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Features

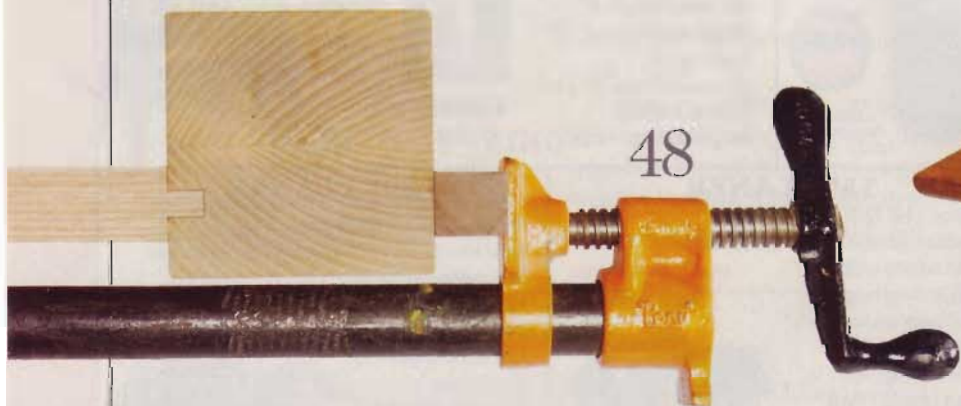
- 36 **Furniture Society 2007**
The annual conference has a Northwest flavor.
- 43 **ToolTest**
Benchtop Planers
Digital readout finally arrives.
- 48 **20 Tried and True**
Clamping Tips
The pressure's on: do it right!
- 52 **Curvy Coffee Table**
How do you make an entire table from one plank?
- 58 **Build A Recurve Bow**
Complete step-by-step for a popular kit.
- 66 **Tapered**
Sliding Dovetails
Sounds complicated, but they're really not.
- 70 **Ultimate Sharpening Station**
Grind and hone at one dedicated spot.



43



36



48



58



52

Departments

8 Mailbox

Editor flamed as "idiot" and more.

10 Question & Answer

Make flat raised-panels, understand a vise's toe-in, build a plane-iron chisel and install a coping saw blade in the right direction.

14 Workshop Tips

Winners for the 2007 Tool Giveaway include a support arm for a crosscut sled, a method to enlarge holes with a rabbeting bit, a universal featherboard, a router table micro-adjust, a jug for cleaning an HVLP sprayer and rare-earth magnets used to align a tablesaw fence.

18 Tool Nut

Grandfather's Delta machines launched a small business selling vintage tools.

20 Well-Equipped Shop

Grizzly 25-in. planer, Pinnacle honing guide, CMT dado set, Lee Valley bench clamp, louver-door templates for the Leigh FMT and Snappy pocket-hole bits and driver.

28 School News

MIT Hobby Shop
Even brainy engineers benefit from hands-on woodworking.

34 My Shop

"I do what I love in a space that I love."

82 Build Your Skills

Brush a Tabletop
A pro shares his hard-won secrets.

88 Oops!

A birds-eye maple shed?!



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EDITOR'S LETTER

Birth of a Woodworker

I visited dozens of woodworkers across the U.S. and Canada over the past several months. For some, woodworking is a livelihood; for others, a pastime. Meeting so many creative and talented people, I was reminded how versatile wood can be. It's pretty amazing stuff. Wood can be shaped, carved and joined with relative ease, producing a product that is strong, beautiful and useful. If properly cared for, our wooden creations will last for many generations.

In Boston, I visited the legendary North Bennet Street School, where students master both hand and power tools while building Queen Anne, Chippendale and other traditional styles of furniture. Across the Charles River in Cambridge, I visited the MIT (Massachusetts Institute of Technology) Hobby Shop (see page 28). In this combination wood and metal shop, students build projects that range from wood-strip canoes to high-end audio speakers to competition robots.

On the other side of the country and north across the border in British Columbia, Canada, I spent a couple very enjoyable days attending the Furniture Society's annual conference (see page 36). This gathering of woodworkers from across North America and abroad really demonstrated that our craft is alive and active. I met many college-age students who were there to learn more about furniture building, which was extremely encouraging. Wandering through the conference's many exhibits, I saw everything from futuristic furniture to native northwestern woodcarving, such as the eagle pictured below. Go to www.americanwoodworker.com/FS2007 to view more photos from Furniture 2007.

Back home in Minnesota, I made my annual visit to our county fair, where I cheered on my son Zack, as he herded his 300-lb. pig around the arena, and my daughter Clara, who enjoys goats as much as I enjoy woodworking. Later in the day, we strolled around the rest of the fair and stopped at a working sawmill display. It was an old, very basic mill, and a bit scary, as we watched an unguarded 4-foot diameter blade buzz it's way through the logs. The two men operating the mill seemed unfazed by the open belts and gears rotating only inches from their legs. The crowd, however, was mesmerized by the slabs of wood as they were sliced off the log. Over the noise of the saw, a man next to me loudly remarked "Wow, that's beautiful wood! Do you know what kind it is?" "Yes, it's red oak," I replied. "That's beautiful wood," he said again, only more quietly, to himself. Yep, I thought, next week he'll be buying a tablesaw, and joining the rest of us.

Until next time,

Randy Johnson

Randy Johnson
Editor
rjohnson@americanwoodworker.com



BEACHCOMBERS

Here is a picture of my pal and I reading the latest issues of *American Woodworker* during a recent vacation to Perdido, Florida. That's a real testament considering the distractions cruising up and down the beach!

Mark Ratley and Manny Heafner

KUDOS FROM DOWN UNDER

I live in New Zealand and am retired with a good workshop. I was quite impressed by your article about Lindsey Dill and her high school woodworking class project on picture frames (AW#129, July 2007). Mr. Bockman, her teacher, and Prescott High School must be very proud of her. Lindsey's approach, innovative thinking and final solution would be brilliant in a qualified tradesman. I am so impressed that I am going to start making a line of her frames in my workshop. I am sure that she will succeed at any career she chooses. Please give her my congratulations and best wishes for her future.

Bill Long

SECOND LIFE FOR SCRAPS

I work at Clark Granite and Marble in Chino Valley, Arizona. Our company donates all our plywood scraps to Prescott High School (AW#129, July 2007). We're proud to support our local school and pleased that these natural resources don't go to our city's landfill. It's a win-win. Consider making it happen in your community!

Betty Berghold



WELL-CRAFTED ENGLISH STANLEYS

The article by Tom Caspar "Troubleshoot Your Plane" in the July 2007 issue suggests that self-aligning tabs for plane frogs were only put on Stanley planes in what he calls the Sweetheart Era, 1920 to 1935. I have two newer planes, a No. 3 and a No. 5 1/2, which have self-aligning tabs. I bought the 3 in the late 1960's or early 1970's. I acquired the 5-1/2 secondhand but I know that it was new around 1950. Both planes are marked "Made In England." Perhaps the Sweetheart Era lasted a little longer over here.

*Roland Green,
County Cork, Ireland*

ONLY AN IDIOT

I'm writing about "Troubleshoot Your Plane" (AW#127, July 2007). The headline reads "Practical Solutions to 6 Common Problems," but you need to add a 7th problem - what do you do with an idiot who

takes a vintage sweetheart-era Stanley No. 3 and cuts off its side? All the years of woodworking wisdom on your staff and you couldn't find a way to demonstrate these problems without destroying an antique? What a waste.

J.M.

Thanks for writing. I'm the guy responsible for cutting up that No. 3. (It was a mid-fifties plane, by the way. For the photos, I substituted a Sweetheart blade and frog.) The side of this plane had been badly cracked long ago, so it was a total loss until I cut off its side. I've been using the cut-away body for years to demonstrate how a plane works in my hand tool classes, and lots of beginner students have appreciated seeing it's innards. But thanks for your concern. - Tom Caspar

Well, after I remove my foot from my mouth, all I can do is apologize.

J.M.

No problem. Sometimes I open mine wide enough to get in both feet! -Tom

SCARY PHOTO

Accidents at the table saw happen very quickly. I know, as I cut off my thumb at the first joint several years ago. I read and reread each issue of AW, but one recent photo frightens me each time I come to it (AW #129, July 2007, "No-Math Saw Setup", p. 90). This cut is very dangerous, especially with the hardwoods and exotic woods we woodturners use. And there's no need for it. Anyone who has used a lathe for even a short period of time can rough down a cylinder in less time than it takes to set up the tablesaw.

George Quay (one-and-a-half thumbs up is the best I can do)

You're right, George, most turners wouldn't bother with the tablesaw to knock the corners off a square blank. The cut is safe, though, if you use your blade guard, as shown in the picture, and you only use this technique on large squares, as mentioned in the text.

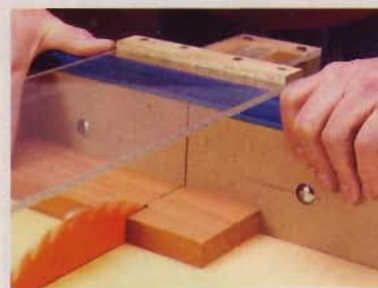
CROSSCUT SLED BLUES

I found a mistake, the hard way, in the directions for building a crosscut sled (AW#128, April/May 2007). In step #7, you say that the first test cut should split the base in half. When I made that cut, my runners no longer fit tight because they only bore against one side of the saw's miter slot, per your plans.

This situation is easy to avoid, however. You should stop the test cut short, so it doesn't cut all the way through and split the base. All you have to do is cut through your test pieces and into the fence a little bit, leaving 2 in. or so of the base uncut. Adjust the fence to make a perfect 90-degree cut, then cut all the way through.

Toby Morgan

Good catch! Cutting all the way through would work fine if the runners were made the traditional way,



the full size of the miter slot, but not the way we designed them. We actually made our sled the way you suggest, but forgot to say so in the directions.

DROP US A LETTER

American Woodworker welcomes your letters and e-mails about our articles, website, and all things woodworking. Published letters may be edited for style and length and become the property of American Woodworker.

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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The Best Wood Glue Ever

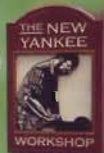
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QUESTION & ANSWER

by Tom Caspar

FLAT RAISED PANELS

Q Making flat raised panels with my dado set leaves an uneven surface. Is there some better way?

A Use a router table and a mortising bit (see Source, below). You'll get very flat surfaces that only need a little sanding. If you use a down-shear mortising bit, the edge of the raised section will be crisp and clean, without any splintering (see photo, below left). A bit's shear angle is the angle of the cutting edge relative to the shaft. The slanted cutting edge of a down-shear bit (see photo, at right) forces chips to travel towards the bit's tip. On a router table, the shear angle forces chips up, away from the raised edge.

Mortising bits are available in a wide variety of diameters, from 1/2 in. to 1-1/2 in. They're also available with or without bearings. You don't need a bearing to make raised panels, but bits with bearings are more versatile. Bearings are useful for tracing around hinge mortise and other templates.

Source: Freud, (800) 472-7307, www.freudtools.com



WHAT'S WRONG WITH MY VISE?

Q The jaws of my new vise aren't parallel, top to bottom. Is this OK?

A Your vise is just fine. This design ensures that a board doesn't wiggle when you tighten the vise. The lean in your vise's outer jaw is called toe-in. Toe-in corrects for up-and-down play in the guide bars. As you tighten a vise, the guide bars tend to angle down, so they're lower in front than in back. This makes the outer jaw lean away from the inner jaw.

Toe-in compensates for that lean. When you tighten a vise with toe-in, the outer jaw becomes parallel to the inner jaw. It puts even pressure along the entire surface of your workpiece, which is exactly what you want.

If your vise doesn't have toe-in, or the toe-in is inadequate, plane the outer jaw's wooden face so it's thicker at the top than at the bottom. That creates the lean you'll need to hold work more securely.



PARING THIN DOVETAILS

Q A while back, you ran a story on making precise half-blind dovetails by paring. The pins were 3/8 in. at the gauge line, narrowing down to 1/4 in. I prefer smaller pins, narrowing down to less than 1/8 in., but I can't find a chisel thin enough to pare into this smaller opening. Can you make a recommendation?



A Make your own chisel from a standard-thickness plane blade. This is a very cool tool! You'll find many other applications for it. The dovetail-paring story appeared in AW #119, Jan. 2006, p. 62 ("Precise Hand-Cut Dovetails"). With this plane-blade chisel, you can pare drawer dovetails that are 1/4 in. wide at the gauge line and have a 1-in-8 slope, as shown in the photo.

Sharpen the plane blade straight across to enable it to pare into a corner. Make the handle from 1/2-in. thick wood. Round the sides and top edge and chamfer the bottom edge. Fasten the sides with 1-in. long 1/4-20 machine screws and square nuts. The handle is easily removable for sharpening the blade, which can go back in the plane when needed.

WHICH WAY DO THE TEETH GO?

Q Should the teeth of a coping saw blade point toward the handle or away from the handle?

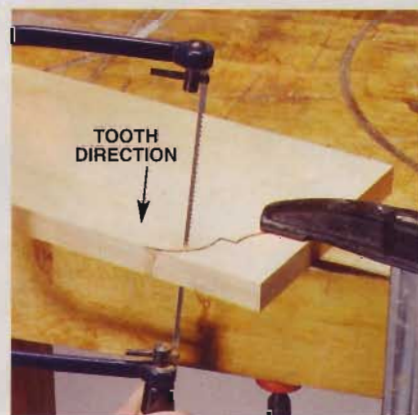
A The blade can go either way, but you'll get the best results when its teeth face towards the object that supports the workpiece. This way, the workpiece won't rattle or vibrate when you saw.

If your workpiece is supported flat on your workbench, and you pull from below, face the teeth towards the handle (top photo).

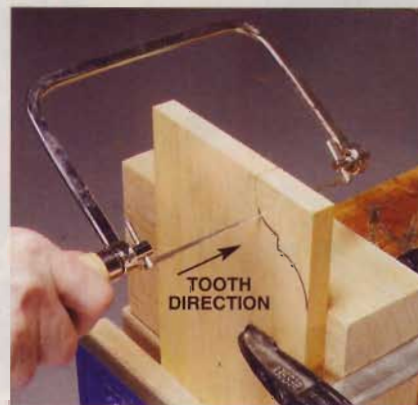
If your workpiece is supported in a vise, and the line you're cutting is close to the vise's jaws, the teeth can go either way.

If you raise the workpiece in a vise to get a better view, it's a good idea to steady it with a support block clamped from behind and out of your line of sight (bottom photo). Install the blade with the teeth pointing away from the handle. Cut on the push stroke.

When the work is supported from below, on the handle side, the teeth should face down. You cut on the pull stroke.



When the work is supported from behind, the teeth should face away from the handle. You cut on the push stroke.



If you have a question you'd like answered, send it to us at Question & Answer, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121, or e-mail to qanda@americanwoodworker.com. Sorry, but the volume of mail prevents us from answering each question individually.

Tool Giveaway

Festool Domino Joiners are on their way to the contributors of these **top three tips**, chosen from the hundreds of entries we received. More winning tips appear on the following pages. Thanks to Festool for providing fabulous tools for all our winners. And thanks to everyone who entered. We'll share many more of the great tips we received in future issues, so stay tuned!



Support Arm for Crosscut Sled

I got tired of trying to keep my crosscut sled flat on the table when I cut wide panels. At the beginning of each cut, I had to support the sled's back end to keep the front end from lifting—sometimes the runners would lift right out of the top's grooves.

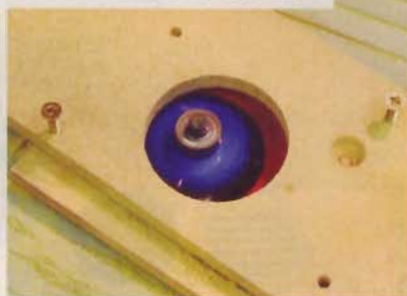
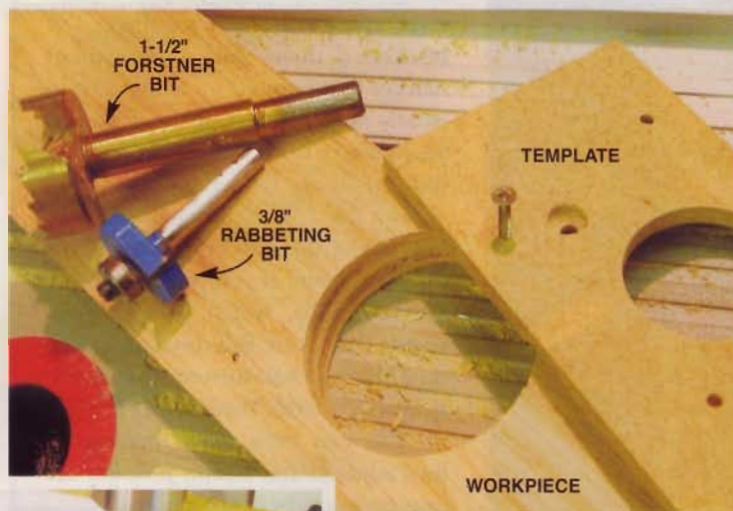
My solution was to fasten this hinged support arm to my saw's cabinet. It also stores my rip fence and other accessories. To use the support, I simply unfold the arm and flip up the hinged block. The block has a strip of ultra-high-molecular-weight plastic (UHMW) fastened on top, so the sled slides smoothly.

Miles Clay



EDITOR: TIM JOHNSON • PHOTOGRAPHY: COURTESY OF THE CONTRIBUTORS

Winners!



Big Holes Without Big Bits

Recently, I needed to drill a couple of 2-1/4-in.-dia. holes. But instead of buying an expensive bit that I would rarely use, I created these holes with a 1-1/2-in. Forstner bit and a 3/8-in. rabbeting bit that I already own.

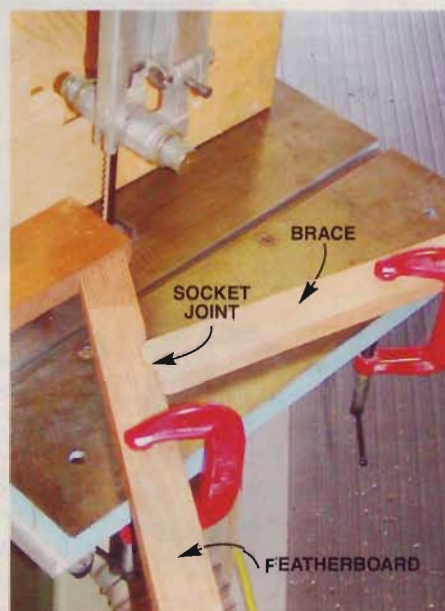
Lay out the hole locations on your workpiece. Using the Forstner bit, drill holes in the workpiece and in a template. Attach the template to the workpiece with screws or double-sided tape. Make sure the holes are aligned. Then use the rabbeting bit to rout the workpiece to the larger diameter. Make several passes, raising the bit after each pass. The template allows you to complete the cut.

To create different-sized holes, start with a different Forstner bit or install larger or smaller bearings on the router bit.

Suwat Phruksawan



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Socketed Featherboard

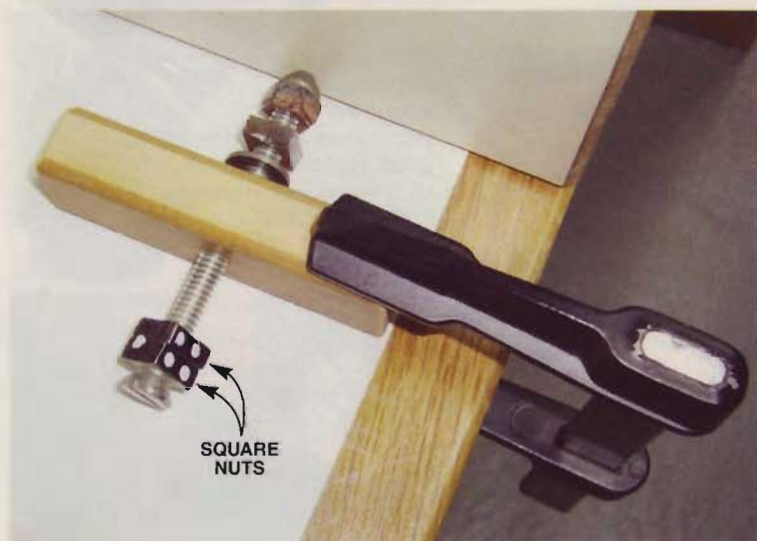
My featherboard won't slip. It's easy to set up and adjust, because the brace fits into a round socket cut in the featherboard. Because of the socketed joint, the brace can securely hold the featherboard from virtually any angle. That means the brace and featherboard can be clamped on wherever the table allows, regardless of its size or shape. This system works equally well on my bandsaw, tablesaw and router table.

Mark Thiel

Gambler's Micro-Adjust

Precise fence adjustments are a sure bet when I clamp this shop-made device on my router table. I simply drilled and tapped a hole for a 1/4"-20 machine

screw through the center of a 3/4-in. by 1-1/2-in. by 3-in. piece of hardwood. I covered the tip that contacts the fence with a cap nut. My "hi-tech" adjustment



For contributing this great tip, Serge receives a **Festool OF 1400EQ Router.**



mechanism consists of two square nuts squeezed tight together. I've blackened them with a permanent marker and painted on white dots to clearly identify each of the 4 sides. I also added a third square nut, so I can lock the device for repetitive cuts.

