

CHEAT AT DOVETAILS: USE A TRIM ROUTER FOR THE DIRTY WORK
THE #1 HAND PLANE SECRET: A CURVED CUTTING EDGE WORKS WONDERS

AUGUST 2005
ISSUE #149

POPULAR Woodworking

In the Shop with Norm Abram

We Debunk 7 Myths
About TV's Frugal Yankee

A MIGHTIER MITER SAW

6 Quick & Easy Tweaks
To Guarantee Accuracy

PLUS

- A Better Technique
For Cope & Stick Joints
- Leaning Bookshelves
- The \$5 Router Plane

**PLUS: Plans
for Norm Abram's
Adirondack Chair**



DISPLAY UNTIL 8-8-2005

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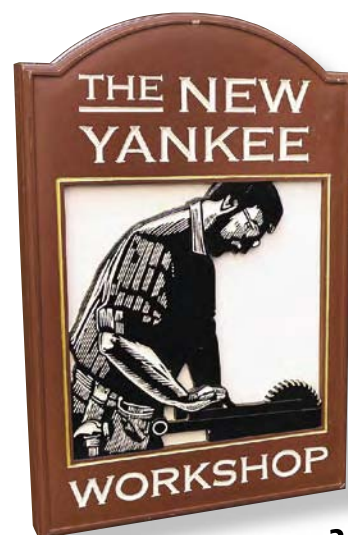
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ON THE COVER

Norm Abram, host of "The New Yankee Workshop," is a woodworking icon. After spending two days on the set of the show we offer plans for his improved Adirondack Chair and share some surprising truths about how he works.

Cover photo by Al Parrish

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SAFETY NOTE

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

What is the Value of Woodworking?

There is a book published by our company called "How to Make \$40,000 a Year with Your Woodworking." Years ago I dubbed it our only offering in the fiction category. Sure, there are enterprising woodworkers who pocket this and more, but there are countless others who don't even get close.

For years now I've returned to the same questions about the lack of prospects even talented woodworkers have. Why can't a wood craftsman earn what an independent electrician, plumber or garage mechanic earns? Even the guy who ran a small crew that washed the windows at my house told me he earned close to six figures, and in Cincinnati, that's seasonal work.

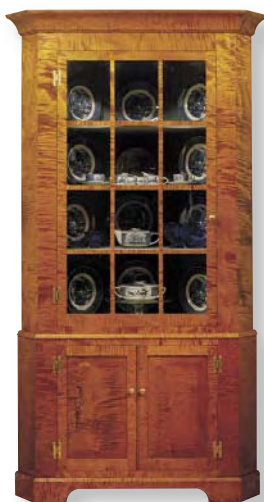
As a society we don't value well-made furniture and cabinets. Is that because we don't recognize good from bad? Why is there no status attached to a one-of-a-kind dining table, unlike those \$50,000 luxury cars we see everywhere? Why do we find "run-of-the-mill" furniture in all those half-million-dollar McMansions? Are the manufacturers of inexpensive furniture that good at making poorly crafted work look good?

Do we not value objects of lasting value? In our disposable world, we'll take a big loss on one of those expensive cars after just a few years. We'll spend a thousand dollars on some electronic device and replace it every two years, leaving the old one at the curb once new technology makes it worthless.

By all measures, woodworking as a hobby enjoys great popularity, on par with golf. Millions of people are captivated by the sight of Norm Abram building a project on television and they tune to "Antiques

Roadshow" to learn about the value of objects that have endured.

Good antique furniture, now worth a small fortune, was built by individual joiners before the start of the Industrial Revolution. Today, most furniture is fabricated in a factory. We've had a century and a half to lose sight of the value of custom-built woodwork. Most commercial shops busy themselves doing the occasional custom kitchen, bath vanity or fast food restaurant interior. Better shops working the "carriage" trade find more upscale projects. But even among these, the bidding wars to win contracts hold back wages and benefits while signaling to buyers a willingness to value their work less and less.



Perhaps all woodworkers, hobbyists included, need to think more about the value of the work they produce and promote nicely crafted work as having value far beyond the purchase price. Perhaps we need to find ways to produce better work at less cost, making it affordable to those who aren't the wealthiest among us. Hobby woodworkers who "don't need the money" shouldn't sell their work below market value because it undermines commercial craftsmen who are trying to run a business, feed a family, and pay living wages and offer decent benefits to their employees.

