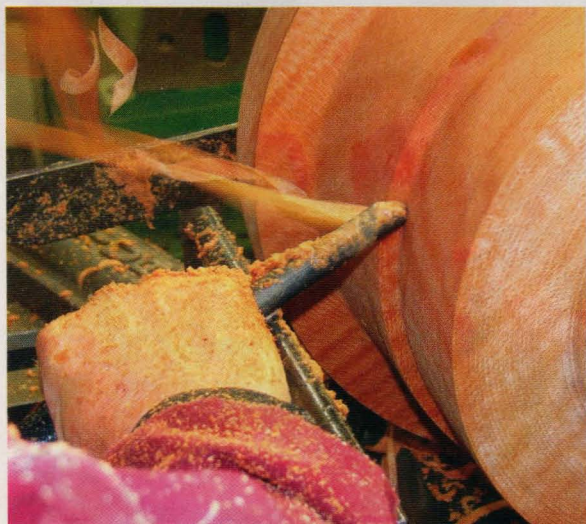
4 As I true the edge of the blank, I'm amazed how difficult it is to keep the gouge steady. Turning a slab of this size and mass is challenging, to say the least!



5 This project requires razor-sharp tools, so I stop often to resharpen. I'm feeling more comfortable now, because the rough turning is completed and the blank is balanced. The brim and crown are just starting to take shape.



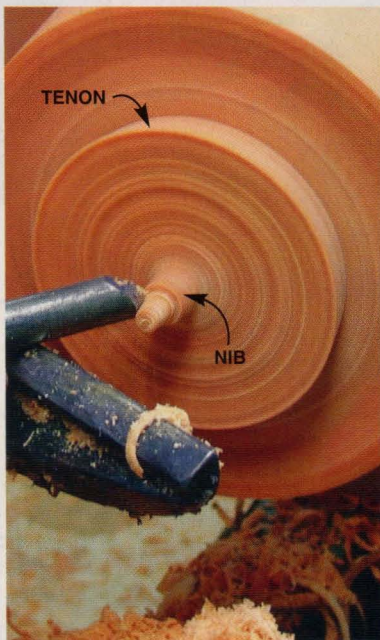
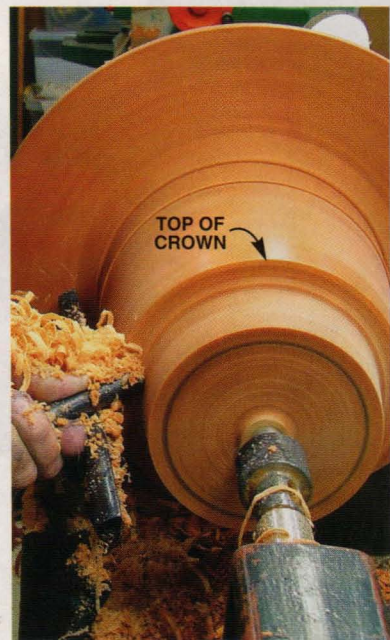
6 Guilio measures for my hat size. Since our heads are oval, he measures the length and width of my head and applies those numbers to a hat size-calculating formula to determine the appropriate size.



7 Now the curly shavings begin to slice off like butter. Water liberated from the green wood runs down my bowl gouge onto my arm and feet. Waterproof clothing, Guilio says, is fashionable attire for green-wood turners.



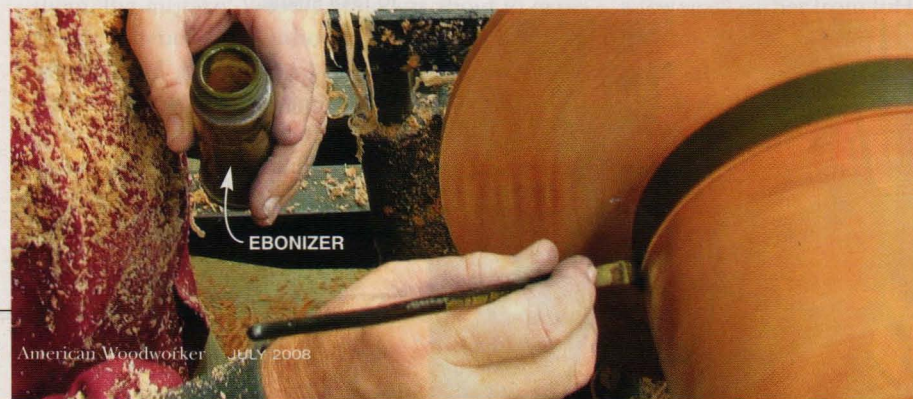
8 Nearing the final shape, we pause to measure the crown, making allowance for the final inside size. Hat-turning may be an art, but it's an art that requires precise measuring. Specialty calipers make this task easier.