With the 1/4"-20 screw I used, one full turn of the nuts corresponds to a travel of .05-in. If you prefer working with fractions, switch to a 3/8"-16 screw. Then, one full turn moves the tip 1/16-in. A half turn moves it 1/32-in. and a quarter turn moves it 1/64-in. You can even make one-eighth turn adjustments. Simply position the nuts on edge, as in the photo.

Serge Duclos

For contributing this great tip, Todd receives a **Festool C12 Cordless Drill.**



Spray Gun Cleaning Jug

When I clean my HVLP spray gun, this shop-made container captures the liquid solvent and fumes. When the gun is clean, I simply pour the waste into a storage container for disposal.

Drill a 3-in. hole in the back of a paint thinner jug. Cut a 3-in. circle from an activated carbon filter pad (available at pet shops with aquarium products) and place it in a 3-in. ventilation louver (from the home center). Insert the louver into the hole in the jug, making sure the fins face down. The activated carbon captures fumes while allowing the pressurized air to escape. Finally, drill a hole in the jug's cap, slightly larger than your gun's air cap but smaller than its sleeve nut. This way the tip of the gun forms a tight seal when pressed against the jug's cap. I used a 1-1/4 in. Forstner bit.

To clean your gun, simply hold the jug in one hand and press the spray gun's tip into the cap.

Todd LaFaille



Levitated Alignment Guide

By holding a straightedge parallel to the blade, rare-earth magnets make it easy to align your table saw fence.

Using digital calipers, find two 1/2-in.-dia. rare earth magnets of exactly the same thickness. Crank the blade to maximum height and place the magnets toward the outer edge of the blade, about 3/4-in. above the table's surface. Place the straightedge—I use an 18-in. rule from a combination square—on edge against the rare earth magnets. The magnets' thickness positions the straightedge beyond the blade's teeth. Align the fence parallel with the straightedge.

Jim Dailey



For contributing this great tip, Jim receives a Festool CT MIDI Dust Extractor.



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THE TOOL HUNTER

My passion for fine old tools goes back to my youth, when I helped out in my grandfather's basement shop. I fondly remember the idle moments when I would kick the sawdust around his Unisaw, brush the shavings off his lathe, spin the wheel of his disc sander and fiddle with the pivoting light on his drill press. My grandfather believed in getting the best, and in the 1930's and '40s, that meant Delta power tools.

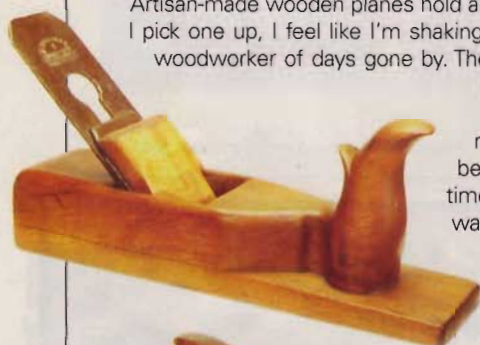
Today, his tools are in my shop. He taught me to treat them with respect, and they're still in excellent condition. I use them for all my woodworking projects. That drill press, for example (see photo at right), works as good as the day it was made in Milwaukee. It's all made from steel or cast iron – even the cowl- ing covering the belt and front pulley.

My grandfather also had a few good hand tools which I put to use when I started restoring old furniture many years ago. I got hooked on those tools, and wanted more. Most of the vintage tools I found needed restoration, just like my furniture. As my collection and skills grew, I began to restore tools for other folks. I've turned this hobby into a part-time business, and now sell classic hand tools in a local antique mall.

Artisan-made wooden planes hold a special place for me. When I pick one up, I feel like I'm shaking hands with a highly skilled woodworker of days gone by. The jack plane with the carved

front handle (top left) was well-loved by the fellow who made it. Its sole has clearly been worn down and re-leveled many times. The small rounding plane (bottom) was shaped to perfectly fit somebody's hand. Its blade is bedded at a very steep angle for planing figured wood. The fore plane (middle) came from a shop in Stavanger, Norway. It's made from a very rare wood, Cuban mahogany, and shows an attention to detail that must have inspired its maker to do equally good work each time he used it. I know that its magic works for me!

Allen Snyder



Are you a Tool Nut, too? You'll get the new Leatherman Charge AL aerospace aluminum multi-tool if we publish your story. Send your tale to toolnut@americanwoodworker.com, or mail it to American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include digital photos of your tool if possible. For more on the Charge AL, visit www.leatherman.com

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BIG NEW PLANER

If you're convinced that bigger is better, this is the planer for you. With 25-in. width capacity, 9-in. thickness capacity, a 15-hp, 3-phase motor and weighing in at a whopping 1906 pounds, the G0603X (\$7,995) is the biggest planer Grizzly sells.

This big boy features carbide insert cutters mounted in a spiral cutterhead. Insert cutters have 4 sharp edges, so they can be rotated, rather than replaced, when one edge gets dull. Carbide inserts stay sharp longer than tool steel knives, and they can even stand up to abrasive materials such as teak, glue or mdf.

The G0603X is equipped with three feed rate speeds (20, 30 and 40 ft. per minute) and electronically controlled table elevation. The elevation reads out on an LCD screen, which can toggle between inch and metric measurements. It even "remembers" commonly-used elevations so you can quickly and easily send the table to that planing height.

Source
Grizzly Industrial
(800) 523-4777
www.grizzly.com
G0603X planer, \$7995

FOUR-STAR HONING GUIDE

The new Pinnacle Honing Guide (\$99.99) consistently provides excellent sharpening results with both chisels and plane irons. The guide consists of a sled that travels on a pair of rails. Lock nuts within the rails allow mounting the guide on

almost any sharpening stone.

The sled has pre-set angles of 15, 20, 25, 30, 35 and 40 degrees. Each angle also has a pre-set +2-degree micro-bevel position. Once the angle is set and the chisel or plane iron is locked in the sled, there's simply no way you can rock the tool and mess up the sharpening angle. The system is rock-solid and virtually foolproof.

The stone's entire width can be used for sharpening, because both the iron's position in the sled and the stone's position within the guides can be varied. The sled, which holds irons up to 4-in.-wide, can also be removed and used on other surfaces, such as granite or glass.



Source
Woodcraft Supply
(800) 225-1153
www.woodcraft.com
Pinnacle Honing Guide,
#147763, \$99.99

NICELY-PRICED DADO HEAD

CMT's new Dado Pro (\$149) is a dado head that stacks up pretty well. It does an excellent job in solid woods and works reasonably well in plywood. To produce tearout-free dados in plywood with this dado head, you have to feed the material at a slow rate. This limitation is common with dado heads in this price range.

The Dado Pro cuts grooves and dados from 1/4-in.-wide to 13/16-in.-wide in 1/16-in. increments. It consistently produces dados with perfectly flat bottoms. The set includes two rim blades, four 1/8-in. chippers, one 1/16-in. chipper and a set of seven steel shims. Use the shims for "in between" cuts. Like most dado heads in this price range, the Dado Pro lacks a 3/32-in. chipper, which can be useful for fine-tuning dados for plywood.



The Dado Pro comes in a durable storage case. Being able to easily and safely store this dado head will extend its life by preventing the teeth from banging against each other.

Source
CMT U.S.A.
(888) 268-2487
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Dado Pro, #230.012.08, \$149



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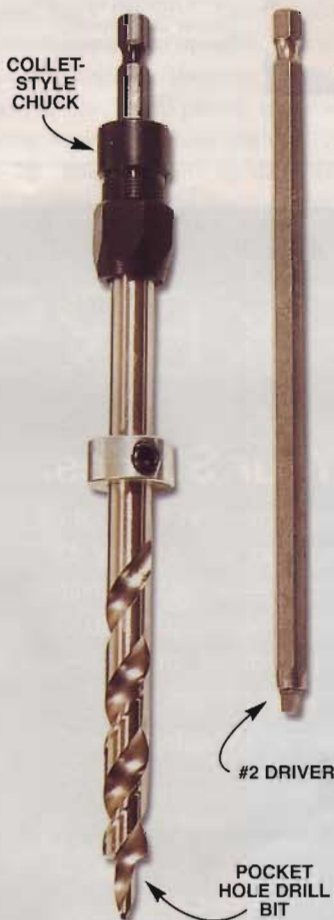
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The Pocket Hole Adaptor set includes the collet-style chuck, quick-change adaptor, and #2 driver. It does not include the drill bit.



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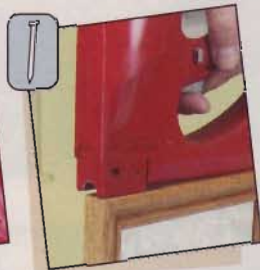
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MAKE LOUVERED DOORS AND SHUTTERS

Templates for making louvered doors are unique accessories for the Leigh FMT Jig. They're simple to set up and easy to use. It's hard to imagine a more straightforward way to make the cuts required for louvered doors or shutters.

Like all other FMT templates, the Louver Door Guides (left and right, \$49.95 per pair) snap into the FMT Jig. Designed for use with a 1/4-in. straight bit, the guides create 1/4-in. by 1-1/4-in. slots at a 45-degree angle. Each set of three slots is on 3-in. centers, so layout is simple. Just mark the door stile every three inches and locate that mark under the alignment guide in the FMT Jig.



Louvers can be made by rounding the corners on 1/4-in. by 1-1/4-in. stock, or by using the tenoning feature of the FMT jig to mill the ends of thicker stock.

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Please send your story proposals to: stories@americanwoodworker.com, or mail to American Woodworker Magazine, 1285 Corporate Center Drive, Suite 180, Eagan MN 55121.

edited by Randy Johnson



Ken Stone, an avid woodworker and Director of the MIT Hobby Shop, displays the model and full-size table that he built using cherry counter tops salvaged during the remodeling of a campus building.

Proof that working with your hands is good for your mind

Under the basketball court, in the basement of the 80 year old Armory building on the Massachusetts Institute of Technology (MIT) campus, is a wood and metal working shop known as the MIT Hobby Shop. It's humble location belies the shop's important mission: To provide MIT's science and engineering students—some of the world's best young minds—a place to work with their hands and learn by doing. Learning by doing is a fundamental principle of MIT's educational approach and the Hobby Shop helps carry out this mission by providing space, machines and instruction to any student

who wishes to take advantage of the facility. Students can pursue any project, whether for a class or personal use (see "The Challenge", page 30). Hobby Shop students have produced everything from cedar-strip canoes to dorm furniture to robots.

The instructors play an important role. MIT alumnus Ken Stone, the current Shop Director, is an accomplished furniture designer and builder (photo, above). Hayami Arakawa is an expert wood turner who also loves imaginative woodworking (bottom photo, page 32). Ken and Hayami offer students formal classes in machine use and building as well as individual instruction.

MIT has endorsed and supported the Hobby Shop for 70 years, an indication of the value this venerable institution places on hands-on learning, and that working with your hands is also good for your mind. Read more about the MIT Hobby Shop at www.americanwoodworker.com/MIThobbyshop.

THE CHALLENGE:

BUILD A HARPSICHORD WITH NO PRIOR WOODWORKING EXPERIENCE.

Zach Bjornson assigned himself this challenge when he started at MIT in the fall of 2006. Zach, who has played the piano since he was six years old, initially tried the harpsichord when he was looking for another instrument to play. The major difference between the two instruments is that a harpsichord's strings are plucked, rather than struck, as they are in a piano. Zach quickly became intrigued with the idea of building his own.

Zach has spent about 300 hours researching this project and expects to spend about 1000 hours building it. One of the challenges he faces is locating some of the special woods a harpsichord requires. This recent e-mail shows Zach's persistence is paying off:

"I spent a few hours last night trying to find one of the rare woods I mentioned, and finally did. It's quarter sawn *Picea abies* (Norway spruce), with a ring density of up to 40 per inch, harvested just before the new moon at a certain hour of the day during winter by a husband and wife in Switzerland, air dried, selected for best tone quality, and perfect for the soundboard!"

To see more pictures of Zach's harpsichord project or to follow his progress log on to www.americanwoodworker.com/zachsharpsichord.



Biological engineering major Zach Bjornson is building a harpsichord in his corner of the MIT Hobby shop. Not one to shy away from a challenge, the harpsichord is Zach's first woodworking project.

MIT HOBBY SHOP A BRIEF HISTORY

by Ken Stone, Director and instructor

During the 1937-38 school year, a group of sixteen MIT students acquired some abandoned equipment and got permission from the administration to set up a 16-ft by 22-ft wood- and metal-working shop in an unused basement room in the main complex (top photo, page 32). The name "Hobby Shop" reflected their belief that to be well-rounded individuals, students needed to pursue interests outside their profession—hobbies. For MIT students, these interests often involved building things. The shop's original constitution stated that it was only to be used by students for non-academic work.

Until the 1950s, the shop was run as a club, with a student foreman. Members started as apprentices and progressed to journeyman and master craftsman. Joe Macalister, the first paid

Shop Master, started during World War II, and left at the end of the war. Then Bob McCadden, still in his early twenties, took over and remained Shop Master until he retired in 1972. Under his leadership the shop expanded several times before moving to its current location. Membership expanded to include faculty, staff, alumni and their spouses. Other hobbies were added as well—electronics, photography, printing, and pottery, to name a few.

When I joined the MIT Hobby Shop as a student in 1968, many of the formalities were gone. There was no student shop foreman and member classifications were no longer given. Several activities had also



The Hobby Shop provides a place for students to pursue all kinds of projects under the guidance of full-time instructors.



PHOTO COURTESY OF MIT

Started in 1938 as a place for students to broaden their interests, the MIT Hobby Shop still provides a valuable service to students by carrying out one of MIT's central missions—learning by doing.

moved to other locations. Eventually, only the wood and metal shop remained. However the shop remained a busy place.

George Pishenin, a technician in Material Science and long time shop member took over as Shop Master in 1972. When George retired in 1991 I took over as only the fourth Shop Master, and the first who was also an MIT graduate.

During my time as director I've seen an increased need for the Hobby Shop. MIT had many shops when I was a student, including a student shop in all engi-

neering and many science departments. Most of these shops have been closed and the ones that remain are primarily used for specific classes. At the same time, fewer students come to MIT with shop experience. The Hobby Shop provides a place for MIT students to work with a wide range of well-maintained machines and tools. Their projects can be academic or personal, serious or just for fun. We provide individual instruction, practical design and building advice. We also offer classes and collaborate with professors and instructors in many departments.



Hayami Arakawa, MIT Hobby Shop instructor, is available full-time to assist students with their projects. In his spare time, Hayami designs furniture and enjoys creative woodturning, such as these ball-and-claw bats.



Tell us about a dynamic woodworking school or vibrant teaching program. What makes it work? Point out notable teaching strategies and student accomplishments. Explain how the program excites students about woodworking and tell us how it helps them develop woodworking skills. Whether the program operates in a public school, community center or a private workshop, we want to hear about its success. E-mail your story to schoolnews@americanwoodworker.com.



Tree-Hugging Shop

After designing and building custom furniture in southern California for 24 years, I finally got to build my dream workshop. Inspired by the Craftsman style and the designs of the brothers Green, my shop cradles a 100-year-old eucalyptus tree in our backyard.

The space is 900-sq.ft., with 12-ft ceilings at the peak. Photovoltaic panels installed on the roof generate a portion



of my electricity. Solatube skylights and recessed fluorescents provide the lighting. I soundproofed with triple-glazed windows, double-thick insulation and drywall, and mass-filled vinyl on the two garage doors. I pull my truck all the way through the shop and park in between the two buildings; my wife parks in the shop at night.

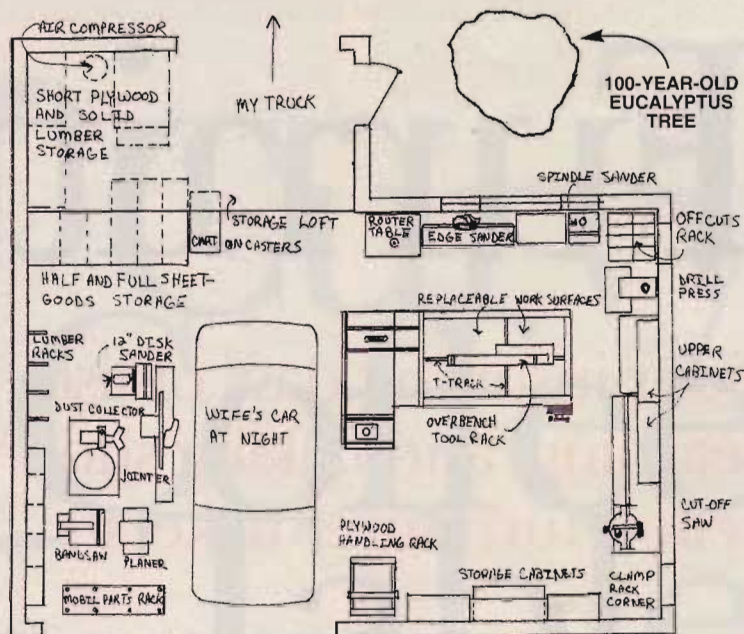
I left the beams exposed and painted the ductwork, walls and ceilings to warm up

the space. I made paneling using left-over bamboo flooring, maple plywood and Craftsman-style wallpaper. I feel at home surrounded by these traditional details, even though my furniture designs are contemporary.

My workbench doubles as my saw's outfeed table. Its top is criss-crossed with T-track for hold-downs and it features replaceable MDF sections. I especially like the shopmade tool rack that I've stationed above the bench. It keeps my often-used tools close at hand and off the work surface.

I am very blessed. Now I get to do what I love in a space that I love.

Miles Clay
Santa Monica, CA



Tell us about your shop!

Send us photos of your shop, a layout drawing and a description of what makes your shop interesting. Tell us what you make in it and what makes your shop important to you. If "My Shop" features your shop, you'll receive \$100.

E-mail your entry to myshop@americanwoodworker.com with digital photos attached. Or mail your description with prints or digital photos on a disc to **My Shop, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121**. Please include your phone number. Submissions cannot be returned and become our property on acceptance and payment. We may edit submissions and use them in all print and electronic media.

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Furniture S

Four inspiring days of listening, learning, and talking shop with fellow furniture makers

by Randy Johnson

Victoria, British Columbia, is one of the most beautiful places in North America. Located at the southern tip of Vancouver Island, on the Strait of Juan de Fuca and facing Olympic National Park in Washington state, Victoria was this year's host to one of custom woodworking's best events, the Furniture Society's annual conference, held June 20-23. I put this trip on my calendar months in advance, anticipating four engaging days of rubbing elbows with fellow woodworkers and studying outstanding new examples of fine craftsmanship. It proved to be that and much more.

In case you haven't heard of this group before, the Furniture Society is really worth getting to know. It's an international non-profit organization, founded in 1996,

whose mission is "to advance the art of furniture making by inspiring creativity, promoting excellence, and fostering an understanding of this art and its place in society."

Society members, who number about 1600, come from across North America and abroad. They're furniture makers, designers and teachers. It's not an exclusive club though; membership is open to anyone interested in the craft. Over 400 members attended this year's conference, the 11th annual gathering.

Each conference has a unique theme. Acknowledging the special location of this year's gathering, the theme for 2007 was "Cultural Mosaic: Reflections from the Coastal Rain Forest." Victoria sits at the heart of one of North America's most highly developed woodworking traditions by Native Americans, or First Nations people, as they're called in Canada. Northwest Coastal carving is known worldwide for exquisite masks, figures, panels, bentwood boxes, boats, and, of course, totem poles. It's a craft that's still alive and well, and this conference was a special opportunity to hear presentations and attend demonstrations by Northwest Coastal artisans. But that was just a jumping-off point for lots more woodworking.

Noted furniture maker Michael Fortune

explains steam bending to a packed room of woodworkers at this year's Furniture Society conference, held in Victoria, British Columbia.



PHOTOGRAPHY: STAFF

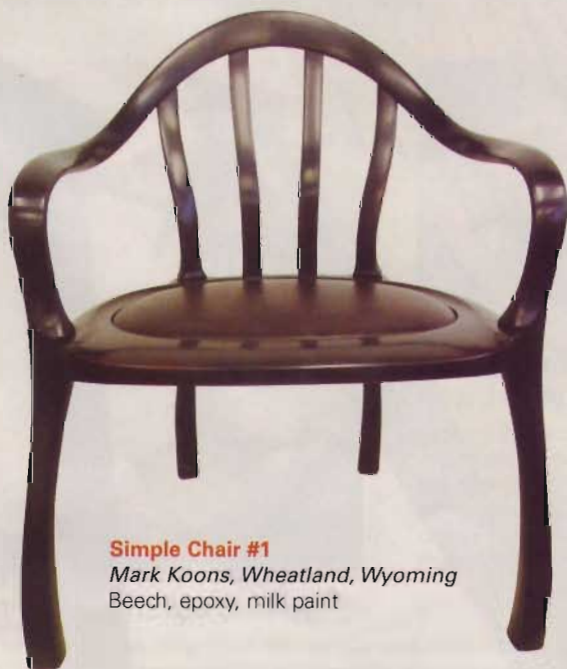
ociety 2007



Bubinga & Maple Credenza

Hikmet Sakman, Victoria, British Columbia

Bubinga, Eastern hard maple, Western curly maple, quilted maple, burl maple



Simple Chair #1

Mark Koons, Wheatland, Wyoming

Beech, epoxy, milk paint

Ceremonial Chair

Maltwood Museum, Victoria, British Columbia

John Livingston, Project Coordinator

John Livingston:

front Tlingit -

style carving

Art Thompson:

back carving

Calvin Hunt:

"Eagle" armrests

Don Yeoman:

sides and lower

front fascia

Norman Tait:

"Eagle" figure

surround

Ann Smith:

"Raven's Tail"

woven cushion

Cheryl Samuel:

Chilkat woven

backrest panel

Western red cedar



DEMONSTRATIONS Every Furniture Society conference has a rich array of educational opportunities. You're sure to learn new methods of work or pick up clever building tips from the pros. "Free-Form Steam Bending" drew an overflow crowd (photo, page 36). This demonstration was led by Michael Fortune, one of Canada's premier furniture builders. Michael was the winner of this year's Furniture Society Award of Distinction for his outstanding body of work and inspiring leadership. You can view some of Michael's superb bentwood furniture at www.michaelfortune.com.