Many more questions remain than there are answers. **PW**

Steve Shanessy

Steve Shanessy
Editor & Publisher

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NORM ABRAM

Norm Abram, host of "The New Yankee Workshop," is more than a woodworker with an affinity for power tools. He's an avid ocean boater, too. While Abram says



his best days of work are those that are spent in his shop, he's quick to note that when he's not working, he's happiest on the water. Abram recently purchased a Sabreline 42 motor

yacht. "It's my therapy," Abram says. "And it's where you get to throw a lot of money away, too," he adds, laughing. Abram says he hopes to someday study old coastal navigation methods and use them while boating. For more details about Abram and his workshop, turn to page 34. To build his Adirondack chair, turn to page 38.

BOB FLEXNER

Bob Flexner's landmark book, "Understanding Wood Finishing" (Reader's Digest Association), has made sense of the complex art of finishing for countless wood-



workers. Since it first hit the bookstores in 1994, Flexner has continued his finishing research and experiments (he owns almost every finishing product on the market today).

Recently, the second, fully revised edition of this book was released. Also check out *Popular Woodworking's Finishing & Refinishing* special issue on newsstands now. In it we've included Flexner's 28 best "Flexner on Finishing" columns. This issue Flexner continues to share his expertise with "Fixing Finished Surfaces" (page 92).

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Looking for More Details on Finishing

Authentic Greene & Greene Finish is Nice, But More Information is Needed

I recently read the "Greene & Greene Sideboard" article in the April 2005 issue; it was a nice piece and truly enjoyable.

I was interested in the finish you described and wondered if I might entice you to supply me with another bit of information concerning the color mixture. The article was clear regarding the amount of Danish oil, as well as the percentage of the colors to achieve the color balance. But it did not mention the total amount of color compared to oil that's necessary. If you could give me the total weight or volume of the color to use with a pint of oil, I would greatly appreciate it.

Jay Goddard
Jefferson City, Tennessee

Sorry for not being more specific about the color mixing; we were very tight on space for that article. Here's the procedure I followed: I squeezed out a line of the artist's oil color on a piece of scrap wood, using 1" as one part. I had a line of Chrome Yellow 3 1/2" long, the line of Raw Umber was 3" long, etc. That's how I kept the proportions straight.

To get the color strong enough, I had to double the amounts above. If I were doing it over, I would mark out the proportions on the scrap, and then squeeze out two lines for each color. Also note that the green color I added was just a dab. I don't think you need to be incredibly precise with it, but this should get you close.

— Robert W. Lang, senior editor

Sawmill Owner Responds to Letter About Cutting Green Wood

I have a few comments on Ken Kindle's question of how thick to saw green lumber ("Letters" April 2005). I am an owner of a LT40 Woodmizer and a 20" planer. I have found with this setup I can cut hardwoods to 4/4, air dry them to 10 percent moisture content,

and plane them to 7/8" without leaving saw marks. I like the beefier look for traditional Arts & Crafts furniture.

Most of what I cut is quartersawn white oak, which reduces the chance of cupping or twisting – although you will get some bowing. Still, even flat-sawn 4/4 boards should be plenty thick to plane to 3/4", as long as the portable band saw mill is cutting accurately. Obviously this leaves you with an 1/8" on each side of the board to plane. This can be quickly and efficiently planed, whereas planing 5/4 to 3/4" is a lot of woodchucking for my taste.

More importantly for Ken is the stacking and stickering (flat, level and supported) of his lumber during air- and kiln-drying to ensure good quality lumber before he starts the planing process.

Each tree is a treasure that provides us with the materials to fulfill our passion. Let's get the most out of each one of them.

Ben Moll
Oakwood Hills, Illinois

Sawing 5/4 Adds to Drying Difficulties

I disagree with the response David Thiel gave to Ken Kindle regarding the thickness to mill his lumber. Mr. Kindle stated that he wanted to wind up with a finished thickness of 3/4". In all but the rarest cases, 4/4 lumber will finish plane at 13/16", and it's not uncommon to be able to clean it up at 7/8". At a mill, 4/4 lumber is sawn green at 1 1/8" and it will be about 1 1/16" after drying. Sawing the rough lumber 5/4 to get 3/4" finished thickness would be wasteful. Furthermore, the thicker the lumber, the more likely Mr. Kindle will have problems drying it, especially if it is something difficult to dry, such as oak.