9 After thinning the brim to 3/8 in., I establish the top of the crown and begin to turn down the waste to create a tenon. When the hat is remounted to hollow out the crown, a four-jaw chuck will grip the tenon.

10 Once the dovetail-shaped tenon is correctly sized, I remove the tailstock support and pare away the nib. Thus far, my only turning tool has been a 1/2 in. bowl gouge with a modified fingernail grind.

11 I switch to a rounded skew to shape the crown and smooth the transition to the brim. You can clearly see the raised hatband.



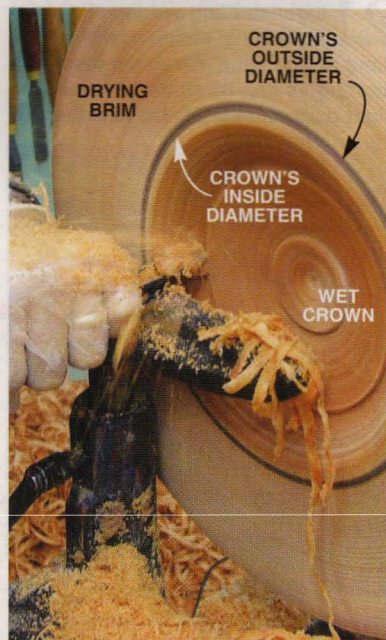
12 Brushing on a mixture of steel wool dissolved in apple cider vinegar creates the ebonized hatband. When the ferrous-rich mixture contacts tannin in the wood, the band turns black almost immediately.



13 A texturing wheel fitted onto a homemade handle creates a unique "woven" texture on the blackened hatband.



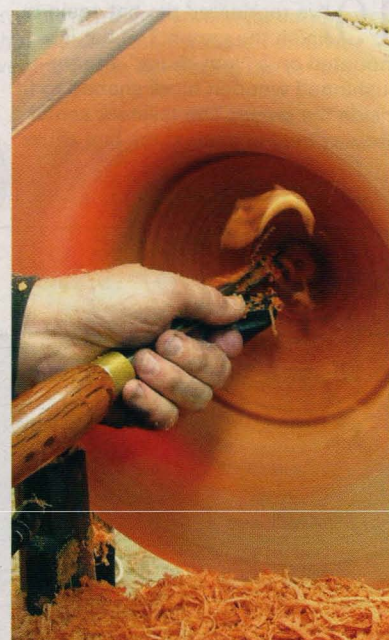
14 To finish the brim and hollow the crown, the hat must be turned around and remounted, while remaining perfectly centered. Guilio explains that the four-jaw chuck centers the top end by gripping the dovetailed tenon. At the other end, a cone center mounted in the tailstock centers the faceplate.



15 With the brim thinned to just over 1 mm, we remove the faceplate and tailstock. Wall thickness near the brim must be reduced quickly now, as the brim is starting to dry out. To keep the wood moist, we continuously spray the hat with water.