Many other demonstrations offered a first-hand look at how a master craftsman thinks and works. John Levine led a workshop on Japanese and Chinese joinery. Kim Kelzer discussed the use of color in finishing. John Livingston and John Marston, First Nations carvers, spoke about Northwest masks, figures, and panels. Richard Oedel covered bent tapered lamination techniques. And there was more – something for everybody.

Bentwood box maker John Martson demonstrates traditional First Nation tools and techniques. The theme of this year's conference was "Cultural Mosaic: Reflections from the Coastal Rain Forest."



GALLERY EXHIBITS The conference included several gallery exhibits that were a feast for the eyes. On display were dozens of pieces of custom furniture, ranging from the formal to the fantastic.

Each gallery represented a different group of artists. The "Cultural Mosaic" exhibit included work from First Nations, Asian, and European cultures. Its centerpiece was a stunning First Nations Ceremonial Chair, a collaborative effort of five artisans (see photo, page 37). Balancing this exuberant work was a serene linenfold carved-oak armchair, made in 17th century England.

Furniture Society members entered work that ranged from the functional to the futuristic in the "Members' Show." Mark Koons shared his *Simple Chair #1*, but there's really nothing simple



Bent on Maple
Julian Laffin
Camosun College
Class of 2005
Western maple,
handmade hardware



Blanket Chest

*Philip R. Smith
Shawnigan Lake, British Columbia
Padauk, bird's-eye maple, curly maple,
cherry and juniper lining, ebony details*



And Climbed Up Beside Her

*Murray Tomkins
Camosun College
Class of 2001
Planchonia, ebony plugs,
tile, cowhide*



Wishbone Table

*Josh Gillis
Victoria, British Columbia
Belmont Secondary
School, 11th grade
Walnut, maple*



Grandfather Clock

*Cam Russell
Victoria, British Columbia
Fir, cedar, yew, aspen, copper*

Furniture Society

about its fluid design (see photo, lower left, page 37). Clearly, this chair required some sophisticated joinery and confident handwork. Mike Wolos exhibited his *Broken Masterpiece* coffee table (photo at right), complete with a solid bird's-eye top, two hidden compartments, and a high gloss, hand-polished polyurethane finish.

The "Cascadia Exhibition" highlighted some extraordinary talent from British Columbia, Washington and Oregon. Hikmet Sakman's *Bubinga and Maple Credenza* is a beautiful blend of Arts and Crafts and Oriental design (see photo top left, page 37). Vancouver furniture maker Cam Russell built an impressive *Grandfather Clock* inspired by the work of Arts and Crafts designers Greene and Greene (see photo, bottom right, page 39). While most Greene and Greene furniture was made from imported mahogany, Cam tapped local woods such as fir, cedar, yew and aspen.

Camosun College, located in Victoria, presented student works from the college's Fine Furniture Program's 2007 graduating class. This exhibit's theme was "Look What We Made For Dinner," which inspired sixteen young furniture makers to get creative designing dining chairs that were as different as scrambled eggs and steak. One of those chairs, *Sushi Anyone?* by Felicity Jones, has a clear Asian influence and is an excellent example of the thoughtful craftsmanship that Camosun students put into their work.

The "Camosun College 20-Year Retrospective" exhibit was an eclectic collection from Camosun alumni. Examples include Julian Laffin's *Bent on Maple* recliner (see photo, bottom of page 38) and Murray Tomkins' *And Climbed Up Beside Her* (see photo, center, page 39), which included a ceramic back panel depicting the fabled eensy weensy spider and its web.

AFTER HOURS Beyond demonstrations, panel discussions and gallery shows, the Furniture Society conference offered numerous opportunities for woodworkers to informally exchange ideas. Chance meetings included lunch, dinner, dances and auctions of woodworking tools and products. Proceeds from the auctions benefit the Furniture Society and its educational scholarship program.

Next year's conference will be held June 18-21, 2008, at Purchase College, which is located 30 miles north of New York City, in Westchester County. For more information about the Furniture Society or to register for Furniture 2008, go to www.furnituresociety.org.

ONLINE SLIDESHOW

To view more great work from Furniture 2007 visit:
www.americanwoodworker.com/FS2007.



A Broken Masterpiece

Mike Wolos
Vancouver, British Columbia
Bird's-eye maple, burl maple,
yellow cedar, ebony inlay



Sushi Anyone?

Felicity Jones
Camosun College
Class of 2007
Western maple,
rosewood dye
and walnut stain



a



b



c



d



e

- a** Blanket Chest - joinery detail, *Philip R. Smith, Shawnigan Lake, B.C.*
- b** Coffee Table - leg detail, *Michael Moore, Duncan, B.C.*
- c** Console - handle detail, *Hikmet C. Sakman, Victoria, B.C.*
- d** Belvedere Hall Table - inlay detail, *Philip R. Smith, Camosun College, Class of 1999.*
- e** Whiskey Cabinet - door and leg detail, *Joe Gelinas, Camosun College, Class of 1995.*

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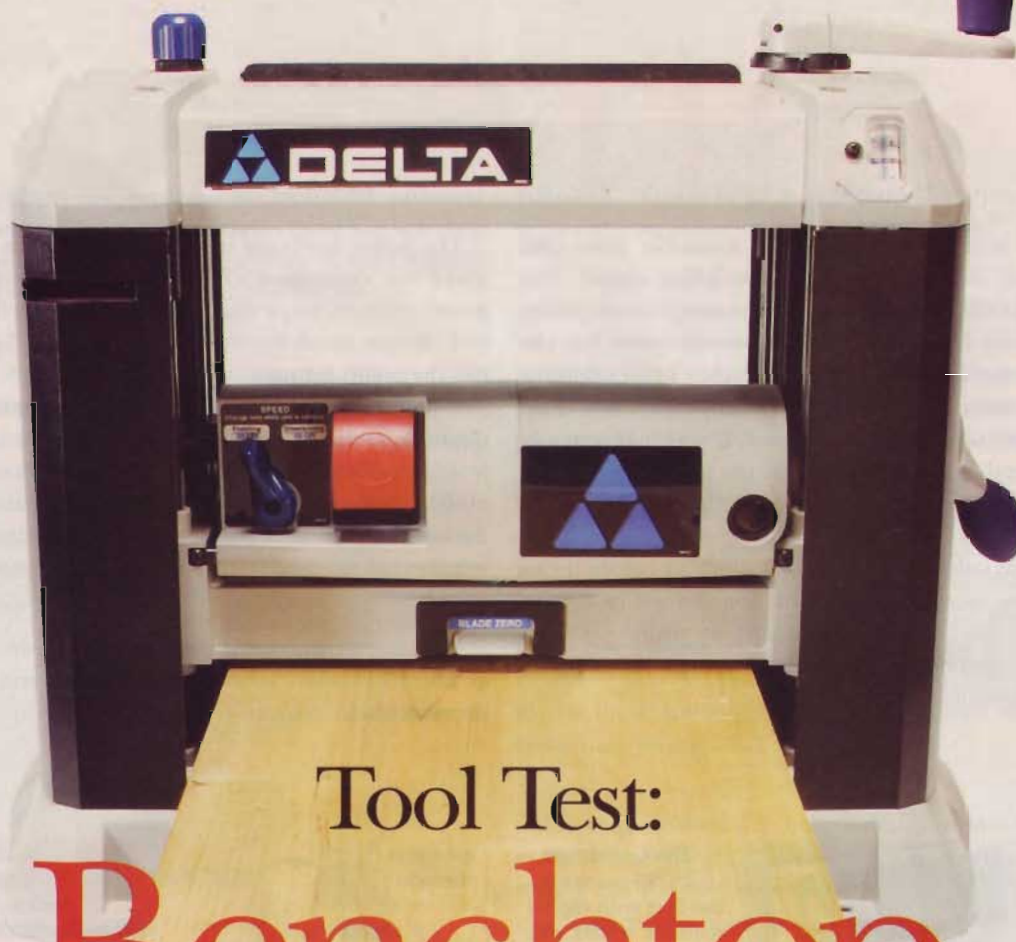
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Tool Test: Benchtop Planers

These little machines
are at the top of their game.

A planer is a must-have tool in a well-equipped shop. It performs one basic task: making a board thinner. This frees you from the tyranny of using only dimensional lumber and saves you money. With a planer, you can turn 3/4-in. stock into 1/2-in. stock for a lighter, more refined looking drawer sides. Add a jointer to the equation and you can square and surface less expensive rough lumber.

Benchtop planers have improved steadily over the years. Gone are the days of nasty snipe, aggravating blade changes, hit-and-miss settings and chips all over the floor. Since our last benchtop planer test (AW #100, May 2003) most planers have features that directly address these problems. The new breed is a far cry from their troubled first-generation ancestors. If you're in the market for a benchtop planer, this may be the best time ever to buy a new one.

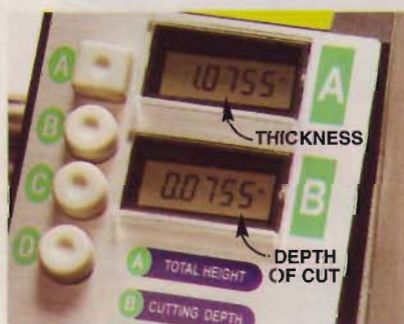
by Richard Tendick

Features

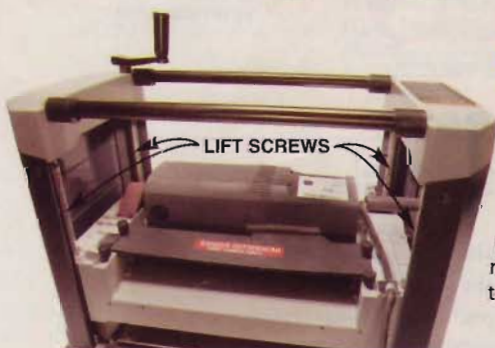
DIGITAL READOUT

A planer with digital readout was inevitable given that everything in this world seems to be going digital. The Craftsman 21759 is the first portable planer to incorporate this technology (Photo 1). The Craftsman's system has two small problems, however. First, it only reads in thousandths of an inch, rather than fractions. (A handy conversion chart is printed below the scale.) Second, if you inadvertently turn the depth-of-cut handle when the readout is turned off, you'll have to recalibrate the scale. That's pretty easy to do, though.

The digital readout needs to be calibrated before it can be put to use. After this first calibration you will be able to control the thickness of the board to within .008-in., although I found height adjustment less than .050-in. to be next to impossible.



1 The Craftsman 21759 planer is the first with digital readout. It tells you how thick the board will be in thousandths of an inch, and how deep the knives are cutting.



2 Some planers have four lift screws, one at each corner, while others have only two. Planers with four screws don't require a headlock to reduce snipe.



3 A two-speed feed rate is a great feature. A fast feed rate results in a low CPI (cuts per inch) and is used for quick stock removal. A slow feed rate results in a high CPI for a smooth finish on the final pass.

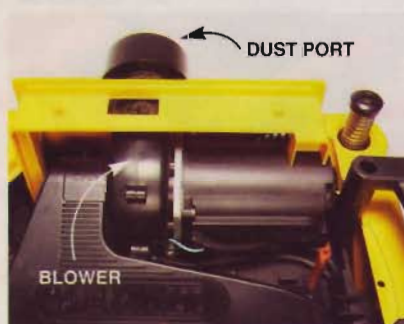
FOUR LIFTING SCREWS

The better machines use four lifting screws to raise and lower the cutterhead (Photo 2). The four-screw system greatly reduces snipe and eliminates the need for a headlock. Simply crank the carriage to the desired position and run the board through.

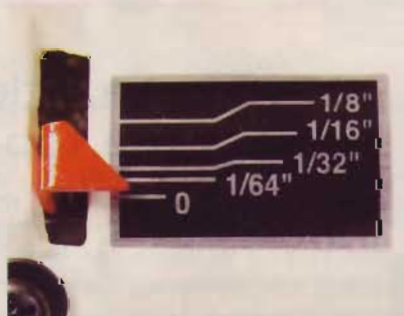
Older designs have two lift screws and four guideposts. The downside to this system is it allows the carriage to rock slightly as a board enters and exits the pressure rollers. The rocking motion creates a slightly deeper cut, or snipe, at either end of the board. A headlock helps prevent this rocking motion but requires you to release and re-engage it with every adjustment.

THREE-KNIFE CUTTER HEAD

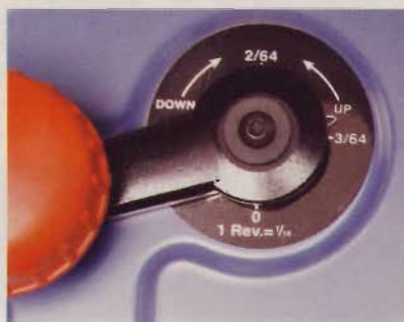
With three knives instead of two, each blade takes a smaller cut. The result is a smoother finish and more time between blade changes.



4 A dust-port blower helps remove shavings from the planer.



5 A depth-of-cut indicator is a mechanical device that tells you approximately how deep the knives will cut before you feed the board through the planer.



6 On some planers, one turn of the cutterhead adjustment crank raises or lowers the carriage exactly 1/16 in. This allows precise adjustments to the cutterhead without guess work.

Portable planers are powered by high-RPM universal motors. A planer with a two-blade cutter head and a 10,000 RPM motor makes 20,000 cuts per minute (CPM). Adding a third knife boosts that number to 30,000 CPM.

TWO-SPEED FEED RATE

Some planers have a switch that changes the speed at which a board travels through the machine (Photo 3). A fast feed rate is good for quick stock removal and is standard on most planers. Two-speed planers offer an additional slow feed rate that effectively increases the cuts per inch (CPI), which results in a smoother surface. A slow feed rate also reduces tearout in figured wood. You'll get the best results when this feature is combined with a three-knife cutterhead.

FAN-ASSISTED CHIP REMOVAL

Some planers add a fan to the backside of the drive motor to help draw more air through the cutterhead

(Photo 4). This is helpful, especially if you use an under-powered dust collector, like a shop vacuum.

DEPTH-OF-CUT INDICATOR

This device gives you a quick read on how much wood you're about to take off a board (Photo 5). To use it, you insert the front end of a board under the gauge. Crank the cutterhead down until the gauge reads the amount of wood you want to remove, then send the board through.

ONE TURN REMOVES 1/16 IN.

On most machines, one turn of the cutterhead height-adjustment crank removes 1/16 in. of material (Photo 6). This makes it easy to track your progress without having to continually consult the planer's scale or your tape measure. On a few models, the crank's lead screw is metric. You remove 2 mm (about 5/64 in.) with each turn. It's harder to use these cranks to calculate how much wood you're removing with each cut.

DEPTH STOPS

Most planers have depth stops that allow you to accurately repeat a common thickness (Photo 7). Using a depth stop means that you don't have to rely on hit-and-miss to duplicate a particular thickness. A depth stop is very helpful when you have to go back and plane a forgotten piece.

There are two types of stops. One is adjustable and allows you to lock in any dimension. This is great for odd sizes, but cannot easily be repeated if the stop has moved. The second type of stop has presets at common thicknesses (1/4-in., 3/8-in., etc.).

LONG TABLES

Long infeed and outfeed tables help reduce snipe, particularly on big boards (Photo 8). All tables are hinged or removable to make the planer more compact for storage. The downside to this design is that the tables deflect slightly under a heavy load. You can eliminate this problem by supporting the end of each table with a block of wood.

INDEXED KNIVES

Indexed knives remove most of the tedium associated with changing blades (Photo 9). They just drop in place, and you're ready to go. Non-indexed knives must be set with a gauge, which takes time and can be frustrating. Indexed knives are also double-sided. When one edge gets dull, you just flip it over.

On the downside, indexed knives cannot be resharpened. You must buy a new set when both sides get dull. Non-indexed knives can be resharpened, although it's very difficult to do yourself. In the long run, there's not a big cost difference between the two types of knives. Most replacement sets of indexed knives cost about the same as sharpening two sets of standard knives.

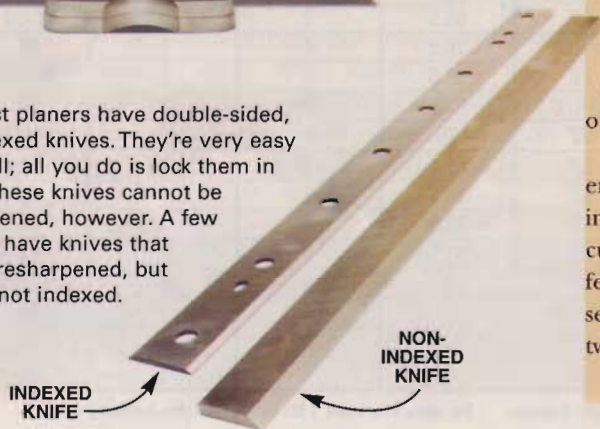


7 Depth stops set the cutterhead at commonly-used thicknesses. If you're planing a lot of boards, and forget one or two, you can use the depth stop to repeat the same thickness.



8 Long support tables reduce snipe when you're planing boards over 4-ft. long.

9 Most planers have double-sided, indexed knives. They're very easy to install; all you do is lock them in place. These knives cannot be resharpened, however. A few planers have knives that can be resharpened, but they're not indexed.



Recommendation

UNDER \$400



RIDGID R4330, \$350

This 13-in. planer includes features found only on more expensive planers. In addition, it comes with Ridgid's life-time warranty.

Feature	Yes	No
Three-Knife Cutterhead	X	
Four Lifting Screws	X	
Two-Speed Feed Rate		X
Depth-of-Cut Indicator	X	
Depth Stops	X	
Indexed Knives	X	
1 Rotation of Height Crank Equals 1/16-in.	X	
Blower	X	
Long Tables (over 33")	X	

\$400 - \$500



STEEL CITY 40200, \$450

The 13-in. Steel City planer comes with a 5-year warranty. It has the best, most complete list of features in its price range.

Feature	Yes	No
Three-Knife Cutterhead	X	
Four Lifting Screws	X	
Two-Speed Feed Rate	X	
Depth-of-Cut Indicator	X	
Depth Stops	X	
Indexed Knives	X	
1 Rotation of Height Crank Equals 1/16-in.	X	
Blower		X
Long Tables (over 33")	X	

Make	Model	Price	Max Width	Weight (LBS)	Number of Knives	Number of Speeds	Cuts Per Inch	Indexed knives
Craftsman	21758	\$250	12-1/2"	60	2	1	60	Y
Craftsman	21759	\$530	13"	89.5	3	2	77	Y
Delta	22-580	\$400	13"	85.5	2	2	60/90	Y
DeWalt	DW734	\$400	12-1/2"	76.5	3	1	96	Y
DeWalt	DW735	\$550	13"	83.5	3	2	96/179	Y
Grizzly	G0505	\$240	12-1/2"	68.5	2	1	52	N
Jet	JWP-13DX	\$480	13"	79	2	2	51/74	Y
Makita	2012NB	\$470	12"	61.5	2	1	51	Y
Ridgid	TP1300LS	\$350	13"	85.5	2	1	66	Y
Ridgid	R4330	\$350	13"	73.5	3	1	86	Y
Ryobi	AP-1301	\$200	13"	51.5	2	1	64	Y
Steel City	40200	\$450	13"	70.5	3	2	85/130	Y
Sunhill	SM-344	\$250	12-1/2"	67	2	1	51	N
Sunhill	SM-346	\$350	13"	77.5	2	1	51	Y
Woodtek	CT-330	\$310	13"	77	2	1	51	Y

* Optional accessory ** With optional table extensions *** Blade zero Indicator † Flip open dust hood ‡ No Extension Table Available

We tested fifteen portable planers, falling into four price ranges. All the models in the \$200 to \$300 range worked well, but lacked some of the features that improve quality of cut and ease of set-up. If you're planning on spending \$300 to \$400, our pick is the Ridgid R4330. It packs in a lot of features at a great price. For a hundred bucks more, the Steel

City 40200 is a real steal. It has all the best features except a blower which you can live without. The top price category (over \$500) has two standout planers: the Craftsman 21759 and the DeWalt DW735. Missing from our test are Hitachi, Metabo and Shop Fox all of whom are coming out with new models that were not available for this test.