Mr. Kindle asked about mixing species when air-drying but he did not ask the more important question of mixing during kiln drying. The answer is yes, he can kiln-dry mixed species, but the drying rate must be set

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LETTERS

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to accommodate the slowest drying species.

I have pushed tens of thousands of feet of 4/4 hardwood lumber through a planer at our business, so my advice is based on experience. When planing to $13/16"$, 99 percent of the surface of 4/4 lumber will clean up. We rarely plane to $3/4"$, but my guess the figure at $3/4"$ would be 99.9 percent. Turning another $1/4"$ of your lumber into shavings by starting at $5/4$ seems a high price to pay to squeeze out a little more yield of planed surface.

Bill Tindall

Church Hill, Tennessee

What About the English Rounder Planes for Chairmaking?

I have a couple of questions regarding the article on chair building ("Cheating at Chairmaking" April 2005). You highly recommend the rounder planes made by Ray Iles. I was wondering if you had tried similar planes made by Fred Lambert (ashemcrafts.com) from England. It seems every British book on chairmaking uses them.

Secondly, do you recommend the Veritas concave spokeshave for spindle shaping? In the article I see you're using one, but you make no mention of it. Is it worth \$75?

Terry Kelly

Presque Isle, Maine

I used the Ashem Crafts rotary and trapping planes during a class taught by Don Weber. Weber is quite fond of them, but I wasn't as enchanted with them as I was with the Ray Iles tools. To each his own, I suppose. As to the Veritas concave spokeshave, I highly recommend it — not mentioning it by name was an oversight. It's an indispensable part of my toolkit. PW

— Christopher Schwarz, executive editor

WRITE TO US

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

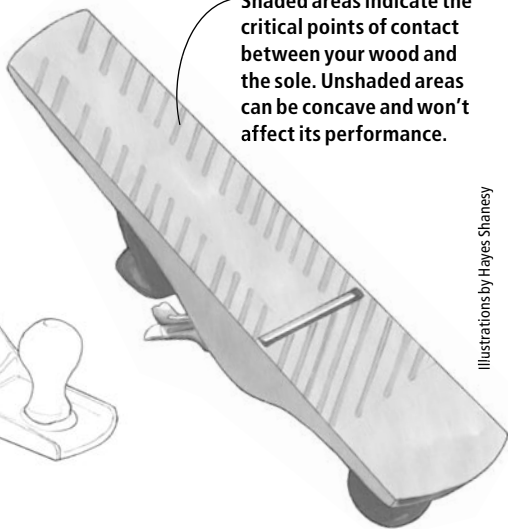
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How Do I Flatten My Jack Plane's Sole?

When flattening the sole, skew the tool left and right to improve your chance of success.



Shaded areas indicate the critical points of contact between your wood and the sole. Unshaded areas can be concave and won't affect its performance.



Illustrations by Hayes Shanesy

Will a Diamond Stone Do the Job?

What is a good way to flatten the sole of a Bailey jack plane? A diamond stone has been suggested to me. Although they cut fast, they are also very expensive. Any suggestions?

Ed Williams
Delavan, Wisconsin

Generally, jack planes are for rough work: taking down high spots off boards and hogging off material on edges. So sole flatness is not critical with a jack, unlike with precision planes, such as the smoothing plane and jointer plane.

And flattening the soles of longer metal planes, such as the jack, is a challenge for people who have never done it before. More times than not they end up making the tool worse.

Finally, many assume they need to flatten the soles of their planes without ever checking them first. Get out a straightedge and check the sole with feeler gauges before you do anything. There's a fair chance the sole is fine as-is. If the sole is flat in front of the mouth and along the long edges of the sole, then you're golden. Don't do a thing. If these areas differ by .006" or more, then you should think about correcting the sole.