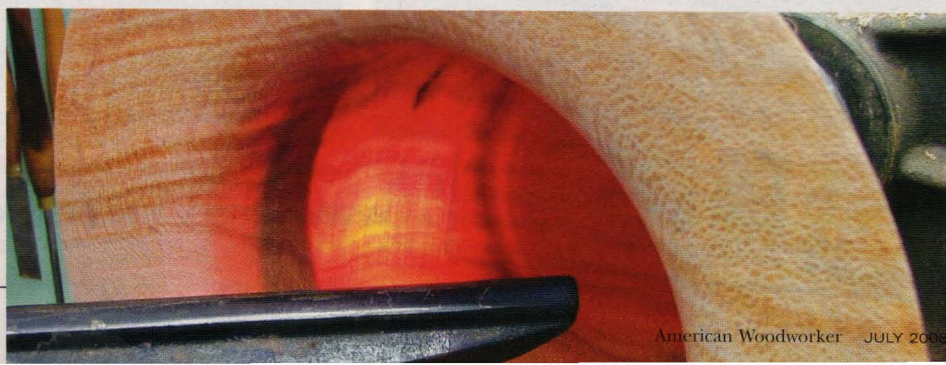


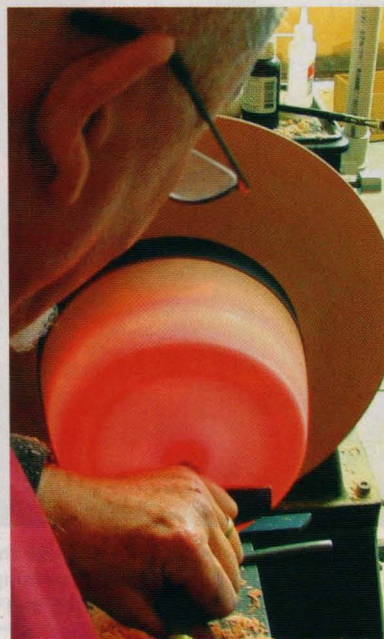
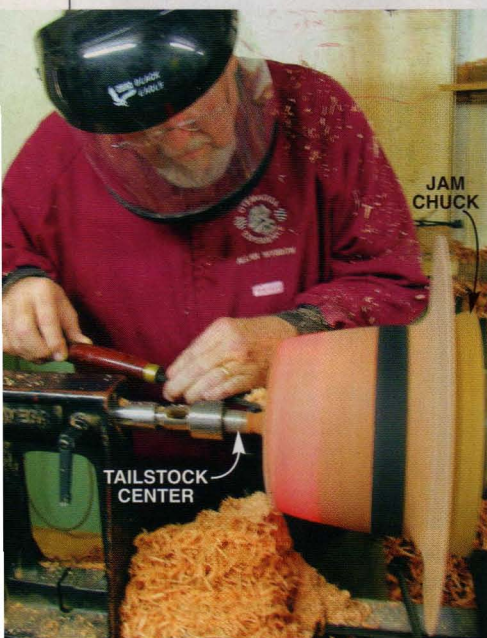
16 Wet wood is translucent, so bright light stationed behind makes it easy to establish uniform thickness across the brim. Using a very sharp bowl gouge, I simply "turn to the color" of the desired thickness.



17 With the brim at final thickness, I turn my attention to removing the waste from the center of the crown. I've returned to the 1/2 in. bowl gouge and positioned the tool rest inside the cavity for maximum support.

18 I've moved the light to the side of the hat and turned the crown's wall thickness "to color," as before. The end result is approximately 1 mm (3/64 in.) thick.





19 I've reoriented the hat again to finish the crown. The hat is mounted on a "jam chuck," a foam-cushioned wooden block shaped to fit inside the crown. The tailstock center presses the hat against the jam chuck.

20 A light inside the jam chuck allows me to achieve uniform thickness while I create the outside rim and domed center of the crown's top. This is delicate work.

21 Light sanding readies the hat for its final shaping, which is done off the lathe. When the hat is thoroughly dry, it will weigh about eight ounces, over 99 lbs. less than the original blank.

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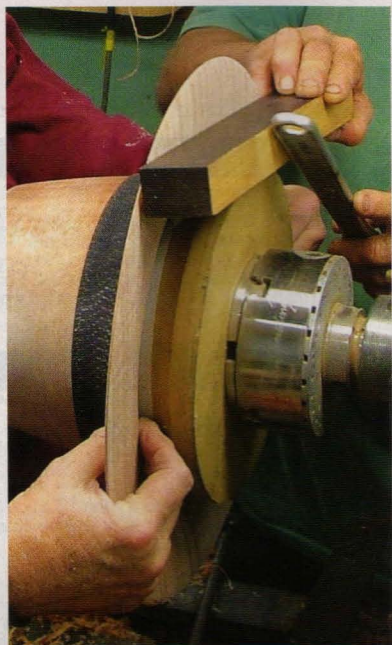
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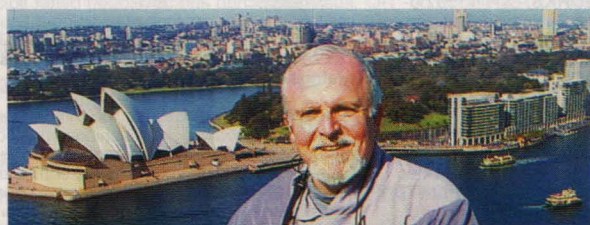
22 Removing the finished hat from the jam chuck is harrowing. The wood has shrunk during the process and I'm afraid one wrong tap will cause irreparable damage.



23 Tightening the threaded rod on a homemade bending jig compresses the hat into an oval shape that matches the measurements we took of my head. Our continuous re-wetting of the hat during the turning process has kept it pliable.



24 Installing heavy rubber bands gradually bends and shapes the brim. The threaded rod has to be adjusted occasionally to maintain the correct front-to-back and side-to-side measurements. Is my head too big now?