CRAFTSMAN 21759, \$530

This is the first bench-top planer with digital readout, but it also has a standard analog scale. Its beds are longer than all other planers we tested.

Feature	Yes	No
Three-Knife Cutterhead	X	
Four Lifting Screws	X	
Two-Speed Feed Rate	X	
Depth-of-Cut Indicator	X	
Depth Stops	X	
Indexed Knives	X	
1 Rotation of Height Crank Equals 1/16-in.	X	
Blower	X	
Long Tables (over 33")	X	



DEWALT DW735, \$550

This planer has a very low profile. Changing the knives is particularly easy. Folding infeed and outfeed tables are available as an accessory (\$60).

Feature	Yes	No
Three-Knife Cutterhead	X	
Four Lifting Screws	X	
Two-Speed Feed Rate	X	
Depth-of-Cut Indicator	X	
Depth Stops	X	
Indexed Knives	X	
1 Rotation of Height Crank Equals 1/16-in.	X	
Blower	X	
Long Tables (over 33")*	X	

* accessory

	Max Height	Bed Length with Extension Tables	Number of Lifting Screws	Head-lock	Depth-of-Cut Indicator	Depth Stops	One-Turn Removes	Dust Hood	Port Diameter
	6-1/4"	23-1/2"	2	N	N	N	1/16"	Y	2-1/4"
	6-1/4"	39"	4	N	Y	Y (6-fixed)	1/16"	Y	4" & 2-1/4"
	6-1/2"	35"	2	Y	Y***	Y (adj.)	1/16"	Y*	4" & 2-1/4"
	6"	33"	2	Y	Y	Y (4-fixed)	1/16"	Y	4"
	6"	37-3/4"***	4	N	Y	Y (6-fixed)	1/16"	Y	4" & 2-1/4"
	6-1/8"	27"	2	N	N	N	2 mm	N	NA
	6"	37"	2	Y	Y	Y (6-fixed)	1/16"	Y*	4"
	6-1/4"	30"	2	N	Y	Y (adj.)	2 mm	Y*	4"
	6"	34"	2	Y	Y	Y (8-fixed)	1/16"	Y	4" & 2-1/4"
	6-1/4"	34"	4	N	Y	Y (8-fixed)	1/16"	Y	4" & 2-1/4"
	6"	14"†	2	N	N	N	1/16"	Y†	2-1/4"
	6-1/8"	34-1/2"	4	N	Y	Y (8-fixed)	1/16"	Y	4"
	6"	23"	2	N	N	N	2 mm	Y	4"
	6"	37"	2	Y	Y	Y (6-fixed)	1/16"	Y	4"
	6"	37"	2	Y	Y	Y (6-fixed)	1/16"	Y	4"

20 Tried and Clamping

Oxalic acid makes black marks disappear.

Nasty stains can occur during glue-up if steel clamp beams are left in contact with wood dampened by glue squeeze-out or by scrubbing off the glue. Removing them requires sanding or scraping... or brushing on a solution of oxalic acid (two heaping tablespoons of crystals dissolved in a pint of hot water). Let the surface dry. Apply a second coat, if necessary. When the stains are completely gone, flood the surface with water to remove any acid that remains. Oxalic acid is available at paint and hardware stores. The crystals are poisonous, so wear gloves when you handle the solution and a mask afterwards, when you sand.



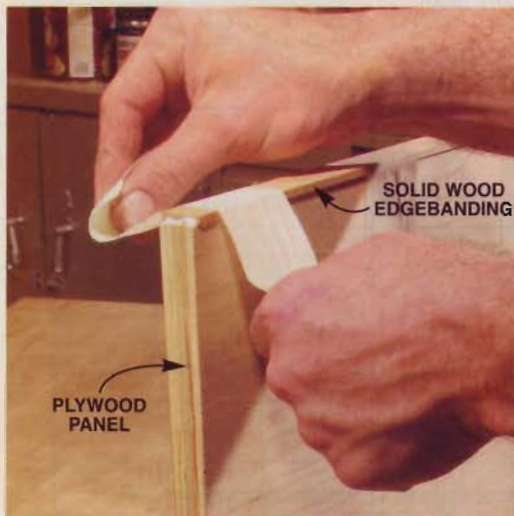
Curved cauls apply even pressure across wide joints.

Make cauls from boards cut to the width of the joint. Plane or sand a 1/16-in. crown on each caul. Clamping both ends automatically puts pressure on the middle of the joint.

1/8"



BILL ZUEHLKE



MIKE HABERMANN

Masking tape clamps edgebanding.

Thin stock doesn't require lots of clamping pressure. Simply draw the tape across the edgeband and firmly down both sides of the panel.

Box beams guarantee flat glue ups.

Made by gluing rails of equal width between two faces, box beams work like thick cauls to evenly distribute clamp pressure. They're great for gluing veneered panels or torsion boxes.



BILL ZUEHLKE

True Tips

by Tim Johnson

Square a crooked frame.

Experts recommend "checking diagonal measurements" to make sure your glued-up frames are square. So what do you do when the measurements don't match? Reposition the clamps to apply uneven pressure across the joints. Watch the change in dimension of one diagonal as you tighten the angled clamps. The goal is to split the difference between the two original measurements. For example, diagonals off by 1/8-in. require a 1/16-in. change. If the dimensional difference grows when you apply pressure instead of shrinking, the clamps are angled the wrong way.



MIKE HABERTZMAN

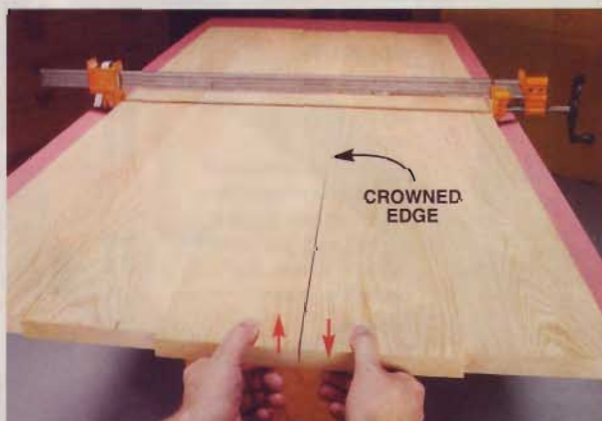
Create parallel clamping shoulders for curved shapes.

Make custom clamping blocks by tracing and cutting the curved profiles. Then mark and cut clamping shoulders parallel to the joints. Be proactive: Self-hanging clamp blocks free both hands for clamping.



Drive glued-up panels flat.

Applying clamp pressure often causes panels to lift off the bar and creep up the clamp head. Cupped or twisted panels are the result. Keep panels flat by rapping them back onto the bar with a dead-blow mallet. Each rap usually reduces the clamp's pressure, so be prepared to tighten the clamp.



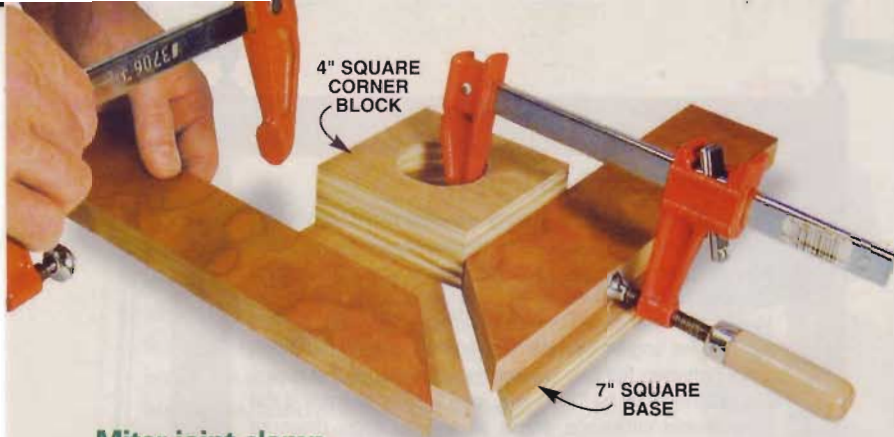
Check edge joints with one centered clamp.

Like dry-fitting a joint before you glue, this technique highlights imperfectly jointed boards that may otherwise be hard to see. Here, one slightly crowned edge causes a noticeable gap. Even if no gaps appear, test all the joints by lifting one board while lowering the other. If the boards move without resistance, the joint is too loose. Re-joint one or both boards and try again.

Tape prevents black marks from clamps.

Black stains result when ferrous metal, moisture and wood come together. If your clamps have untreated steel bars or black pipes, make it a habit to cover their surfaces before you glue. The tape insulates the metal from moisture in the glue and damp areas on the wood's surface.





Miter joint clamp.

This shop-made jig holds parts square and flat, allows adjusting each piece independently and accommodates glue squeeze-out. Use it to make picture frames with openings 4-in.-square or larger.

Make the corner block by gluing together two pieces of 3/4-in. plywood. Its corners must be perfectly square. Drill a 2-in.-dia. hole in the middle. Cut a diagonal slot halfway through the 3/4-in. plywood base before gluing on the corner block.



Paper towel pads keep corner joints clean.

Here's a trick for managing glue squeeze-out when you clamp dovetails or box joints: Face your clamp pads with paper towels. They absorb glue so it doesn't soak deeply into the wood. After the glue has dried, the papered blocks knock off easily. Dampen any paper that remains on the joint. After about a minute it'll scrub right off.



MIKE HABERMANN

Make short clamps go long.

You don't need super-long clamps to clamp super-long glue-ups. Just gang your regular clamps together.



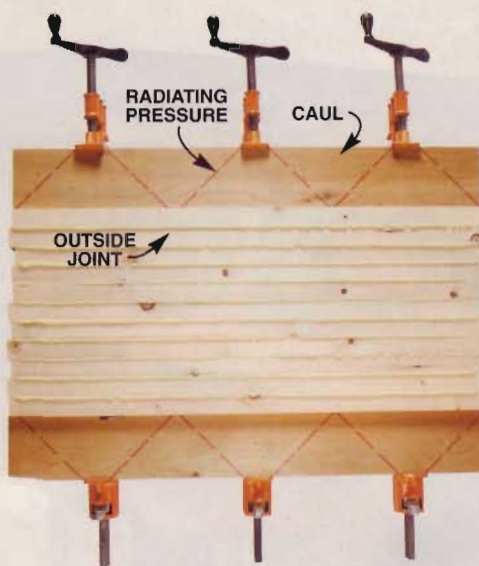
90-degree brackets simplify complex clamping jobs.

Clamping together a cabinet with numerous shelves and rails can be a real pain. Shop-made 90-degree brackets allow assembling the cabinet one joint at a time and keep the joints square while you clamp the cabinet together.

Blocks center clamping pressure.

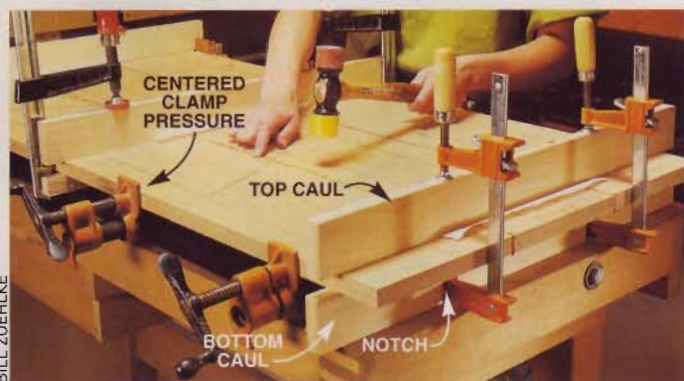
Uneven clamping pressure can easily draw offset joints, such as the one shown here, out of square. A block aligned with the joint properly directs the clamp's pressure.





Wide cauls require fewer clamps.

Cauls distribute clamp pressure, which radiates from the jaws up to 45 degrees from center. When you locate the clamps, simply make sure the pressure from adjacent clamps overlaps at the outside glue joints. The wider the cauls, the fewer the clamps you'll need. Wide cauls are especially useful when you glue numerous thin boards—butterblock tops, for example.



BILL ZUEHLKE

Clamped cauls assure flat panels.

This set-up makes gluing large panels a breeze. The bottom cauls support the panel and center the jaws' clamping pressure on it. The clamps are easy to position, because the elevated panel doesn't rest on them. Notches allow clamping the panel between the top and bottom cauls, so the joints stay flush and the panel stays flat when the pipe clamps are tightened.



BILL ZUEHLKE

Toggle clamps: Fast and versatile

Available in all shapes and sizes, toggle clamps are invaluable for jigs and fixtures. By firmly holding workpieces during difficult operations, they make woodworking safer and more enjoyable.

Source:

Woodcraft Supply, (800) 225-1153, www.woodcraft.com. Quick action toggle clamps available in a variety of styles, \$8-\$15 each.



RAMON MORENO

Plastic laminate clamps.

When shimmed under cauls clamped on wide cabinet sides, plastic laminate pieces act as deep-reach clamps, providing pressure in the middle of the joint.



Spring clamps keep boards aligned.

Keeping the joints flush during glue-up can be challenging, because boards can slide every direction when you start applying clamp pressure. Spring clamps help to keep adjacent boards from creeping up or down.



Refrigerator magnets make instant clamp pads.

They're readily available, a snap to install and they effectively insulate clamp pressure!





Curvy Coffee Table

I've been hoarding some huge, air-dried walnut boards for over twenty years, waiting for the right projects to come around. This small coffee table was the perfect opportunity to finally cut one open and get my hands on the rich figure inside.

by Tom Caspar



1 All the pieces of this coffee table came from one 2-1/2-in. thick, 6-ft. long walnut board. Before running the board through a planer or cutting it into smaller pieces, I used a No. 40 scrub plane to uncover knots, checks and sapwood.



2 Resaw the board to make the top, legs and rails. Making the table from one board ensures that all its pieces will be similar in color and texture. They won't have to be stained to match.



3 Use a sturdy sled to plane boards that are wider than your jointer. Put shims under the board's high spots, so the board won't rock as it passes through the planer. This board will become part of the table's top.



4 Rout two dove-tail-shaped grooves across the top's underside. Clamp the top to ensure that it's flat, then use a jig and template guide (see inset) to make grooves with parallel sides.

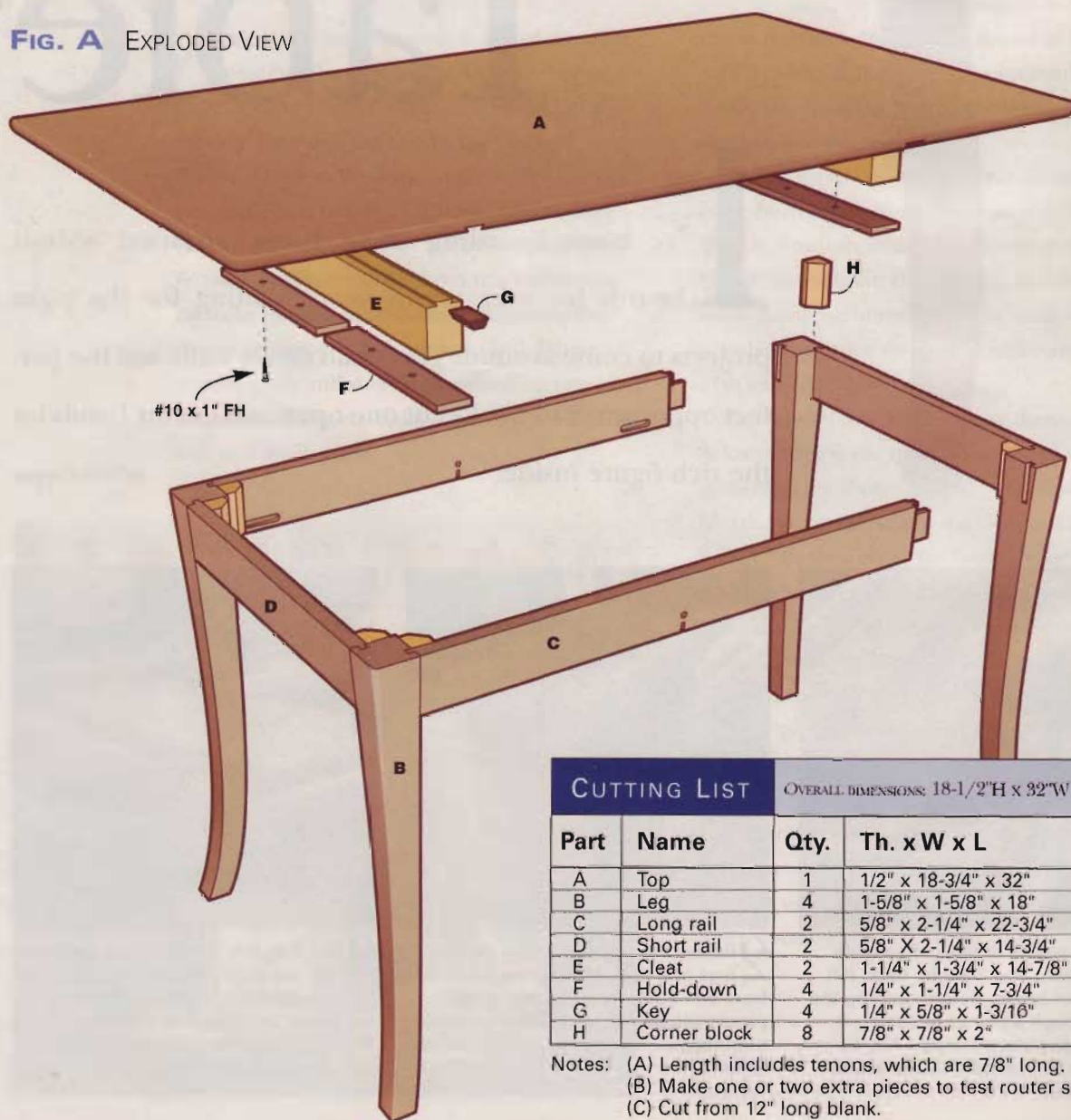


5 Make cleats to fit the grooves. This table's top is only 1/2 in. thick; the cleats keep it flat. The top would crack if the cleats were glued or screwed in place, so they slide in dovetailed grooves instead.



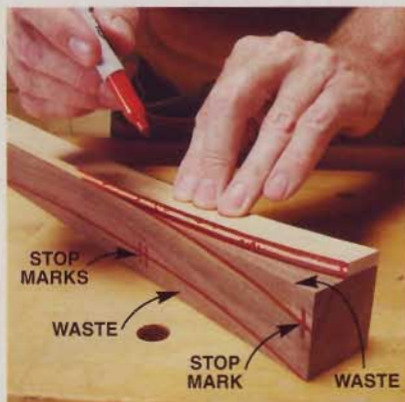
6 Slide the cleat in the groove to test its fit. Fitting can be very fussy, but it's worth spending the time to get it right. You should be able to slide the cleat all the way across the top by hand.

FIG. A EXPLODED VIEW



CUTTING LIST			OVERALL DIMENSIONS: 18-1/2"H x 32"W x 18-3/4"D	
Part	Name	Qty.	Th. x W x L	Notes
A	Top	1	1/2" x 18-3/4" x 32"	
B	Leg	4	1-5/8" x 1-5/8" x 18"	
C	Long rail	2	5/8" x 2-1/4" x 22-3/4"	(A)
D	Short rail	2	5/8" x 2-1/4" x 14-3/4"	(A)
E	Cleat	2	1-1/4" x 1-3/4" x 14-7/8"	(B)
F	Hold-down	4	1/4" x 1-1/4" x 7-3/4"	
G	Key	4	1/4" x 5/8" x 1-3/16"	(C)
H	Corner block	8	7/8" x 7/8" x 2"	

Notes: (A) Length includes tenons, which are 7/8" long.
 (B) Make one or two extra pieces to test router setup.
 (C) Cut from 12" long blank.



7 Trace a pattern on two adjacent sides of each leg blank. On one side, draw lines to indicate where to stop the saw when cutting the leg's first side. Stopping the saw creates small bridges that allow the waste pieces to remain connected to the blank.



8 Make mortises while the legs are still square. To start, rout two stopped grooves in each leg. Clamp a stop block to the router table's fence to limit the groove's length.



9 Complete the mortises with a mortising machine. The grooves made on the router table guide the chisel. The result is a precise haunched mortise with absolutely straight sides.

There's something that pleases a woodworker's soul when you make a whole project from just one board. It's really satisfying to study a big plank with all its problems, such as knots, sapwood and runout grain, and figure out how you're going to cut it into smaller pieces (Photo 1). Thick, large boards are a luxury, though. You can certainly make this table from separate boards instead, using standard 1 and 2-in. thick wood.

MAKE THE TOP

1) Resaw boards for the top (A, Fig. A, Photo 2). Cut them 3/4 in. thick, then joint and plane the boards 1/2 in. thick (Photo 3). Glue the top together and cut it to exact size.

2) Rout two dovetailed grooves across the bottom of the top (Fig. B and Photo 4). First, install a 1/2-in. wide dovetail bit and a 1/2-in. dia. template guide in your router. Next, build a jig, composed of four pieces, to guide the router. Use 1/2-in. thick material. Assemble the jig using two 5/8-in. thick spacers to fix the distance between the rails. The router's bit and template guide setup makes a groove that's exactly the same width as the distance between the jig's rails.