If you do want to flatten the plane's sole, you

need a flattening surface that's larger than the sole itself – so a single diamond stone won't do for large planes. You'll end up making the sole banana-shaped. When I resort to flattening a plane's sole, I normally go one of two routes: A long strip of belt sander sandpaper (#80 or #100 grit) adhered to an old (yet flat) spare table saw wing. Or I use kerosene and silicon carbide lapping grit (#90 grit, available from Lee Valley Tools, 800-871-8158 or leevalley.com) directly on the wing, building up an abrasive slurry. Both methods are messy and time-consuming.

Before you begin, color the sole of the tool with a permanent marker to gauge your progress. As you work, be sure to skew the tool left and right during your passes to keep from removing too much material at the toe and heel. Check your work as you proceed with a straightedge.

— Christopher Schwarz, executive editor

How Do You Remove Light Rust From Hand Tools?

I recently opened my chisels and they had rust on them. There also was a little spot of rust on the side of my block plane. I have some Boeshield "Rust Free" rust remover, but when I used that before, the acid left a discoloration.

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I have some rust preventer (Boeshield and also CorrosionX), but that won't help until I get the rust off. Should I use sandpaper to get rid of the rust? What solution do you recommend for this task?

Greg Koukl
Los Angeles, California

There are many ways to skin this cat. Here are two ways that work for me: I generally use #0000 steel wool and mineral spirits to remove rust. I've also become fond of the handblock from Sand-Flex. There are three grits (coarse, medium and fine). I use the medium and the fine. They're available from several sources, including Lie-Nielsen Toolworks (800-327-2520 or lie-nielsen.com). Each handblock will last for years.

After removing the rust, I protect the tool with Camellia oil. I keep a rag soaked with the stuff expressly for this purpose. Our tests of rust preventatives didn't put Camellia oil at the top (that would be Fluid Film and WD-40), but I've found the Camellia oil to be well-suited for hand tools. It never stains the wood. It's also available from a variety of sources.

—Christopher Schwarz, executive editor

Can I Make a Raised-panel Door With a Veneered Panel in the Middle?

I've seen magazine advertisements, such as one from Freud, where a raised-panel door is made using a veneered board for the center (or field) of the raised panel.

Such a panel would have the edges of the veneer exposed when the profile is made using a raised-panel router bit. One would think that this exposed veneer edge would be susceptible to chipping, and the substrate would be visible. Is there a type of veneer/glue combination that makes this type of panel possible? Or is there a technique by which the veneer edge isn't exposed? I would love to have my cake and eat it, too! That is, to be able to have both the beauty of a raised-panel door and also get the premiere figure found in veneer.

John Pettus
Westminster, California

Using a veneered panel in a door is indeed possible. The most common way to accomplish this is to surround the veneered panel with a mitered frame of solid wood—and then cut the raised-panel profile into this frame of solid wood. This is common in the furniture industry.

To do it, you must be precise in sizing the panels and in cutting the edge profile. It works best with a profile that won't leave a quirk at the intersection of the panel and the hardwood. If possible, size the parts so you have 1/16" or so of solid wood left against the veneer after the panel is raised.

—Robert W. Lang, senior editor

How Far Apart Should Dog Holes Be?

I just installed a metal vise on the front of the left-hand side of my workbench. The vise itself has a metal vise dog, and in the wooden jaws I built for the vise I put in two holes for Veritas Bench Pups. I thought it would be helpful if I put a couple lines of bench dog holes in the bench to work with the vise, and I was wondering if there is a suggested spacing or interval you would suggest for the most effective placement of the holes.

Todd Marshall
via the Internet

In general, you should space your holes a shade less than the maximum opening of your vise. If your vise opens 10", I'd space the holes every 9". That way you'll be able to grasp almost anything. The other consideration on spacing is if you're going to ever use the Veritas Wonder Dogs in conjunction with your bench dogs, which work like a tail vise. If so, you'll want to reduce the spacing to 4" to accommodate these devices.

—Christopher Schwarz, executive editor

Caring for Danish Oil

What is the best way to maintain and clean a piece of furniture finished with Danish oil?

Jeremy Graham
Bend, Oregon

You care for a Danish oil finish the same way you care for any finish. You can clean water-soluble dirt (dried soda spills, children's fingerprints) by wiping with a water-dampened cloth. You can clean solvent-soluble dirt (grease or wax) by wiping with mineral spirits or a furniture polish.