Working with wood has taken me to many parts of the world. From the American Midwest and Southwest, to West and Central Africa, to the sunburnt Australian outback, I have been blessed to meet and study with amazing woodworkers and experience a vast array of exotic wood species.

—Ray Lanham, www.coeur-de-larbre.com



25 I can hardly believe I did it! The hat stays in the bending form until it is thoroughly dry—about 150 hours, according to Guilio. Still to come are final sanding and multiple coats of wipe-on polyurethane.

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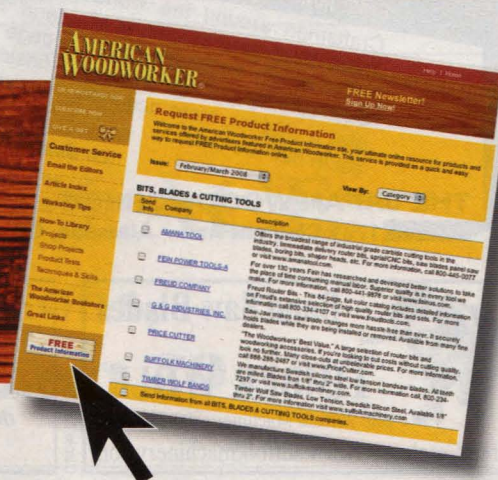
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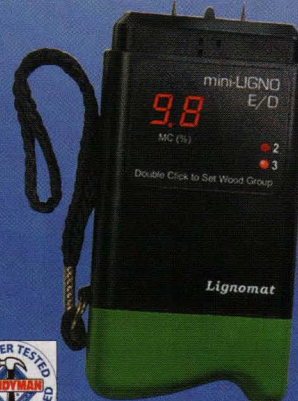
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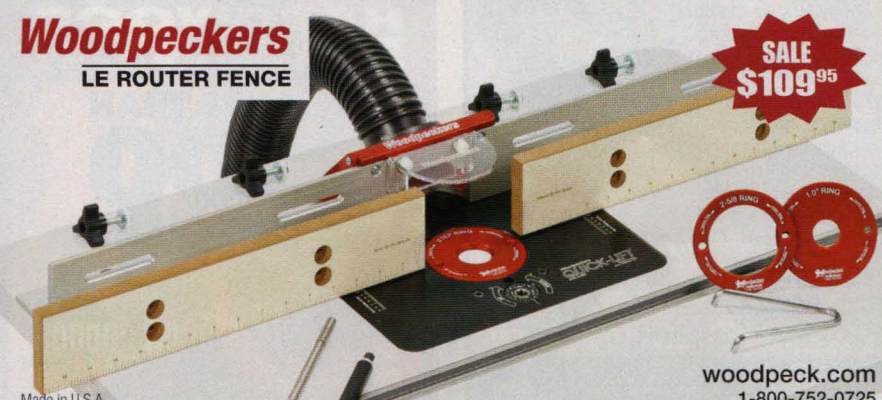
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Post and Beam Shop

I built my idea of the perfect woodworking shop behind our house in Winston-Salem, North Carolina. The building's post and beam structure is reminiscent of the barns I grew up with in Western Michigan. Raised in a five-generation dairy farming family, I really wanted my shop to feel like an old barn inside.

My shop stands above a two-car garage and has two levels. The main floor measures 23-ft. by 25-ft. One half of this space is open to the rafters; a beamed ceiling creates a lumber-storage loft over the other half. Bringing boards down from the loft is easy, thanks to the laws of gravity. Getting boards up there in the first place, however, is a quite different story!

Double 4-ft.-wide doors provide access to the center of the shop's main level. Post and beam construction provides an open floor that allows excellent work flow. Most of my tools are on mobile bases, so they can be easily moved when the need arises. My table saw and planer are oriented so I can process really long boards by opening the doors. Against the wall to the left are my two radial arm saws, which share a common 8-ft.-long table and mobile base. One saw is dedicated to crosscutting; the other is equipped with a dado set for joinery.





My workbench is located on the opposite wall, below a window that provides excellent working light as well as summer breezes. A smaller mobile bench serves as my assembly table. It has drawers on one end and shelves on the other for my portable power tools.

The shop has its own meter and 200-amp service. Each major tool is on a separate circuit. Outlets for portable tools are located waist-high all around the walls, as well as on the two support posts. I have grand plans to install a cyclone collector in the garage below and run permanent ductwork to each tool through the floor. Due to current budget restraints, however, I have to move a portable dust collector to each machine.