DOVETAILED CLEATS

3) Make cleats (E) from a stiff hardwood that resists splitting. Maple is

ideal. Make one or two extra pieces to test your router-table settings.

4) Shape the cleat's dovetailed key on the router table (Photo 5). Set the height of the router bit so that the key is a paper-thickness shallower than the grooves in the tabletop. (You don't want the cleat to drag against the bottom of these grooves when you insert it.) Adjust the router table's fence until the cleat fits right (Photo 6). Remove the cleats from the table.

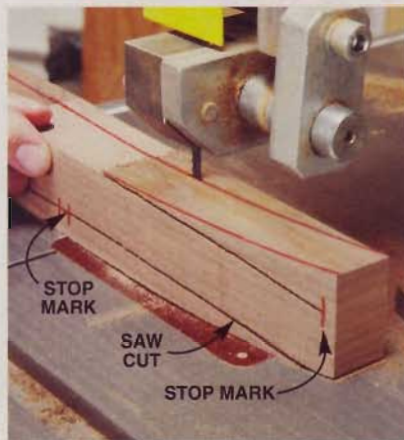
5) Finish the top by shaping a shallow curve on both of its long sides (Fig. D). Bend a 3-ft. long stick to form the curve. Cut the curve using a jigsaw or bandsaw. Round over the bottom edge of the top using a router (Fig. B). Use a smaller roundover bit on the top's upper edge. Use a file to soften the top's four corners.

SHAPE THE LEGS

6) Make a pattern for the legs (D) from 1/4-in. thick wood (Fig. G). Mill leg blanks and trace around the pattern on two adjoining sides (Photo 7).

7) Mill mortises before bandsawing the legs. Begin by routing grooves for the tenon's haunch (Fig. E, Photo 8). Deepen the mortises with a mortising machine (Photo 9).

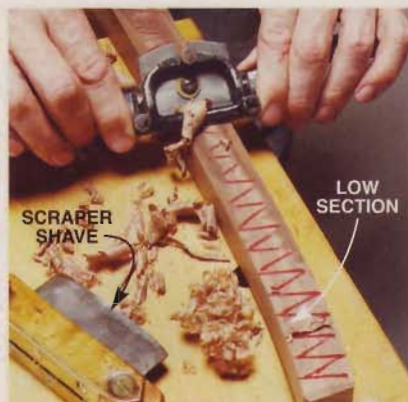
8) Cut the legs on the bandsaw (Photo 10). Saw one side first, then turn the leg 90 degrees. Lay the pattern on the leg and mark the portion



10 Bandsaw the leg. For the first cuts, saw up to the stop marks, then back out. Rotate the leg 90 degrees, as shown here, and saw the full length of the leg's curve.



11 Plane the top 6 in. of the leg's outer faces, which are rough from the bandsaw. This creates a guide surface for planing the rails later on.



12 Spokeshave the leg's concave lower half. It's easiest to shave the outer edges first, then the middle. I use an old convex-bottomed scraper-shave to smooth the lowest section of this curve, where a flat-bottomed spokeshave can't reach.



13 Rout a roundover along the leg's outside corner. Make a rounded subbase to follow the leg's contour (see inset). The subbase will work fine on the leg's flat section, too, because the subbase's curve is so slight.



14 Assemble one side of the table without glue, then plane the rail approximately flush with the leg. You must remove a fairly large wedge-shaped section from the rail to follow the leg's taper, so start out with a heavy cut.

FIG. B TOP DETAILS

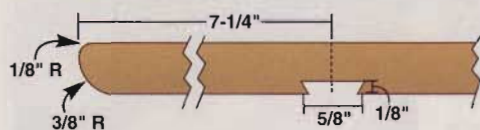


FIG. C CLEAT DETAILS

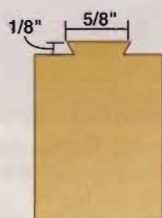


FIG. D PLAN VIEW OF TOP

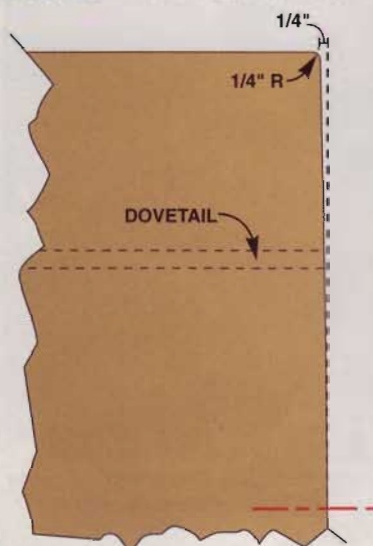


FIG. E JOINERY AND SLOT DETAILS

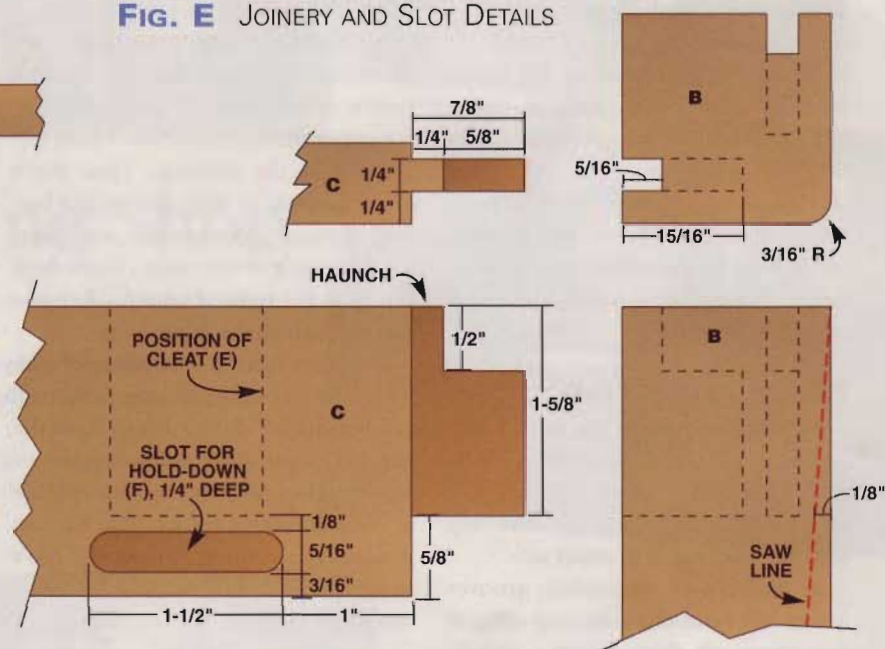
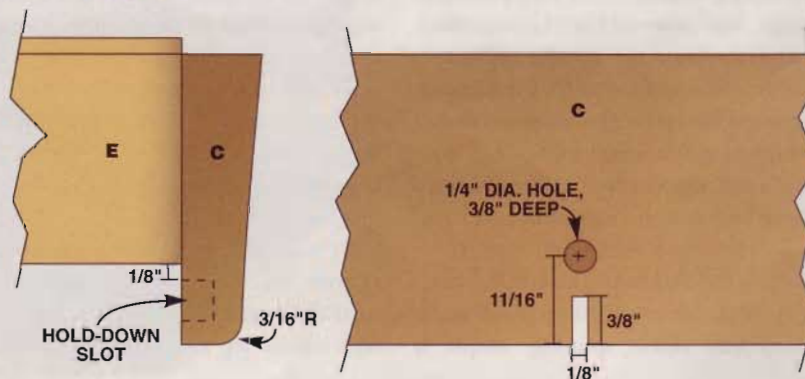
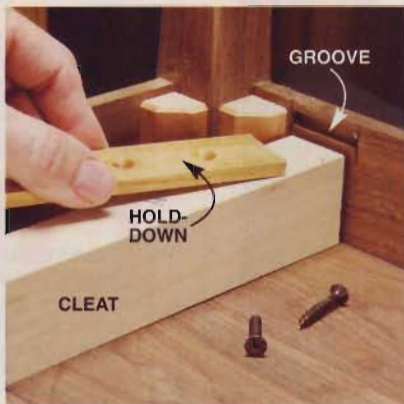


FIG. F RAIL DETAILS

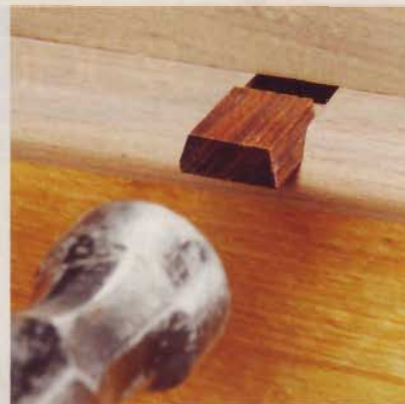




15 After gluing, finish making the joint flush with a No. 80 scraper. Mark both sides of the joint, then scrape until the marks are gone. This ensures that the joint is even.



16 Install hold-down pieces to clamp the base to the top. Slide each hold-down into a groove in the rail, then screw the piece to the cleat. This pushes the rails down tight to the tabletop.



17 Tap small keys into the exposed ends of the dovetailed grooves. Make them from an exotic dark wood to accent your table.

of the curve that was removed by sawing. Saw the other side.

9) Hold the leg between dogs on a workbench in order to smooth the bandsawn surfaces. Begin by planing 4-6 in. of the upper end of each leg's outer face (Photo 11). File or cut a 1/8-in. wide chamfer all around the leg's foot as you work on each face.

10) Smooth the lower half of the leg's outside face using a spokeshave (Photo 12). You won't be able to get down into the lowest section of the curve, however. I use a scraper-shave to smooth this area, but you could use a file or coarse sandpaper wrapped around a convex block.

11) Smooth the leg's inside faces. Mark the point where the curve starts (Fig. G). Begin forming the convex surface below this point with a smoothing plane. Don't plane the upper part of the leg, where the mortise is. That section must remain flat and square to make a tight joint with the rail. Use a spokeshave on the leg's lower section.

12) Round over the legs' outside corners using a router (Fig. E, Photo 13).

MAKE THE RAILS

13) Mill the rails (C and D) as square stock. You'll taper their front edges later on. Cut the rails' tenons using the tablesaw and a dado set. Hold the rails against a sub-fence attached to a miter gauge. Clamp a stop block to the miter gauge to set the tenon's length. Note that the tenons are offset, relative to the rail's thickness (Fig. E). Raise the dado set to cut all the tenons' outside faces first, then lower the blade to cut the inside faces.

14) Cut haunches on the tenons with a bandsaw using a fence and miter gauge. Use the same method to rip the lower half of the tenon. Crosscut this piece with the bandsaw, too, but cut 1/32 in. away from the tenon's shoulder. Use a chisel to pare the shoulder.

15) Taper the outside faces of all four rails (Photo 14). Assemble two legs and a rail without glue. Plane the rail more or less flush with the legs.

16) Round over the lower edge of all the rails (Fig. F).

17) Layout and cut decorative notches and holes in the long rails (Fig. F).

Rout slots for the tabletop hold-downs (F) inside the long rails (Fig. E) using a plunge router and a fence.

ASSEMBLE THE TABLE

18) Glue the short rails to the legs. Lay the assembly on your bench and scrape and sand the rails until they're flush with the legs (Photo 15). Glue the rest of the table together and scrape and sand the long rails flush.

19) Make corner blocks (H) and glue them into each corner of the base. There's no need for clamps; just apply a thin film of glue to each block and rub it up and down in position until it sticks.

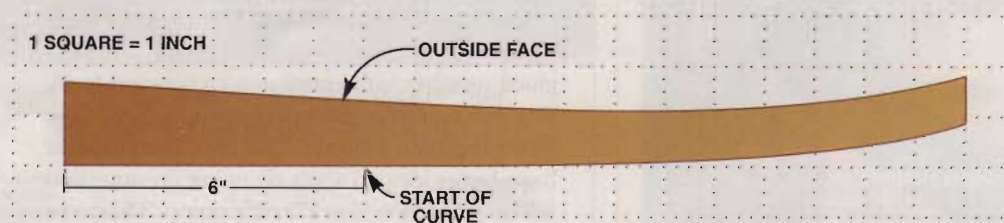
20) Fasten the top to the base. Make hold-downs (F) and drill and countersink screw holes in them. Turn the top upside down and slide in the cleats. Place the base on the top and fasten the hold-downs to the cleats (Photo 16).

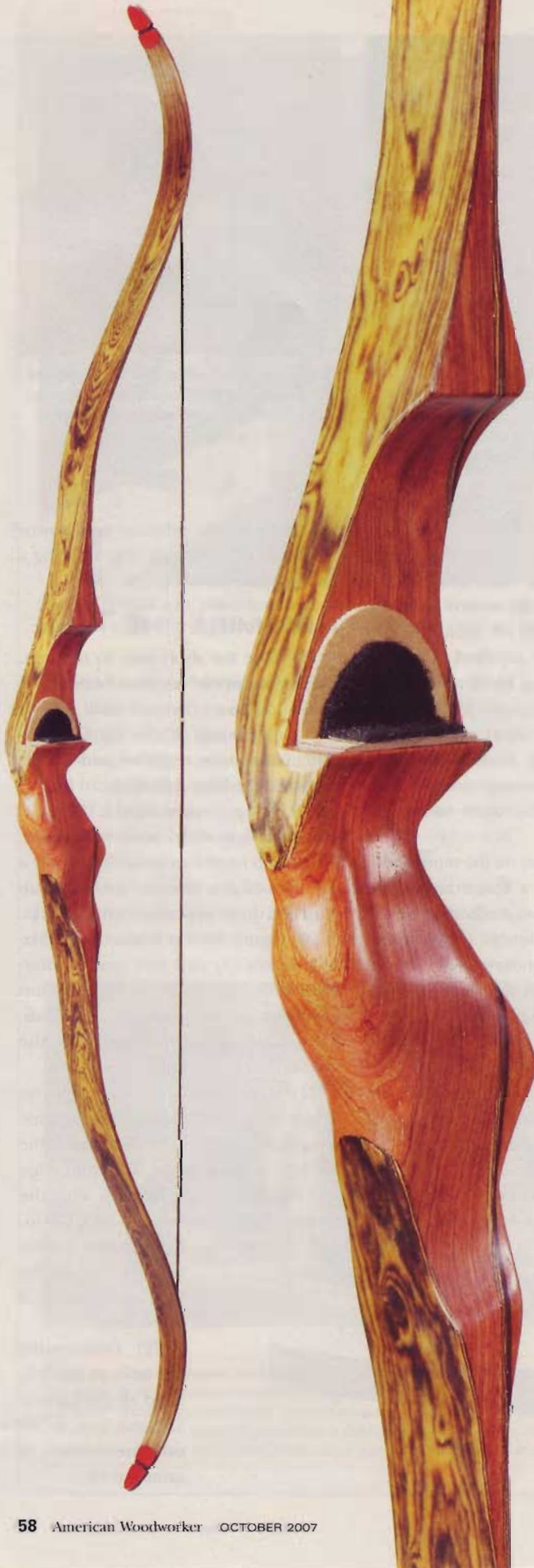
21) Make keys (G) to fit the grooves (Photo 18). Use the same router table setup you used to make the cleats. Glue the keys in the grooves. The front edge of each key should be even with the table's edge. There should be a 1/8-in.

gap between the key and the rail so the top can contract in a dry season.

22) Disassemble the table to finish it. Sand all the parts to 150 grit and brush on three coats of satin varnish.

FIG. G LEG PATTERN





Build a

by David Radtke

I got my first bow for my fourth birthday. It was plastic and thank heavens the arrows had rubber tips because everything within a 30-ft. radius was fair game. These days I exercise better judgement and only shoot at designated archery targets, but my fascination with this ancient technology is as strong as ever.



Several years ago I built my own wood and fiberglass recurve bow from a kit. The “recurve” refers to the way the bow curves away from the shooter at the tips. This gives the bow more snap when the arrow is released. Building the bow was almost as exciting as shooting it. Since then I’ve built several bows, each with a feel and character of its own. They’re beautiful to look at and fun to use. There aren’t too many woodworking projects you can play with outdoors!

A bow may look complex, but the kit I used makes it pretty straight forward (See “Bow Kits,” p.60). In this story, I’ll show you how to make a bow from one of these kits. No specialized tools are required, but you will need a handsaw and an oscillating spindle sander to shape the bow. A drum sander in a drill press can substitute for the spindle sander.

The bow is laminated with thin strips of wood and fiberglass (Fig. A, p.60). They’re bent and glued together with epoxy using a plywood form. You don’t need a zillion clamps to squeeze the forms together, however. The kit’s manufacturer has a better idea: to apply clamping pressure, you inflate a fire hose with a bicycle pump. Then, you

Recurve Bow

place the assembly in a shop-made plywood box equipped with incandescent light bulbs. The bulbs provide the heat necessary to cure the epoxy. The result is a one-piece recurve bow with incredible strength and flexibility.

BUILD THE FORMS

1. Use the full-size paper patterns from the kit to lay out, cut and smooth one layer of plywood to use as a template for the upper and lower halves of the form (Fig. B, p.60).

2. Rough cut the other plywood layers about 1/8-in. oversize.

3. Glue the layers together using 1-3/4-in. screws as clamps (Photo 1). Use a wet rag to clean away any squeeze out on the template edge. You will need a smooth surface for the bit bearing to ride on in the next step.

4. Once the glue is dry, use a router with a flush-trim bit to trim the other pieces even with the templates (Photo 2).

5. Drill a 1/4-in. hole in the center of the lower form and drive in the steel riser index pin (Fig. B).

6. Glue the reverse taper strips (Fig. B) onto the lower form. Butt the skinny end of each strip against the index pin. The taper on these strips is just the opposite of the taper on the bow lamination strips and creates a better matched clamping surface. Use contact cement for an instant bond without clamps. Then, add strips of plastic laminate to create a smooth surface (Photo 3). The edge of the upper form does not contact the bow laminations, so it needs no special treatment.

7. Install the locking hardware on the form (Fig. B). Add spacers under the hardware to allow room for the deflated hose.

8. Build the laminating oven using 1/2-in. plywood with 2x2 corner cleats (Fig. C, p.60). Assemble the box as one big unit, then cut the lid free with a circular saw.

9. Wire in the porcelain light bulb sockets and the thermostat (Fig. D, p. 61). I lined the box with thin-foiled insulation, but that's optional.



1 The first step in bow building is to make the form for gluing the bow laminations. The form is composed of four layers of 1/2-in. plywood glued together. One layer is a template cut to the exact shape. The other pieces are cut oversize and trimmed to match later. A notched trowel makes a great glue spreader.