You can maintain the finish by applying paste wax, which will provide long-term shine and scratch resistance, or by applying a furniture polish, which will provide short-term shine and scratch resistance. You can also apply additional coats of Danish oil, or you can apply any other finish you would like as long as the Danish oil on the wood is cured—at least a week.

One thing you need to remember about a Danish oil finish is that it is very thin. Therefore it is easily penetrated by water and other liquids, which will probably cause a mark that will be difficult to remove, and anything that scratches the finish will also scratch the wood.

— Bob Flexner, contributing editor

Why is My Glue Line Becoming More Visible Over Time?

In the last couple of years I've noticed – especially on my glued-up tabletops – that a year or so after the project is in use I am finding a very fine line of glue at the joints. It almost looks like the wood is shrinking and the glue isn't. None of the joints has ever opened up, but you can feel them and can pick at them with your fingernail. Can you tell me what I am doing wrong and how to avoid this problem?

R.G. Black
Red Lake, Ontario

What you're experiencing is common with aliphatic resin (yellow or white) glues. When the glue dries, it doesn't form a hard surface, but a flexible plastic film. As the wood expands and contracts, the glue moves with it. This is actually one of the good points of modern glues; if it didn't move, it could eventually fracture, resulting in failure of the joint. There isn't really anything you can do, other than keeping the temperature and relative humidity at a constant level so that seasonal wood movement is kept to a minimum. Other glues, such as hide glue, reactive polyurethane or epoxy aren't as flexible, and will likely hold up in a tabletop. You might try one of these in your next project. **PW**

— Robert W. Lang, senior editor

WRITE TO US

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

Send your questions via e-mail to popwood@fwpubs.com, or by mail to:

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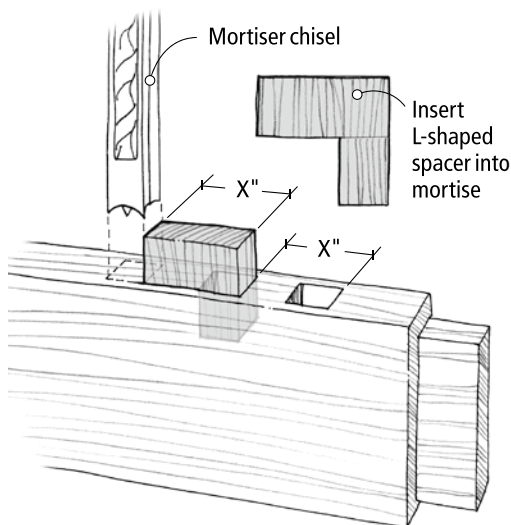
Mortising Spacer Reduces Measuring

THE WINNER:

I recently made a Morris chair that had 17 spindles on each side. With a tenon on each end of every spindle, I had a grand total of 68 mortises to make using my mortiser. The job required accurate alignment and consistent spacing of the $\frac{1}{2}$ " x $\frac{1}{2}$ " mortises on the upper and lower rails of the chair.

It was easy enough to align the row of mortises across the thickness of the rails by setting the fence on my mortiser, but I really didn't want to have to lay out the spacing of each mortise along the length of each rail.

To make the job easy, accurate and efficient, I first made a $\frac{1}{2}$ " x $\frac{1}{2}$ " hardwood plug that slipped snugly into a mortise. I then made a small block with a width that equaled the intended distance between the right sides of two adjacent mortises. I glued the block to the top of the hardwood plug to create an L-shaped spacer.



After cutting the first mortise in a rail, I inserted the spacer, then slid the rail over so the spacer contacted the mortising chisel, then made the next mortise. All subsequent mortises on the rail were quickly and accurately made in the same manner.

Mike Suddes
Plainville, Massachusetts

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CASH AND PRIZES FOR YOUR TRICKS AND TIPS!

Each issue we publish useful woodworking tips from our readers. Next issue's winner receives this terrific set of three specialty planes from Veritas, including a large and medium shoulder plane, and a bullnose plane. These planes are perfect for fine-tuning a variety of woodworking joints including rabbets and tenons. This set of quality joinery planes is valued at more than \$400.