My shop has proven to be a great workspace; the only change I'd consider would be to make it bigger!

*Bruce Bradford
Winston-Salem, NC*

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BAD DOGGIE!

Remote control modules for my dust collector are located near every machine in my workshop. They resemble the remote that my three-year-old granddaughter Jasmin has learned to use to change TV channels.

Recently, she and I decided to paint one of her toys, so we went to my shop. As I searched for the paint and brush, she found one of the remotes and pushed the start button. The dust collector roared to life and its upper bag instantly plumped full of air. Accompanied by the sound of machinery, Jasmin's terrified screams were so startling I nearly had a heart attack. Grabbing my leg, she scampered up into my arms like a squirrel climbing a tree. Trembling in fear, she clung to me with a vise-like grip.

Quickly, I gathered my wits and found the stop button, but the infernal machine continued to rumble and growl as the bag deflated. Printed on the bag is a

large picture of a fox. Jasmin stared at the picture with huge bulging eyes. Tears flowed in torrents and sobs punctuated her

speech, but her message was clear: "BAD DOGGIE!" she cried.

Dale Thompson



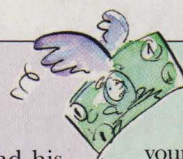
MOLDING MISHAP

My friend Tony asked me to help him install crown molding around his new kitchen cabinets. We set up the miter saw in his garage and went to work. The installations were going smoothly. We'd measure each cabinet section, and then cut the mitered moldings. Every piece we cut fit perfectly—we were on a roll!

But then a car pulled up in front of the house across the street. Out stepped the most gorgeous woman, wearing a skirt with a long slit up the side. Every time she took a step...well, you get the point.

We collected the last few molding pieces we'd cut and carried them to the kitchen. The first piece was several inches too short; the second was even farther off. In fact, none of the pieces fit. I guess girl-watching and woodworking are a bad combination.

Fred Johnsen



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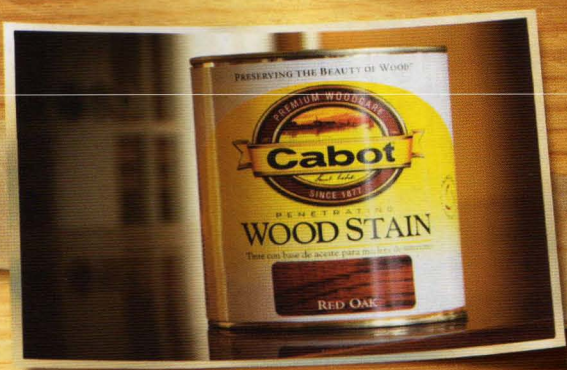


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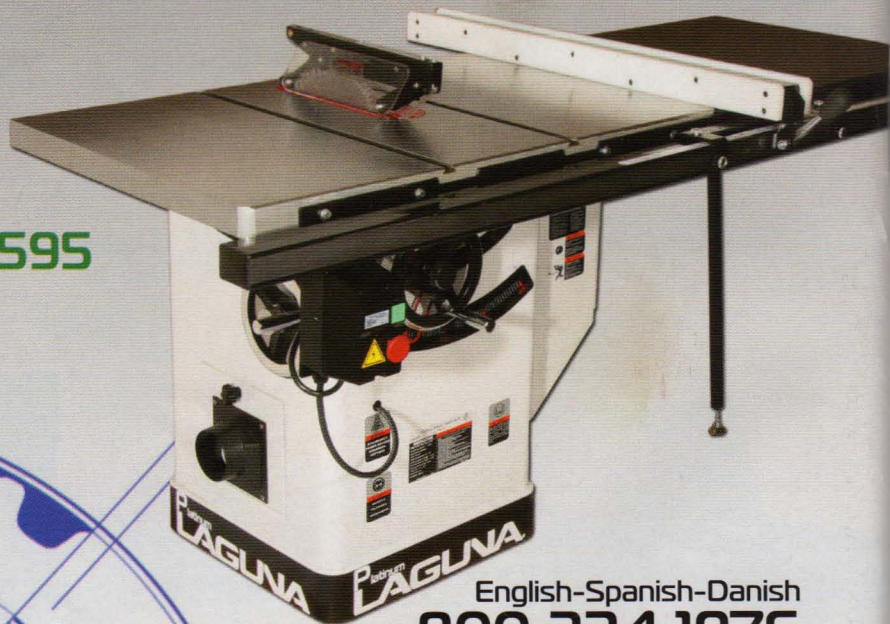
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