2 Flush trim all the form layers with the template layer. The top half of the form is built in the same manner.

FIG. A Bow Laminations

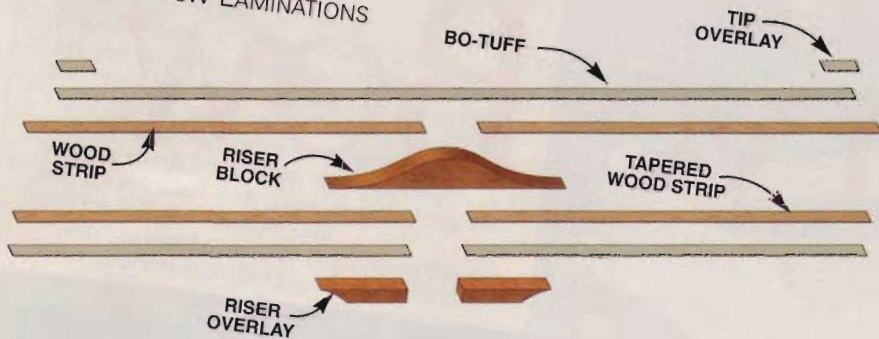


FIG. B FORM

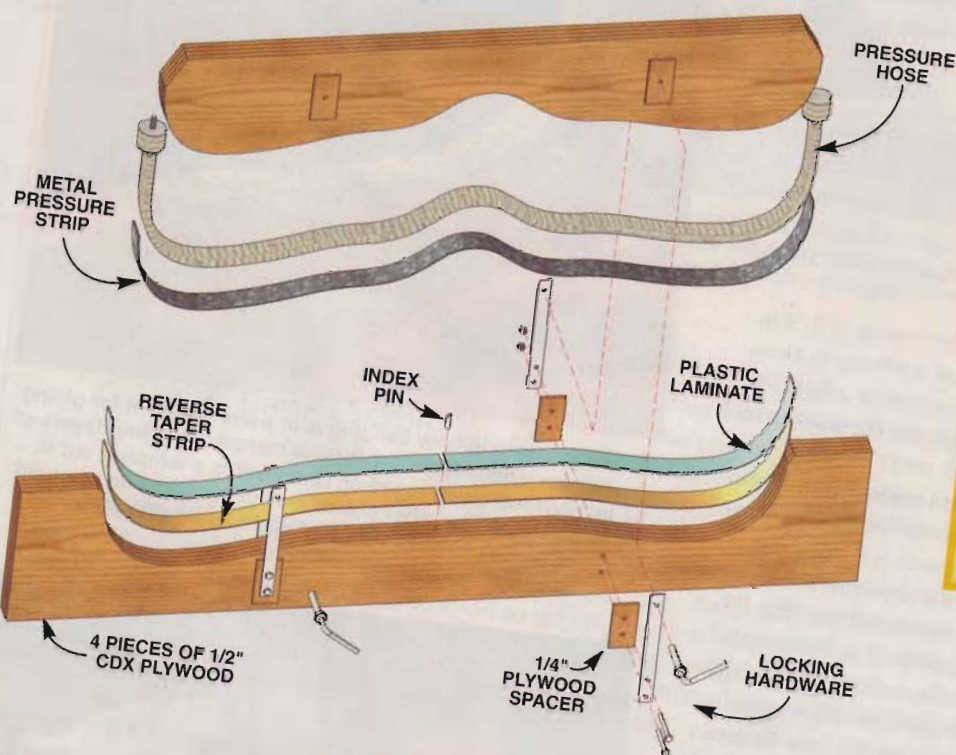
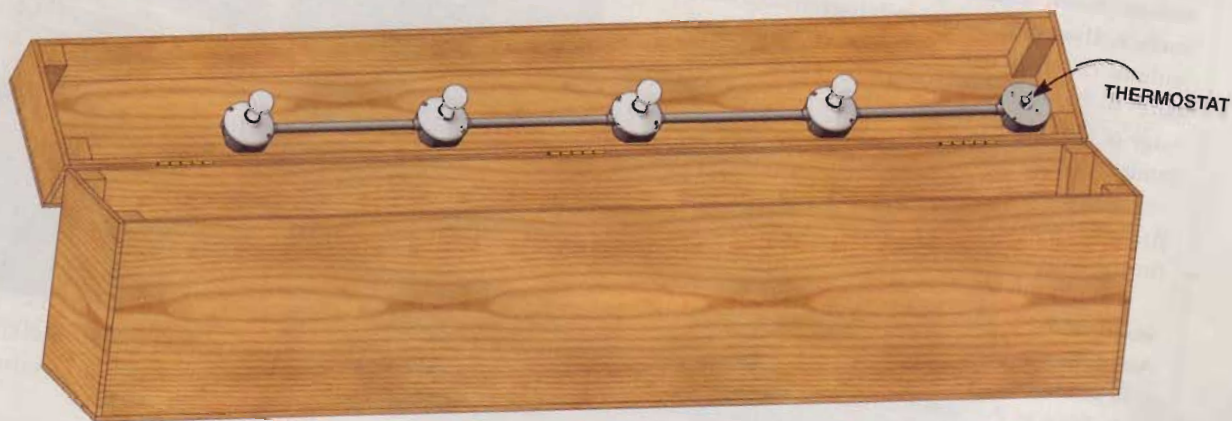


FIG. C HEAT BOX



Bow Kits

I used kits from Bingham Projects (see "Buyer's Guide," p. 64). You can select from a wide variety of wood species and Bo-Tuff colors for your bow. The kits include:

- **Bo-Tuff** - fiberglass strips that give the bow strength.
- **Four wood strips** - two have a slight taper. The fat end goes to the middle.
- **Tip overlays** - mitarata plastic used to reinforce the bow tips.
- **Riser block and overlays** - blocks of wood that form the handle and arrow rest.
- **Paper patterns** - for bow and form shapes.
- **Steel hardware** for the forms.
- **Pressure hose** with fittings.
- **Metal pressure strip** - distributes hose pressure evenly.
- **Index pin** - keeps the riser block anchored in the form.
- **Plastic laminate** - provides a smooth, non-stick surface.
- **Reverse Taper strips** - opposite of the bow strip taper.
- **Thermstat** - limits the temperature in the heat box.
- **Slow-set epoxy** - allows for unfrenzied assembly.
- **High temperature masking tape** - protects the Bo-Tuff.
- **Construction video**

PREP THE LAMINATIONS

10. Cut the riser block to length. Find the center of the bottom of the riser block and drill a 5/16-in. hole, 1/2-in. deep to fit over the index pin on the lower form. Trace the shape of the riser using the pattern in the kit and cut the shape using your bandsaw. Sand with a drum sander (Photo 4).

11. Trim the wood laminations to 32-in. Then, cook the riser and wood laminations in the heat box for about 30 minutes to chase off any surface moisture that might interfere with the epoxy set.

12. Cut both bottom pieces of Bo-Tuff fiberglass to 32-in. and the top piece to 64-in. A Dremel cut-off disc works great on the Bo-Tuff, but a pair of metal cutting shears will do. Wear gloves when handling the Bo-Tuff. Fiberglass slivers are a real drag.

13. The Bo-Tuff has a smooth and a rough side. The smooth side is the finished surface while the rough side gets the epoxy. Apply heat-resistant masking tape to the smooth side of the Bo-Tuff. The masking tape keeps epoxy off the surface and avoids unnecessary cleaning and sanding.

14. It's imperative to have everything (including a helper) ready before applying epoxy to the bow laminations. I like to set the form between blocks clamped to a pair of sawhorses. This provides clearance around the entire form so I can wrap filament tape around the form and pull the laminations down tight to the form. Test the pressure hose fittings for leaks in a pail of water just as you would with a bicycle inner tube. Also, rub a thin layer of paste wax onto the plastic laminate and both sides of the metal pressure strip (Fig. B) to keep oozing epoxy from sticking to their surfaces.

15. Roll out an ample length of plastic wrap over the lower form onto the plastic laminate to further protect it from epoxy squeeze out.

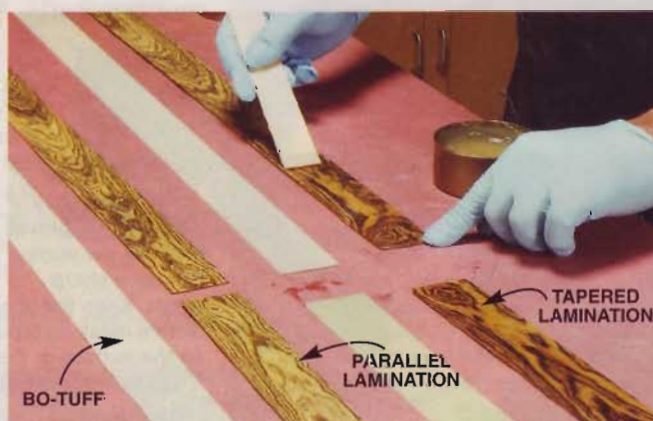
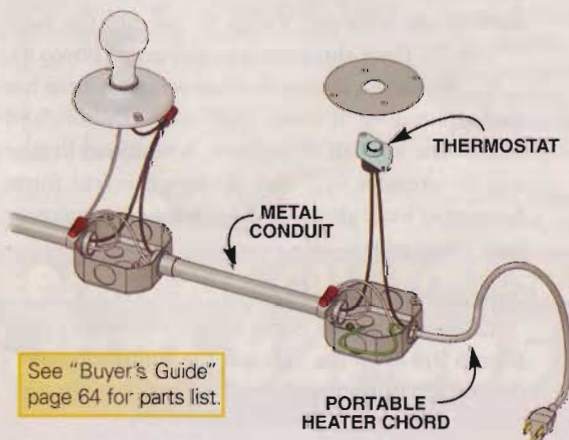


3 Glue the reverse taper strips to the lower form with contact cement. Make sure the thin end goes against the index pin. Add plastic laminate strips on top of the reverse taper strips to create a smooth surface on the form. The steel index pin is used to anchor the riser block in the form.

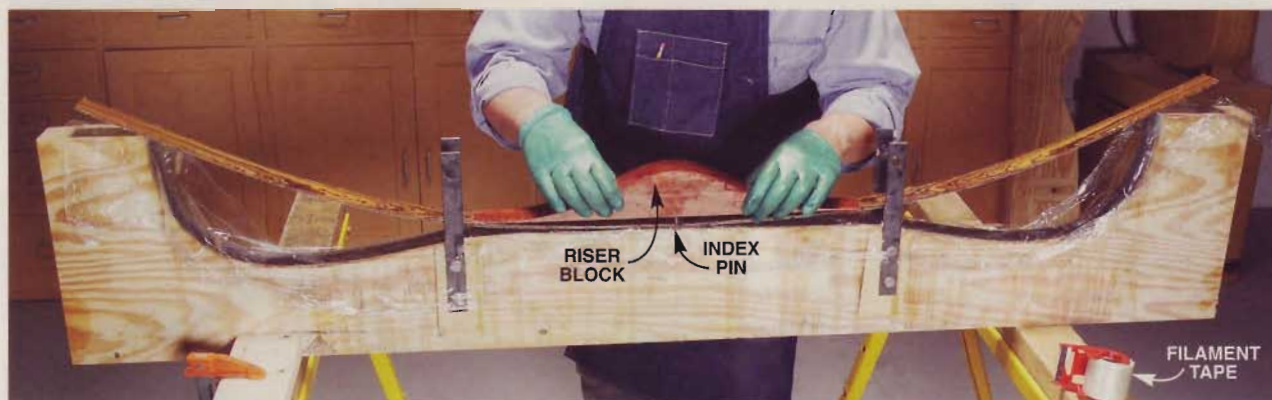


4 The bow's handle is shaped from a large block of solid wood called a "riser block." Sand the riser with an oscillating spindle sander or a drum sander. A backer board allows you to feather the riser's tapered edges to a paper-thin thickness.

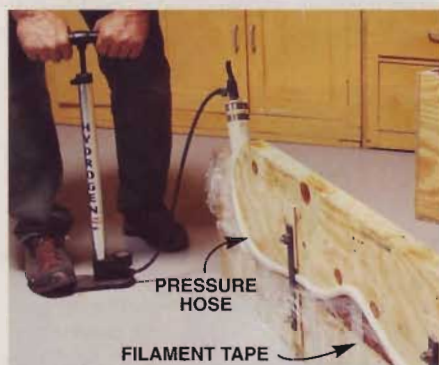
FIG. D WIRING DIAGRAM



5 The bow is composed of three types of laminations: strips of solid wood of uniform thickness, strips of solid wood that taper from end to end, and strips of Bo-Tuff fiberglass. Coat all of these pieces with slow-setting epoxy.



6 Butt the bottom pair of laminations against the index pin on the form. Set the riser block over these laminations so the hole drilled in the back fits over the index pin. The top laminations will lay over the riser. Plastic wrap protects the form from epoxy squeeze out. Wrap filament tape around the laminations to keep them from sliding around on the bottom form.



7 Pump air into the pressure hose to apply clamping pressure to the laminations. The pressure hose is set on top of the laminated bow in the form. The two halves of the form are held in place with metal straps and bolts that come with the kit.



8 Set the form in a shop-made plywood oven for a four-hour bake. The oven is heated by incandescent lights. Heat is needed to cure the slow-set epoxy. Remove the form after it's cooled overnight.



9 Sand off the excess epoxy. Wear leather gloves because the epoxy can have sharp edges. Keep the protective masking tape on the surface of the limbs as long as possible to prevent scratches.

16. Lay all the lamination pieces onto a papered surface in pairs. Mix about 4 oz. of epoxy in a small can. Coat the rough side of the Bo-Tuff with epoxy and both sides of the wood laminations. Set the wood laminations onto the rough surface of the Bo-Tuff.

17. Lay the lower Bo-Tuff and tapered laminations onto the lower form and butt them up against the riser index pin. Make sure the thick part of the wood laminations are against the pin.

18. Coat the riser with epoxy. Set the riser on top of the lower laminations and push it into the index pin (Photo 6). Set the top pair of laminations onto the top of the riser. Make sure the center of the Bo-Tuff rests directly over the center of the block. Place the metal pressure strip over the top of the bow assembly.

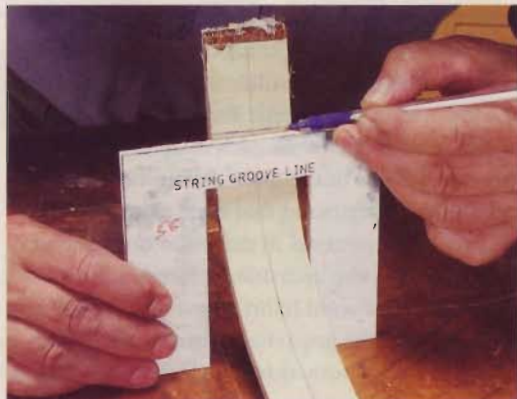
19. Wrap filament tape around the form and the pressure strip to pull the laminations tight to the form.

20. Lay the deflated hose over the pressure strip and bolt the upper form in place. Make sure all the laminations are aligned with each other and no shifting has occurred. Pump 60 psi into the hose (Photo 7). Place the form into the oven (Photo 8).

21. When the curing is done and the form has cooled, remove it from the oven. Unbolt and remove the top half of the form, hose, filament tape and the pressure strip. Pull the bow from the form. Be sure to wear gloves as the hardened epoxy may have sharp edges.

SHAPE THE BOW

22. Sand the bows edges to remove excess epoxy (Photo 9). Keep the tape on the limbs to protect the surface from scratches. Always wear safety glass-



10 Use a bridge shaped template to mark the length of each limb (top of the bridge) and to position the grooves for the string (underside of the bridge).

es and a dust mask.

23. Draw a centerline along the length of the bow. Mark the limb cut-off point and the string groove location (Photo 10). Cut the limbs to length on the bandsaw. Fiberglass is hard on blades, so use an old one. If you plan to make a lot of bows, consider buying a carbide blade.

24. Mark the limb tip shape (Photo 11).

25. Rough-cut the shape of the bow limbs on the bandsaw. Use a drum sander to finish the shape.

26. Start the string groove cut with a triangular file. Follow up with a rat-tail file (Photo 12) and a fine chain-saw sharpening file. Be sure each string groove is cut at the same angle and depth. The exact angle is a bit arbitrary but should be around 70-degrees to the tabletop.

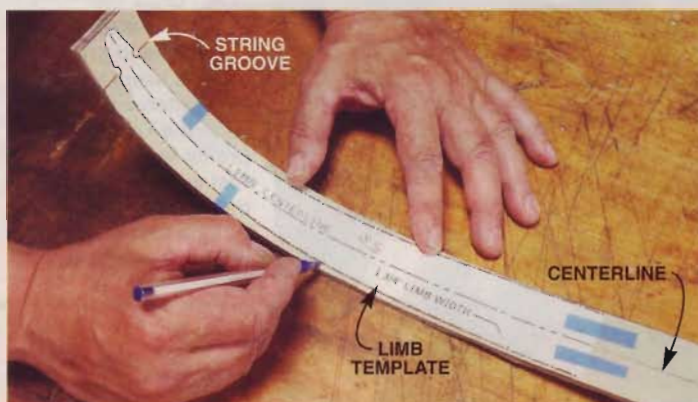
27. Reinforce the tips with a tip overlay (Fig. A). Cut and shape the part of the tip overlay that lays directly on the bow surface. Let the outside edges overhang the bow limb for now.

28. Remove the tape at the tip and lightly sand the area with 120-grit sandpaper. Use regular epoxy to glue the tip overlays to the limbs. Lightly clamp in place and let the epoxy cure overnight. File the tip overlay flush with the bow edges and string grooves.

29. Remove the tape on the bottom center portion of the bow. Scuff sand the area and epoxy the riser overlays to the bow, leaving a 1/2-in. gap between them.

30. Check the bow for uniform limb stiffness (Photo 13). It's best if both limbs are the same stiffness.

31. To limber up a stiff limb, remove the string and lightly sand the fiberglass surface on each side of with 120-grit sandpaper. If you still end up with



11 Align a paper pattern with the limb's centerline and the string groove mark. Cut the shape on a bandsaw and finish shaping the edges with a drum sander.

12 File the string grooves with a rat-tail file. The angle should be approximately 70-degrees to the tabletop. Check the backside of the bow often to make sure each side is symmetrical.



13 Due to variations in shaping and sanding, one limb may be stiffer than another. To test, string the bow and measure from the end of each riser overlay to the string. A stiffer limb will measure shorter.



14 Check for twist in the limbs. Make a tiller stick to pull the string and flex the limbs. If one limb is twisted, mark the side that is high. Sand the high edge to remove enough material to correct the twist.





15 Draw the arrow notch and the hand-grip profiles using the two patterns provided in the kit. Cut the profile for the top first as shown and then lay the bow on its side to further cut the hand-grip area.



16 Use a combination of rasps and small drum sanders to custom-fit the bow to your hand. Once you get it right, start sanding the wood areas with 80-grit sandpaper. Don't sand the fiberglass surfaces with anything less than 120-grit sandpaper or you'll leave deep scratches that are hard to remove.



17 Finish your bow by suspending it from a wire attached to the string grooves. Spray several coats of gloss varnish to protect the bow and bring out the wood's beauty.

one limb slightly stiffer than the other, that's OK - just make sure the stiffer limb is at the bottom of the bow.

32. The next step in tuning your bow is called "tillering". Cut an 18-in. tiller stick and use it to stretch the string and mimic bow pull (Photo 14). Sight down the surface of each limb and look for twist. Mark the side of the limb wherever it rises from the horizontal. Then, sand that edge to correct twist.

33. Use paper patterns to trace the bow grip and arrow notch onto the riser block. Reverse the arrow notch template for a left-hand bow.

34. Rough out the grip shape on a bandsaw with a 3/8-in., 4-TPI skip-toothed blade (Photo 15). Clamp your bow in a vise and rasp the riser to fit your hand (Photo 16). I used many shaping tools, from portable drum sanders to files, rasps and sanding blocks.

35. Finish sand all the bow surfaces. Start with 120-grit and work your way up to 400-grit to remove scratch patterns from the fiberglass. Spray the bow with several coats of gloss varnish, let dry - then give your bow a try.

BUYER'S GUIDE

**Bingham Projects, (801)-399-3470,
www.binghamprojects.com**

- 302 - Recurve Laminating Press Kit with Video - choose bow length and limb width (includes 3-01 Instructional materials, full-size blueprints & video)
- 2TC - Thermostat Control for laminating oven
- 6300 - Recurve Limb Lamination Kit - choose bow length, limb width (1 3/4" or 2"), draw weight, draw length and glass color
- 403LVC - Recurve Riser - choose color
- 4061 - Epoxy glue - 3/4 pt.
- 402BT - Bow tip overlays - choose color
- 1707 - Bow string - 2 recommended
- 415 - 3/4" Filament tape
- 415 - High Temperature masking tape - 2"
- 58" or 60" Recurve Limb Lamination Kit - includes Bo-Tuff E glass and wood strip laminations.

Total Bow Supplies Approx. \$250
(Additional Bows Approx. \$120)

Home Centers

- 4 sheets 1/2" CDX plywood
- 1 - 2x2x8' pine
- 5 - 4-in. x 1-1/2" octagon steel junction boxes
- 8 - 1/2" EMT set screw connectors and lock-nuts
- 10' of 1/2" EMT conduit
- 1 - 1/2" metallic chord connector with strain relief grip
- 10' of black and 10' of white, 16 ga. stranded high temp. insulated wire (150°C)
- 8 - Wire nuts sized for 3 - 16ga. conductors
- 1 - box cover with center knock-out
- 1/4" #10-32 green ground screw
- 4 - porcelain keyless lampholders
- 1 - Portable heater cord set, 3 conductor, 16 gauge grounding type HPD or HPN (105°C or more)

Total Materials Approx. \$150

Tapered Sliding Dovetails

Create perfectly-fitting joints that don't need to be clamped.

by Tim Johnson

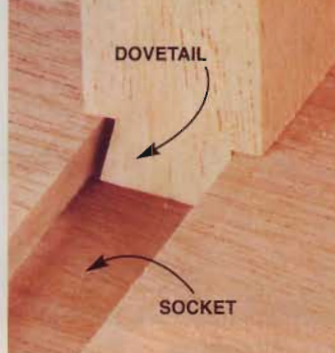
How would you like to assemble a rock-solid cabinet without using clamps or fasteners? That's the promise offered by tapered sliding dovetail joints. The joint consists of a tapered socket cut into the face of one piece and a tapered dovetail cut on the end of the other. The pieces simply slide together (photos at left). Like a dado joints with attitude, tapered sliding dovetails lock mechanically to form rigid 90-degree joints.

Before reliable glues or economical fasteners were available, cabinetmakers relied on these sturdy joints to connect cabinet components. The tapered parts must fit precisely to create a wobble-free joint, so cutting these joints by hand is a real woodworking tour de force.

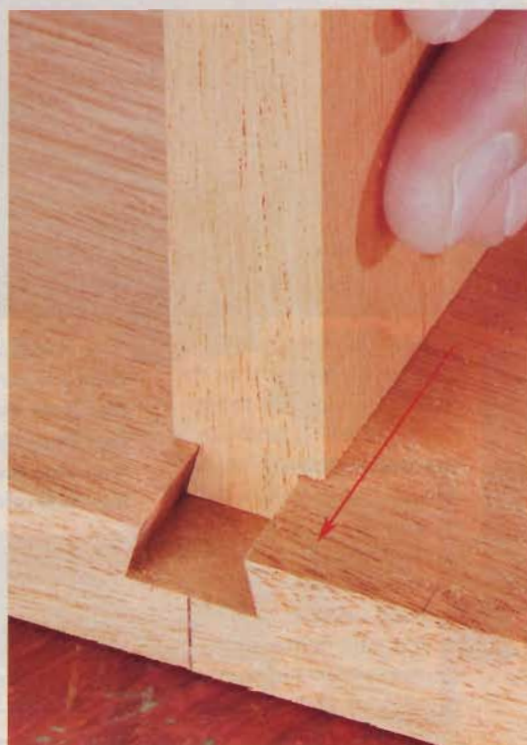
Fortunately, a dovetail bit, a router table and a simple shop-made jig make tapered sliding dovetails much easier to master.