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

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Cheap Dust Collection

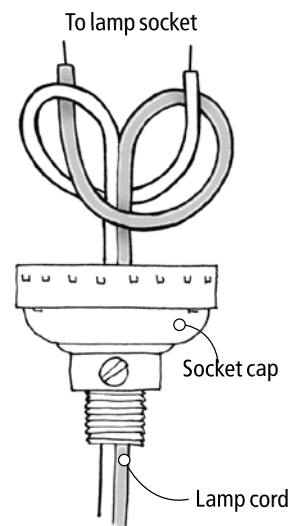
Have you been thinking about getting a dust collector? You may already have one sitting around the house. An old box window fan pulls a tremendous amount of air. Strap a cheap furnace filter to the intake side of the fan using bungee cords, and set the fan next to your bench when sanding. You might be surprised to see how quickly the filter turns brown from sanding dust. Alternatively, you can set your sanding bench next to a window and just suck the dust directly outside (provided your neighbor's shiny black Mercedes isn't parked nearby, of course).

John Henry
Philipsburg, Pennsylvania

UL-approved Lamp Cord Knot

If you make lamps, it's important to know how to make the lamp cord knot that is approved by Underwriters Laboratory (UL). This particular knot is easy to tie and can't be accidentally pulled back through the lamp rod, making it a safe way to wire a lamp. Simply feed the lamp cord through the rod and through the lamp socket cap, then split the cord down the center into the two separate wires. After tying off the two wires, pull the knot against the bottom of the socket cap by pulling on the opposite end of the wire. Cut the leads inside the socket to an appropriate length, strip their ends, and screw each section of bare wire to the socket before replacing the socket sleeve.

Ed Westin
Cleveland, Ohio

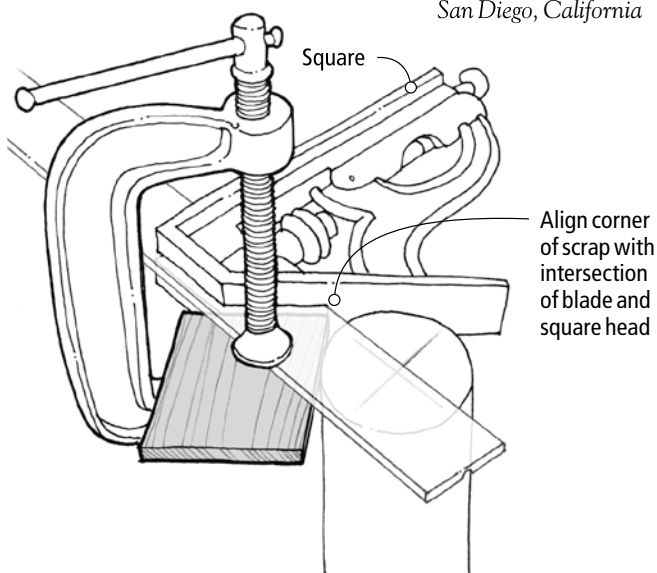


Combination Square Center Finder

Although I'm not much of a wood turner, I occasionally need to find center on the end of round dowels and other round workpieces. I'm definitely too cheap to spend money on a commercial center-finder tool for those few occasions when I need one. Instead, I just clamp a small square scrap of 1/4"-thick plywood or hardboard to the blade of my combination square, and against its 45° fence face. I align the corner of the scrap with the intersection of the square's blade and its body, or stock.

To find center, I lay the blade against the end of the round workpiece, with the perimeter of the workpiece touching the square's stock and the edge of the scrap. I first strike one line across the end of the workpiece, then another approximately perpendicular to the first. The center of the workpiece lies at the intersection of the lines.

Allen Madsen
San Diego, California



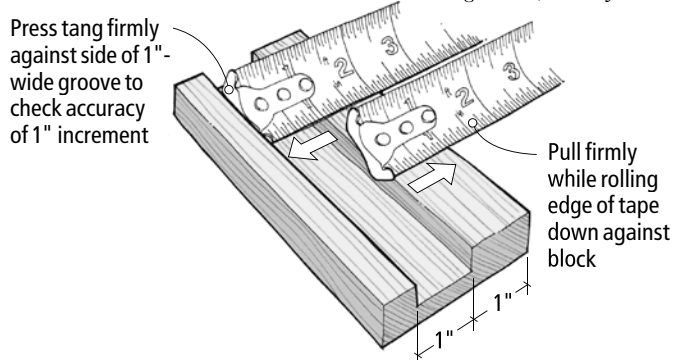
How to Buy (and Tweak) a Tape Measure

If you're serious about accuracy in your work, you need accurate measuring tools, and that includes your tape rule. Unfortunately, the sliding tang on a tape rule – which allows for taking inside and outside measurements – is often the tool's Achilles' heel. Inexpensive tape rules are particularly prone to inaccurate measurements taken from the end of the tape.