In a tapered sliding dovetail joint, the dovetail and socket both gradually taper from back to front. The parts fit loosely at first, because the dovetail's narrow front end enters at the socket's wide back.



As the dovetail slides forward in the socket, the fit gradually tightens. The result is a snug clamp-free joint.



You use the jig (Fig. A, right) to make the sockets and the router table to make the dovetails. Shims make it easy to create the tapers.

TAPER DIMENSIONS

The dovetails and sockets increase in width at the rate of 1/16-in. every 12 inches. (Both sides of each dovetail and socket are tapered, so each side increases by 1/32-in.) Shims milled to 1/32-in.-thickness create perfect tapers on the 12-in.-wide workpieces shown here. To maintain the taper angle on assemblies wider or narrower than 12-in., simply adjust the shims' thickness.

MAKE THE JIG AND ROUT THE SOCKETS

Use a sled to make the jig's tapered guide boards (Photo 1). The sled and both guide board blanks must be squarely cut. Mark the taper's 12-in. run on the sled. Position the sled flush against a block and a stop. Tape a shim on the block, above the mark you've just made on the sled. The shim's 1/32-in. thickness constitutes the taper's rise. Butt the guide board blank against the stop and the shim and nail it to the sled. Mark the tapered edge and the direction of its slope. Then cut the taper (Photo 2).

Assemble the jig (Photo 3). It should fit snugly over the cabinet sides. Make sure the tapered guide boards angle outward from front to back. The distance between the guide boards at the front of the jig determines the narrow width of the dovetail socket. For example, to make a 5/8-in.-wide socket using a 1/2-in. dovetail bit, the distance between the faces would measure the diameter of your router's base plus 1/8-in. This socket would swell to 11/16-in. at the back of a 12-in.-wide workpiece. Tapered sockets (and dovetails) of this width are perfect for the 3/4-in.-thick stock shown here.

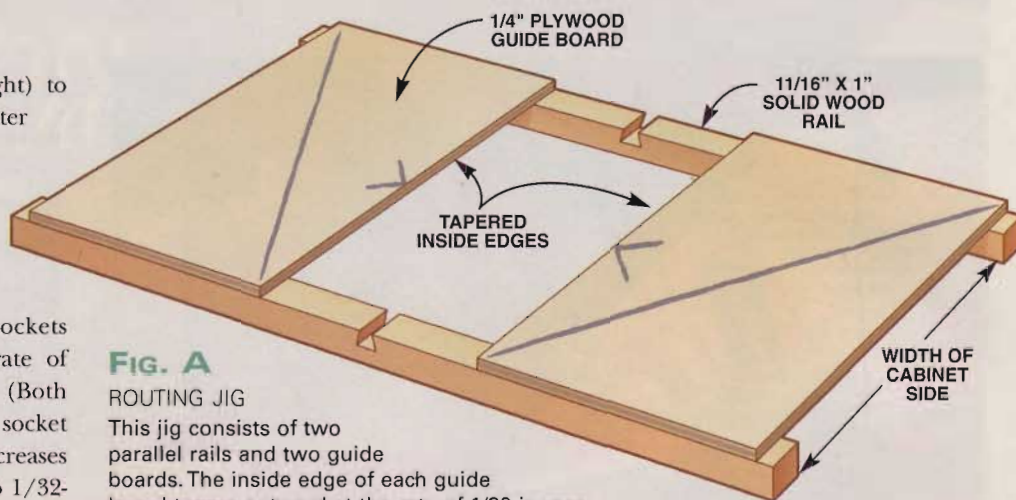
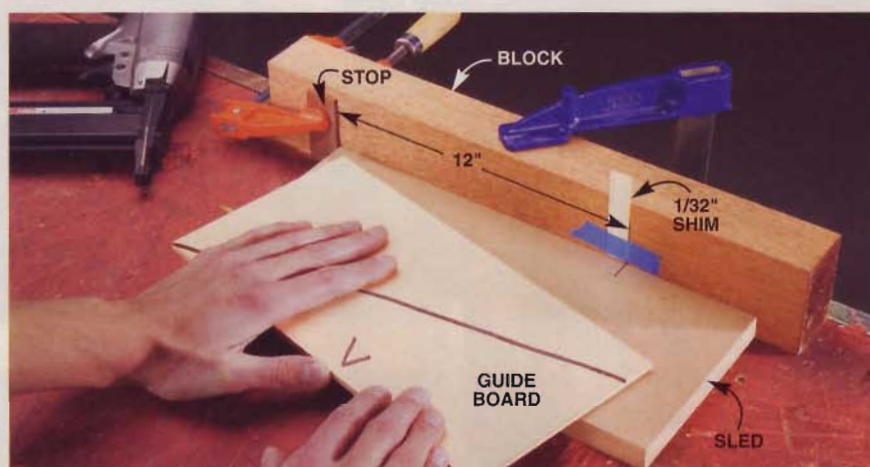


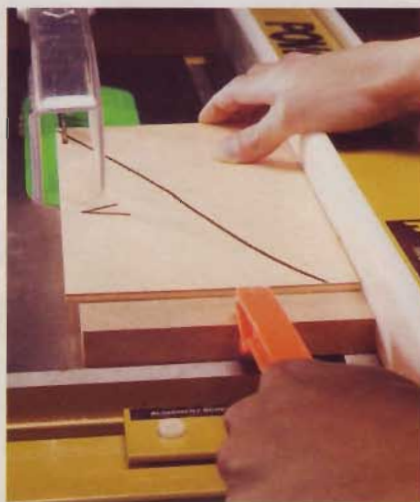
FIG. A

ROUTING JIG

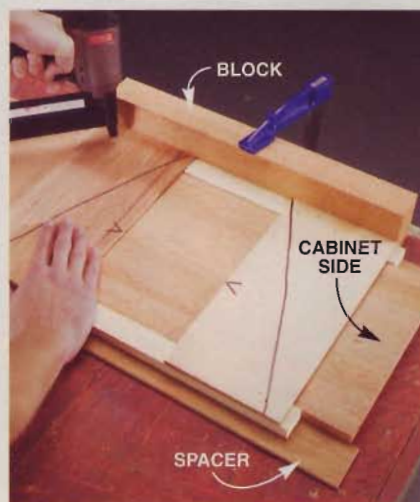
This jig consists of two parallel rails and two guide boards. The inside edge of each guide board tapers outward at the rate of 1/32-in. per 12-in. length. On a 12-in.-wide board, this jig creates a socket that increases in width by 1/16-in. overall.



1 Fasten the jig's guide boards to a sled for tapering, using a block, a stop and a shim for positioning. Butt the sled to the stop and the block. Then tape on the shim. Its thickness and location determine the taper's slope. Butt the guide board to the stop and the shim. Then nail it to the sled.



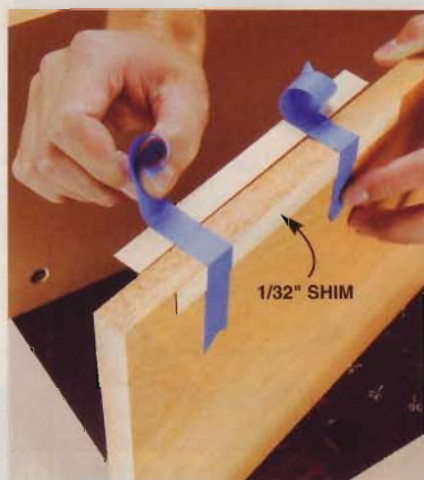
2 Taper the skewed edge of each guide board. Holding the sled against the rip fence skews the guide board's back end toward the blade. The taper is very slight, so indicate the tapered edge and the taper's direction.



3 Assemble the jig around the cabinet side. Butt everything against a block to guarantee the jig goes together squarely and the guide board tapers run true. Spacers elevate the rails for fastening the guide boards.



4 Rout the tapered sockets by bearing against each guide board. Orient the jig's front with the cabinet side's front, so the sockets grow wider from front to back.



5 To create the tapered dovetails, attach shims at the back edge of each shelf. These shims must be the same thickness as the shim used to skew the guide boards.



6 Use a tall fence to rout the tapered dovetails. The dovetails gradually decrease in width from back to front, because the shims hold the back end of the shelf away from the fence.



7 A stop and paper shims installed behind the fence allow micro-adjusting the fence to dial in the perfect fit.



8 The shelf fits perfectly when it can be pushed to within 1-inch of the end by hand. Tap it home with a mallet.

Rout the sockets (Photo 4). The sockets' depth can vary. In 3/4-in.-thick stock, 5/16-in.-deep sockets are ideal.

ROUT THE DOVETAILS AND FIT THE JOINTS

Install the dovetail bit in your router table. Then attach shims to an extra long shelf (Photo 5). Use the shelf's extra length for test cuts while you adjust the bit's height and the joint's fit. The shims hold the back end of the shelf 1/32-in. away from the fence when you rout (Photo 6).

Test the dovetail's fit in a socket. If the dovetail is too wide, the joint won't go together. If it's too slender, the shelf will slide past the cabinet side's front. I won't lie. These joints are finicky. To dial in a perfect fit, you'll have to be able to make paper-thin adjustments. So when you get close, outfit your router table with a simple micro-adjust system that's up to the challenge (Photos 7 and 8).

Sliding dovetail joints don't have to be glued: They're the predecessors of knock-down hardware. But gluing makes them stronger for the long haul. Apply glue to the beveled sides of the sockets. Slide in the dovetails and tap them home (Photo 9). Give your clamps a rest.



9 Gluing tapered dovetails is easy. The glue doesn't get forced out because the joints stay loose until the last inch. Once you tap them home, they're rock-solid.

Ultimate Sharpening Station

EVERYTHING YOU NEED TO MAKE A RAZOR-SHARP EDGE IS RIGHT AT YOUR FINGERTIPS.

by Brad Holden

If your sharpening supplies are scattered all over your shop, here's a project designed to keep them in one place. This station holds everything you need for grinding, lapping and honing, with room to spare for storing tools.

Picture this: you're grinding at the perfect height for precision work. When you're done, you push the grinder back out of the way and vacuum or wipe off grinding dust from the cabinet's plastic laminate surface. You pull a rubber mat from its storage pocket, retrieve your stones from one of the drawers, and you're ready to hone.

That mat is really terrific. It's made from flexible but firm solid rubber. Water can't soak in; it just makes puddles. Better yet, stones stay put, as if they were locked in place.

EXPERIMENT WITH HEIGHTS

This project is designed for a 5'6" to 5'10" tall woodworker. If you're shorter or taller than this, you may want to

alter the plans so the working surfaces are at more comfortable heights.

Experiment before you build. First, figure out the height at which you're comfortable honing (don't forget to add the thickness of the rubber mat and stones). For most folks, this is roughly equal to the height of their

wrists when their arms are hanging at their sides. Use this measurement to determine the height of the cabinet.



Second, figure out the height at which you're comfortable grinding. Many woodworkers prefer elevating a grinder so its tool rests are about elbow-high. This height will vary between 6-in. and 8-in. grinders (we used an 8-in. grinder for our station). Use this measurement to determine the height of the shelf above the cabinet.

BUILD THE CABINET

Use basic plywood-construction techniques to build the base cabinet and drawers. The cabinet is very similar to our Tool Chest in AW#96, October 2002, page 60. You'll find complete step-by-step instructions and many how-to photos in that article. You can also view or download this story at our web site, www.americanwoodworker.com/toolcabinet. See Fig. C for the location of the dadoes and rabbets in the cabinet's sides and Fig. B for drawer details.

MAKE THE TOP

To ensure a flat top, use MDF for the substrate (B1, Fig. A). Edgeband it with solid birch (B2 and B3), mitered at the front corners. Use an 80-grit sanding block, a plane, or a router and flush-trim bit to level the edging (Photo 1).

Apply the laminate (B4). Use a chamfer bit to trim the laminate and create the finished edge in one step (Photo 2).

Route two grooves for the T-track (B5 and Fig. D). Seal the grooves with slow curing epoxy to keep water from soaking into the MDF. While the epoxy is still tacky, apply a second, thicker coat and glue in the T-track (Photo 3). Drill two holes in the top for registration pins. These keep the rubber mat from sliding back and forth. Attach the top to the cabinet. Position it flush with the back and offset on the right side, to allow for the pocket.

ADD THE POCKET

The pocket fastens to both the top and the cabinet. Cut two pieces of aluminum angle (D2). Drill and counter-

3 KEY FEATURES

Moveable Grinder

The grinder sits on a tall shelf that slides on two T-tracks. Pull the shelf forward for grinding; push it back to make room for sharpening.



Honing Mat

Place your waterstones on this solid rubber mat. They'll stay put on its non-skid surface.



Protected Storage

Slide the mat into this side pocket to protect it from grinding dust, which you don't want on your stones.



1 The station's top is designed to survive water, grit, oil and shop dings. Begin building the top by gluing thick, solid edging to an MDF substrate. Level the edging with coarse sandpaper, then glue on an oversized piece of plastic laminate.



2 Trim the laminate flush to the edging by routing a large chamfer.

FIG. A EXPLODED VIEW

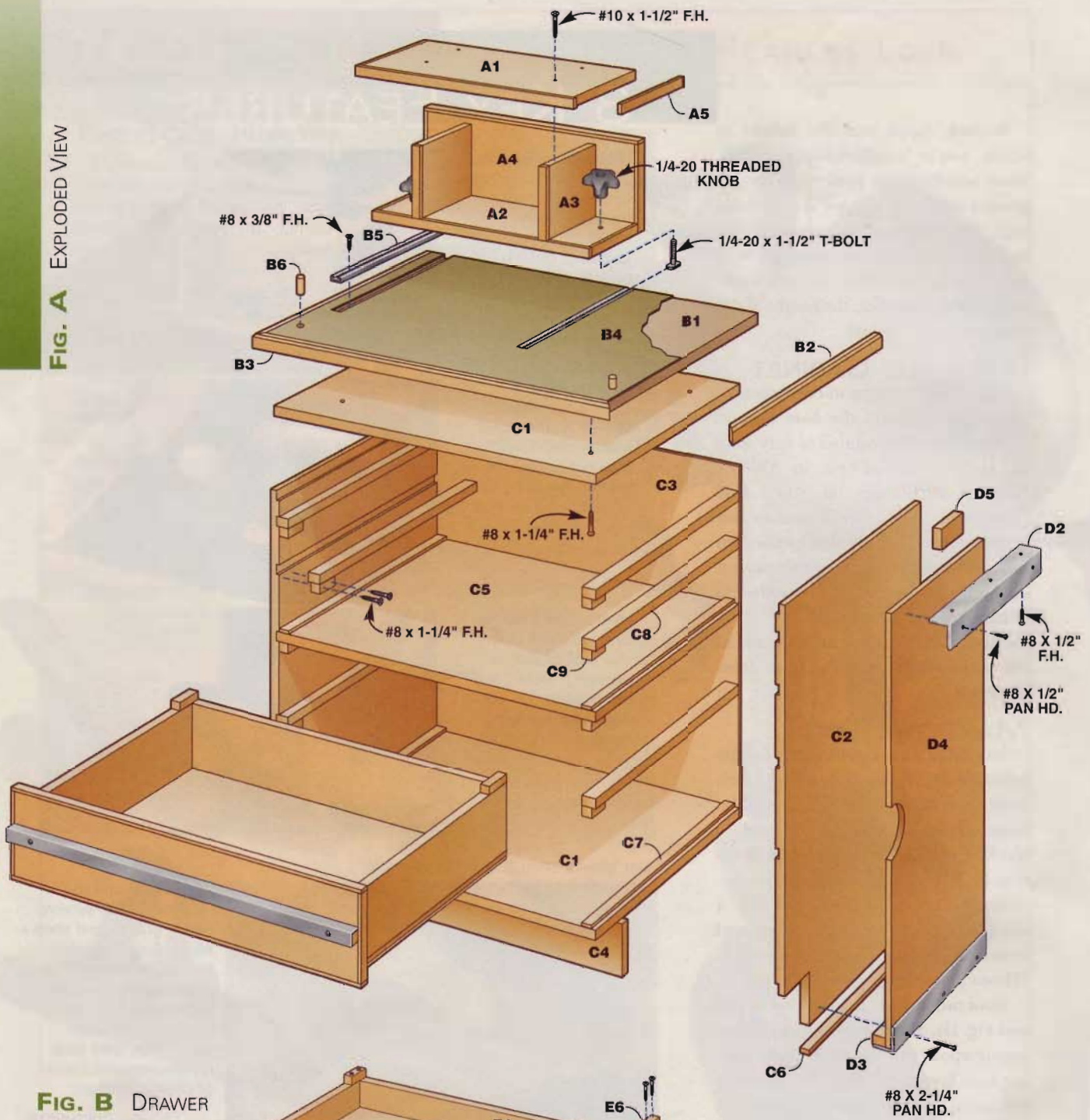
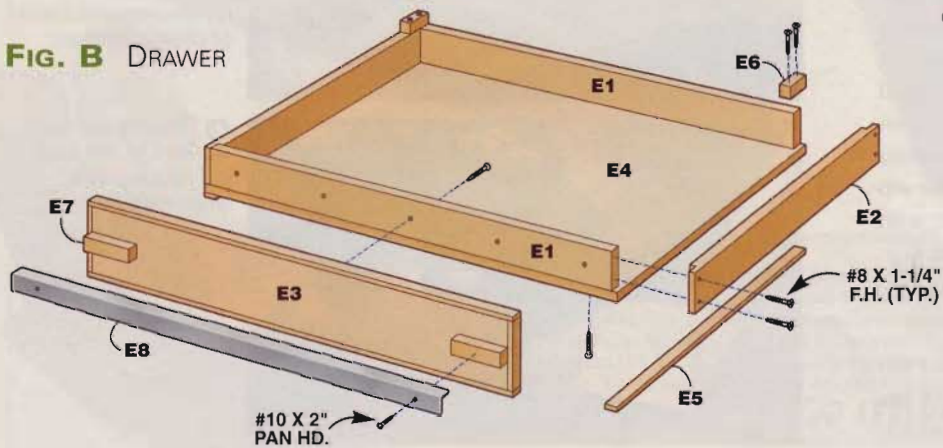


FIG. B DRAWER



sink holes in one piece for fastening it to the top. Drill the remaining holes for fastening both pieces to the pocket's side (D4). Fasten the top angle to the cabinet top, then install the side, spacer (D3), stop (D5) and bottom angle.

CUT THE MAT

The rubber mat (D1) comes in a 2 ft. x 3 ft. piece (see Sources, below). Use a straightedge and a utility knife to cut it to size. It will take a few passes to cut entirely through the rubber. Drill registration holes in the mat to correspond to the holes in the cabinet top. Use a utility knife to cut a recessed fingerhold on one side of the mat. A fingerhold makes it easier to pull the mat out of the pocket.

Sources:

RubberCal, (800) 370-9152, www.rubbercal.com

Shark Tooth Rubber mat 3/4" x 2' x 3', \$30.

Might-T-Track, (888) 512-9069,

www.ttrackusa.com Mini-T-Track #1022,

48" long, includes 2 knobs and 2 bolts, \$18.

FIG. C SIDE DADO LAYOUT

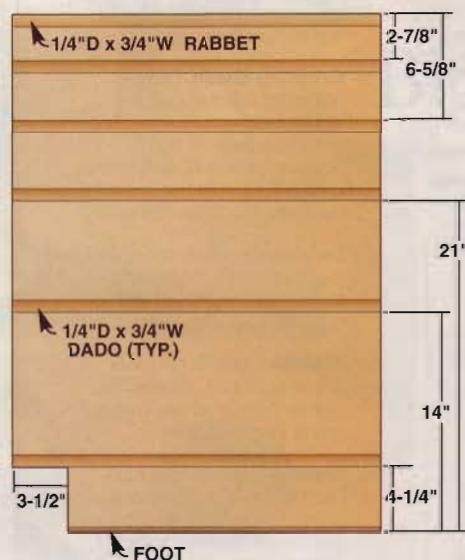
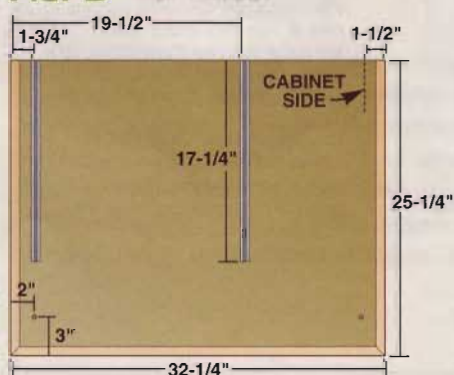


FIG. D TOP LAYOUT



3 Glue T-track into the slots with epoxy. Add screws to clamp the T-track in place.

CUTTING LIST			Overall Dimensions: 41-1/4"H* x 32-1/4"L x 25-1/4"D			
Section	Part	Name	Qty.	Material	Th x W x L	Notes
Shelf						
	A1	Top	1	Birch plywood	3/4" x 10-1/4" x 20-1/2"	(1)
	A2	Bottom	1	Birch plywood	3/4" x 7-3/4" x 20-1/2"	(1)
	A3	Support	2	Birch plywood	3/4" x 6-1/4" x 7-3/4"	(1)
	A4	Back	1	Birch plywood	1/2" x 20-1/2" x 7-1/2"	(1)
	A5	Edging		Solid birch	1/4" x 3/4"	
Top						
	B1	Substrate	1	MDF	3/4" x 24-1/2" x 30-3/4"	
	B2	Side edging	2	Solid birch	3/4" x 1" x 25-1/4"	
	B3	Front edging	1	Solid birch	3/4" x 1" x 32-1/4"	
	B4	Laminate	1		26" x 33"	
	B5	T-track	2		3/8" x 3/4" x 17-1/4"	
	B6	Registration peg	2	Birch dowel	3/8" x 1-1/4"	
Base						
	C1	Subtop & bottom	2	Birch plywood	3/4" x 28-7/8" x 23"	
	C2	Side	2	Birch plywood	3/4" x 23-1/4" x 32-1/2"	
	C3	Back	1	Birch plywood	1/4" x 28-1/2" x 29-1/8"	
	C4	Toe kick	1	Solid birch	3/4" x 4-1/4" x 29-15/16"	
	C5	Center support	1	Birch plywood	3/4" x 28-7/8" x 23"	
	C6	Feet	2	Solid maple	1/4" x 3/4" x 19-3/4"	
	C7	Wear strip	4	Solid maple	1/4" x 3/4" x 22-7/8"	
	C8	Drawer support	6	Solid maple	3/4" x 1" x 22-7/8"	
	C9	Drawer stop	10	Solid maple	3/4" x 3/4" x 2"	
Pocket						
	D1	Mat	1	Rubber	3/4" x 16" x 31"	
	D2	Bracket	2	Aluminum angle	1-1/2" x 1-1/2" x 16"	
	D3	Spacer	1	Solid birch	3/4" x 1" x 16"	
	D4	Side	1	Birch plywood	1/2" x 15-3/4" x 31-3/4"	(2)
	D5	Stop	1	Solid birch	3/4" x 1-1/2" x 3-1/2"	
Drawers						
#1	E1	Front and back	2	Birch plywood	3/4" x 5/8" x 27-1/4"	
	E2	Sides	2	Birch plywood	3/4" x 5/8" x 22-7/8"	
	E3	Front	1	Birch plywood	3/4" x 2-5/8" x 29-1/4"	(3)
#2	E1	Front and back	2	Birch plywood	3/4" x 1-1/2" x 27-1/4"	
	E2	Sides	2	Birch plywood	3/4" x 1-1/2" x 22-7/8"	
	E3	Front	1	Birch plywood	3/4" x 3-1/8" x 29-1/4"	(3)
#3	E1	Front and back	2	Birch plywood	3/4" x 2-1/8" x 27-1/4"	
	E2	Sides	2	Birch plywood	3/4" x 2-1/8" x 22-7/8"	
	E3	Front	1	Birch plywood	3/4" x 3-3/4" x 29-1/4"	(3)
#4	E1	Front and back	2	Birch plywood	3/4" x 4-3/4" x 27-1/4"	
	E2	Sides	2	Birch plywood	3/4" x 4-3/4" x 22-7/8"	
	E3	Front	1	Birch plywood	3/4" x 6-3/8" x 29-1/4"	(3)
#5	E1	Front and back	2	Birch plywood	3/4" x 7-1/2" x 27-1/4"	
	E2	Sides	2	Birch plywood	3/4" x 7-1/2" x 22-7/8"	
	E3	Front	1	Birch plywood	3/4" x 9-1/4" x 29-1/4"	(3)
All	E4	Bottom	5	Birch plywood	1/2" x 28-1/4" x 22-7/8"	
	E5	Runner	10	Solid maple	1/4" x 3/4" x 22-7/8"	
	E6	Stop	10	Solid maple	3/4" x 3/4" x 2"	
	E7	Handle block	10	Birch plywood	3/4" x 3/4" x 4"	
	E8	Handle	5	Aluminum angle	3/4" x 3/4" x 29-1/4"	

Notes

(1) Add 1/4" edgebanding front and sides.

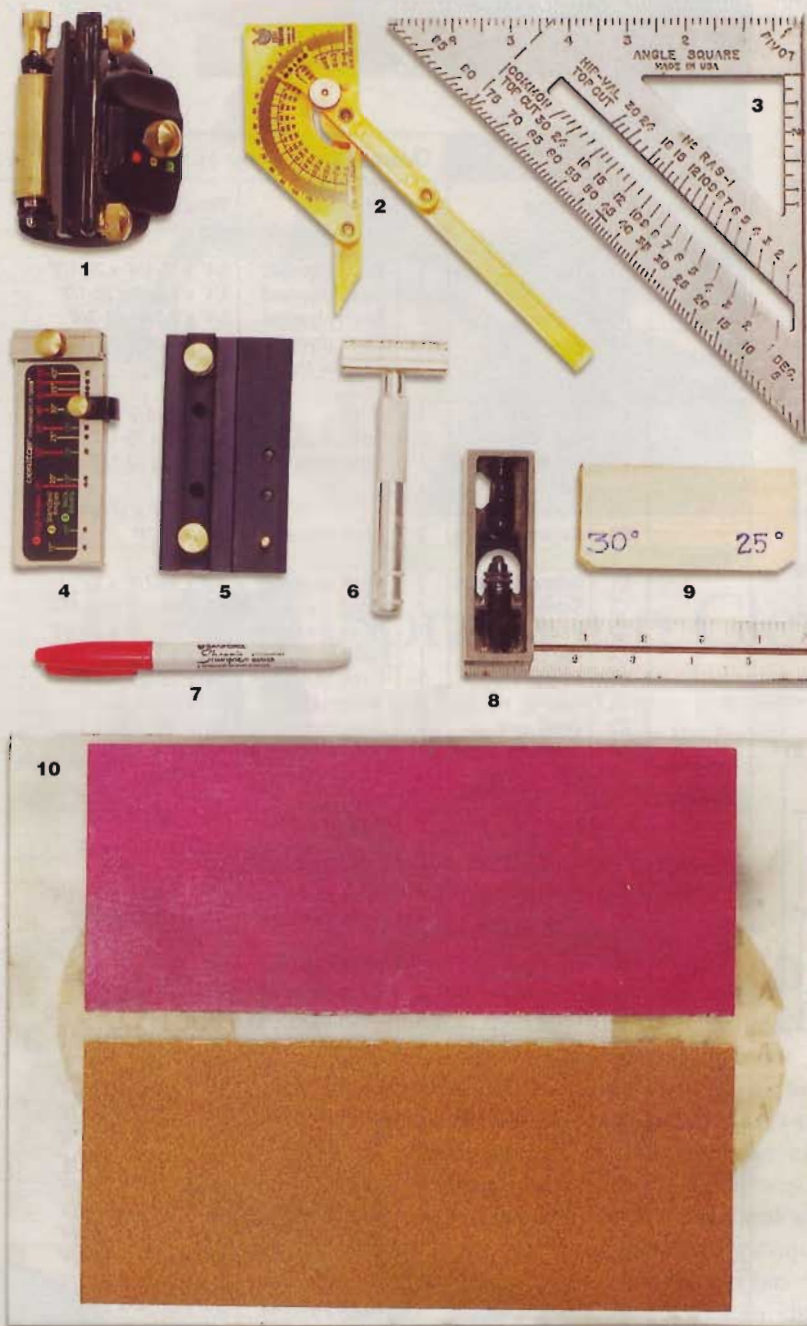
(2) Add 1/4" edgebanding on front.

(3) Add 1/4" edgebanding all around.

* Cabinet is 33-1/2"H

10 Sharpening Essentials

All the basics that you need for grinding and honing will fit into the sharpening station, with plenty of room for tools. We recommend using a slow-speed grinder for plane irons, chisels and turning tools. (See AW#124, October 2006, page 62, for a review of all the latest models and must-have upgrades.) We also recommend waterstones for honing. Waterstones work fast and produce an incredibly keen edge. For more information, see AW#116, September 2005, page 30. In addition to a grinder, you'll also want:



1) **Honing Guide.** This device holds chisels and plane irons at a set angle. Many types are available, but we prefer this model from Lee Valley (see Sources, below).

2) **Protractor.** This clever tool is invaluable for checking bevel angles (see Sources, below).

3) **Speed Square.** This carpenter's tool is optional, but it's handy for checking the squareness or camber of a plane iron (for more on cambers, see AW#129, July 2007, "Troubleshoot Your Plane," page 64).

4) **Angle Guide.** Part of the honing guide, this device has preset stops for sharpening your tool at 12 different angles.

5) **Grinding Guide.** This tool holder fits into a slot on the Veritas tool rest, shown with the grinder on page 70 (see Sources, below). It helps you to grind a straight and square edge, but it isn't absolutely necessary.

6) **Dresser.** This diamond-tipped tool is essential for keeping grinding wheels round and clean (see Sources, below).

7) **Marker.** Color an old bevel before you grind or hone. This makes it easier to see where you're removing steel.

8) **Double Square.** This tool's head slides like a combination square. It's perfect for checking the squareness of a chisel's bevel.

9) **Angle Guide.** Used for setting a grinder's tool rest, two corners of this shop-made block are cut at the two most commonly used bevel angles, 25 and 30 degrees.

10) **Lapping Plate.** Used for flattening the backs of chisels and plane irons, a lapping plate is a piece of plate glass, at least 1/4 in. thick, with sandpaper adhered to it.

Sources

Lee Valley, (800) 871-8158, www.leevalley.com, Veritas grinder tool rest, #05M23.01, \$43.

Veritas grinding jig, #05M06.01, \$23. Veritas Mk. II Honing guide, #05M09.01, \$53.

Woodcraft Supply, (800) 225-1153, www.woodcraft.com Diamond-tip wheel dresser, #124670, \$15.

Grizzly, (800) 523-4777, www.grizzly.com Protractor, #H5401, \$6.

Brush a Tabletop

GET GREAT RESULTS WITHOUT RUBBING OUT.

Maybe I'm crazy, but I like to brush polyurethane. I've built more than 50 dining room tables, and I've brush-finished every one, using a simple system that consistently provides great results.

I'm not a purist. I use tools that you can get at any paint store and I don't rub out the final coat. My tabletop finishes look good and feel smooth. They're durable...and do-able.

A tabletop requires multiple coats, of course, but each one is applied the same way. I use flat, satin or semi-gloss polyurethane, depending on the look I want and the wood. A lower sheen helps to disguise finish imperfections, but it can make dark woods such as walnut look a bit hazy.

You can practice my methods by finishing the bottom of your tabletop. It should have at least one coat of finish anyway, to stabilize the top for seasonal changes in humidity.

SET UP FOR SUCCESS

I always sand with 280-grit paper between finish coats, and I let the polyurethane dry thoroughly before sanding. I wipe the top twice to remove the sanding dust, first with a slightly damp lint-free cloth, then with a fresh tack cloth.

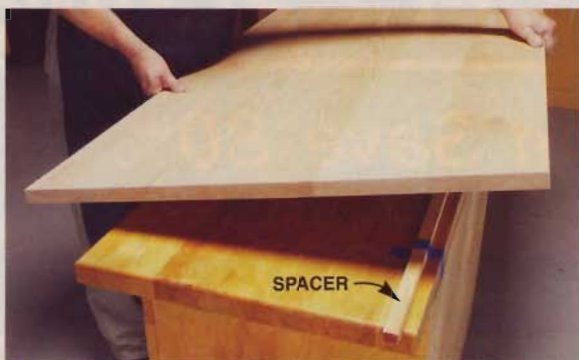
After final sanding, I vacuum the top thoroughly before moving it into my finishing area. I like to apply finishes early in the morning, when the air is still and airborne debris has had all night to settle.



Top-Brushing Trio

My brush arsenal for tabletops includes a 2-1/2-in. bristle brush for the top's wide, flat surface, a 2-in. foam brush for its long edges and a 3-in. trim roller for the ends.

Choose a natural-bristle brush for oil-based polyurethane. Its business end should appear wedge-shaped or tapered when viewed from the side. Most natural bristle brushes are made with Chinese hog bristles. China bristles, as they're called, are relatively large. I prefer brushes that combine china bristles and ox hair. Ox hair is finer than china bristle (and more expensive), so it's less likely to leave marks. The tips of china bristles are often flagged (split into multiple fibers) to imitate ox hair. I like long, flat wooden handles. They're comfortable to hold and offer good balance. A stainless-steel ferule won't rust—a must for any brush you plan to keep long-term. The "Demon" flat sash brush from Best-Liebco and the Purdy "Ox-O-Thin" are good, reasonably-priced brushes for oil-based polyurethane. Expect to pay about \$20 for a 2-1/2-in. brush.



1 Use gravity to help fight brush marks. A single spacer allows positioning your top at a slight angle, to help the polyurethane flow.



2 Set up a low-angle light to highlight imperfections. Use its sharp contrast to spot wayward brush strokes, loose bristles and other debris that appears in the finish.



3 Wipe the surface with a tack rag after vacuuming. I never vacuum in my finishing area, though, because the vac's exhaust stirs up the air.



4 Prime your brush by soaking it in solvent for a few minutes. The solvent saturates the porous natural bristles, so they don't soak up the polyurethane and become tacky. Suspend the brush so its bristles don't rest on the bottom of the glass.

I always slope tabletops for finishing (Photo 1). Taking this step helps me think positively about the job ahead, because it makes me feel like I'm doing everything possible to insure a good outcome.

A low-angle light creates shadows that make it easy to see imperfections in the finish (see Photo 2 and "Removing Debris", page 90). I use this light immediately, to check for debris missed by the tack rag (Photo 3).

PRIME AND STIR

Natural bristle brushes work best when the bristles are saturated with solvent (Photo 4).

Saturated bristles release the polyurethane efficiently and make the brush easier to clean.

Thoroughly stir the polyurethane. Then pour enough to complete the job into a separate container (Photo 5). I always open a new can of polyurethane for the final coat.

My secret weapon against brush marks is Penetrol (Photo 6). Penetrol makes brushing easier, whether it's hot, humid, cold or dry. (Polyurethane is usually formulated to perform best at 70-degrees F. and 50-percent relative humidity—when do you ever finish in those conditions?) Adding mineral spirits also makes polyurethane easier to brush, but it thins the finish, so you might have to apply more coats. Adding Penetrol doesn't thin the finish. I usually start by adding two capfuls per pint of polyurethane. Like mineral spirits, Penetrol slows the drying time, which increases the chances of accumulating dust in the finish.

BRUSH AND ROLL

Before I brush the top, I prime the end grain (Photo 7). This method prevents ugly drip marks that can result when you brush the top first, because drips that soak into unfinished end grain create permanent marks.

Rather than brushing the top's entire surface, I divide it into sections that are easier to manage. For each section, brushing on the polyurethane is a two-step process.

First I flow it on (Photo 8). Then I brush it out (Photo 9).

I load the brush by dipping it 1/3 of the way into the polyurethane. Then, starting on the top's low side, I go directly to the surface, without tapping the brush on the sides of the measuring cup. Just dip and go, man. I apply the polyurethane liberally and reload my brush often. While coating this first section of the top, I also include its adjacent long edge.

About the only mistake you can make during this step is being too stingy with the polyurethane. Covering the surface quickly and uniformly is most important. Brushing direction doesn't matter, except at the ends. There I brush parallel to the edges, to apply the polyurethane evenly and minimize drips.

After using the low-angle light to make sure the section is completely covered, I level the polyurethane with end-to-end strokes. The brush wicks up excess finish during this process, so before each stroke, I unload the brush by gently pressing it inside the measuring cup's rim. I use an especially light touch at the beginning of each stroke, to avoid leaving a pool of varnish.

I don't brush out the last couple inches of the section, because I'll be brushing back into this portion later. When the raking light shows that all the brush marks run with the grain, I switch to a dry foam brush to clean the adjacent long edge (Photo 10). Most bristle brushes deposit too much polyurethane for this job, creating as many drips and sags as they remove.

I move to the other side of the table to brush the next section, so I'm not leaning over the wet finish (Photo 11). I cut back into the wet polyurethane as soon as possible. The longer it sets up, the more likely it is to show brush marks. I check my work in the raking light before moving on to the last section, and then again when that section—including its adjacent long edge—is completed.

When the top looks good in raking light, I complete the job by cleaning the ends with the roller and dry foam brush (Photo 12). Then I walk away. Experience has taught me to leave tiny imperfections. They look bad when the varnish is wet, but they virtually disappear when the varnish is dry.



Removing Debris

Inevitably, dust, hair, bristles or bugs will lodge in the wet finish. I use the edge of the brush to lift them off the surface as soon as I see them—it's too late if the poly has started to set up. After removing the offender, I brush lightly end-to-end to eliminate pock marks left by the process.



5 Pour enough polyurethane to complete the job into a clean container. I use a plastic measuring cup. It's light in weight, easy to hold and it's wide opening allows plenty of room for the brush.



6 Make polyurethane easier to brush by adding Penetrol, a conditioner for oil-based paint and varnish. Penetrol extends the open time, increases flowability and improves leveling, all without thinning the finish.



7 Start finishing the top by priming the end grain, so drips from brushing the top won't leave permanent marks. A trim roller quickly applies an even, drip-free coat of polyurethane.



8 Finish the top in stages. Brush on the polyurethane in sections that are about 12-in.-wide. Your goals are to cover each section quickly and uniformly, using a minimum number of brush strokes. Brushing diagonally across the grain helps to evenly spread the polyurethane.



9 Brush end-to-end to level the finish and align the brush marks with the grain. Make as few strokes as possible. Over-brushing leaves visible brush marks.



11 Cover the adjacent section with polyurethane. Brush back into the wet area you've just completed to tie the two sections together. Follow with light end-to-end strokes as before. Repeat the process to finish the top.



10 Switch to a dry foam brush to clean the front edge. It soaks up drips and sags and leaves a thin, even coat. Clean the edge of the bottom, too.



12 Remove drips from the ends. The roller re-wets the polyurethane and amalgamates the drips. Follow with the foam brush to level the finish.

American Woodworker OCTOBER 2007 87

A Call for Entries!

Reader's Showcase

Here is your chance to share your best work with fellow woodworkers across the country and around the world.

As woodworkers, we love to build things, but we also love to share our work and the ideas behind them. American Woodworker Magazine is debuting a new department called "Reader's Showcase." We're looking for projects that range from practical, everyday pieces to one-of-a-kind artistic masterpieces.

Here's how to submit your work! We ask that the piece you submit be made primarily of wood by your own two hands. Only high quality photos will be selected for publication so make sure you put some time and effort into your photograph. Check out our web page (www.americanwoodworker.com/phototips) for tips on taking good photographs. Digital photographs are preferred but slides and color negatives are also acceptable. If you want your slides or negatives back, you must include a stamped, self-addressed envelope with your submission.

Send your pictures along with a description of the piece that includes the wood(s), joinery and finish that you used. It seems like every piece has a story behind it – please feel free to share yours. We look forward to hearing from you.

Send entries to: Showcase@AmericanWoodworker.com or mail to: American Woodworker Magazine, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.



Regency Chair
by Richard Ciupka
Quebec, Canada

BYE-BYE BIRDS-EYE

An Army buddy from northern Michigan stopped when he came upon a truck that had overturned and scattered its load of lumber. The trucker, who was unhurt, told my friend to take all the boards he wanted, because the load would be considered a total loss. While loading his pickup, my friend realized that the lumber was highly-figured bird-eye maple. He raced to his father's house and stacked the boards behind the garage. Then he returned to the wreck—twice—to salvage more of the spectacular wood.

Shortly thereafter, my friend's Army unit was deployed overseas. He returned a year later, only to discover that his dream lumber stash had disappeared. Thinking the boards were only salvage, his father had given the entire stack to

a neighbor who was planning to build a shed.

Hoping to retrieve the precious birds-eye, my friend visited the neighbor. But all he found was a peculiar-looking shed, sheathed with bird's-eye and partially cov-

ered with tarpaper. When he asked what it had been like to hammer in the roofing nails that attached the tarpaper, the neighbor rolled his eyes and said, "I finally gave up. That's the worst lumber, ever!"

Phil Hobson



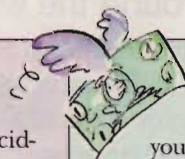
PORCUPINE CABINET

To save a little money on the bathroom cabinet I was building, I decided to use 1/2-in. cherry plywood. I cut grooves in each side to house the metal tracks for the adjustable shelves. Then I assembled the cabinet, glued on the face frame, installed the molding and applied the finish.

I cut the metal tracks to length and installed them in the grooves, using the flat head nails that came with the track. Then I stepped back to admire my handiwork.

Ack! Every nail had broken through, tearing out chunks of the plywood's cherry face veneer. I had used those shelving tracks for years—but always with 3/4-in. plywood. Repairs would have been difficult, so I opted to build a new cabinet—using 3/4-in. plywood.

Alan Blanchard



Make your woodworking mistakes pay! Send us your most memorable "What was I thinking?" blunders. You'll receive \$25 for each one we print. **E-mail to oops@americanwoodworker.com or send to AW Oops!, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.