When buying a new tape rule, there are a couple things you can check to maximize accuracy. First of all, look for a tape that has increments marked in fine lines. The lines on some tapes are 1/64" or more thick, which compromises your accuracy from the start. Secondly, make sure that inside and outside measurements made using the tang on the end of the tape are accurate. To be sure of this, I head to the store with an accurate gauge block that I have made for the purpose. When gauging the tape, make sure to roll it over slightly so the edge of the tape actually lays on the workpiece. This helps to avoid parallax error when reading the tape.

After finding an accurate tape at the store, keep the block. You can use it to re-check the accuracy of your tape rule after dropping it on the floor and possibly bending its tang. A bent tang can easily be corrected with a pair of pliers.

Paul Anthony
Riegelsville, Pennsylvania

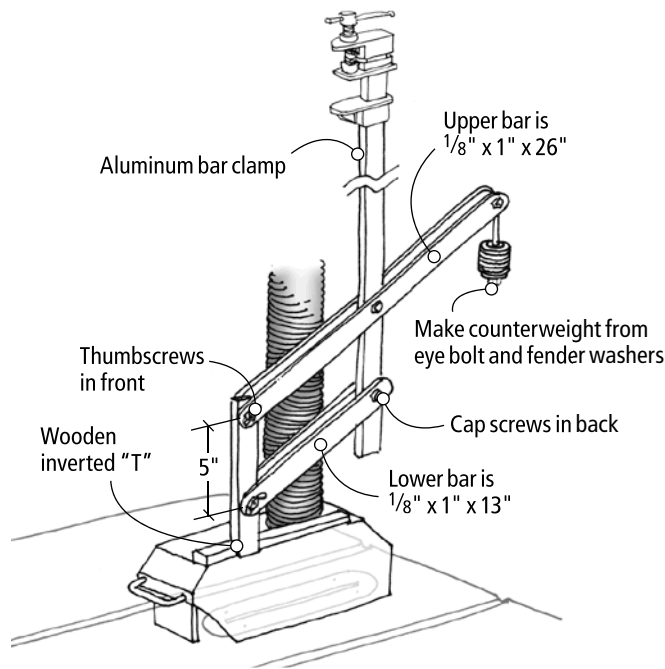


Overarm Blade Guard

Like many woodworkers, I was dissatisfied with the stock blade guard on my table saw. I wanted an overarm guard that could easily be moved out of the way when necessary. However, I don't have shop space for a standard aftermarket overarm guard with its long horizontal mounting bars. And I needed a unit that allowed me to relocate my table saw when necessary for ripping long stock.

I decided to make my own guard that I could suspend from 2 x 4 shorts strategically nailed between my basement ceiling joists. I designed it to incorporate the standard counterbalanced parallelogram mechanism common to commercial overarm blade guards. For the parts, I used an aluminum bar clamp, some $\frac{1}{8}$ " x 1" aluminum flat bar from my local home-supply store, and a few bolts and washers. For the guard itself, I purchased a commercial replacement part from one of the companies that makes aftermarket guards, making sure to get one with a dust-collection port.

Construction was simple. After screwing a wooden inverted "T" to the guard, I drilled a pair of holes in the vertical section of the "T," spacing them 5" apart on center, and an identically spaced pair at the appropriate location in the bar-clamp body. Next, I drilled the pivot holes in the aluminum flat bar, as well as a hole in the far end of each upper flat bar for a cap screw from which to hang an eye bolt. I attached the bars to the clamp with cap screws and washers, making sure all parts pivoted freely. For the front pivot holes, I used thumbscrews and



wing nuts for tool-less tightening when temporarily locking the guard up and out of the way. The last step was to create the counterweight by hanging an eye bolt at the far end of the bar, and attaching as many fender washers as necessary to "float" the guard.

Steven Sampson
Wilbraham, Massachusetts

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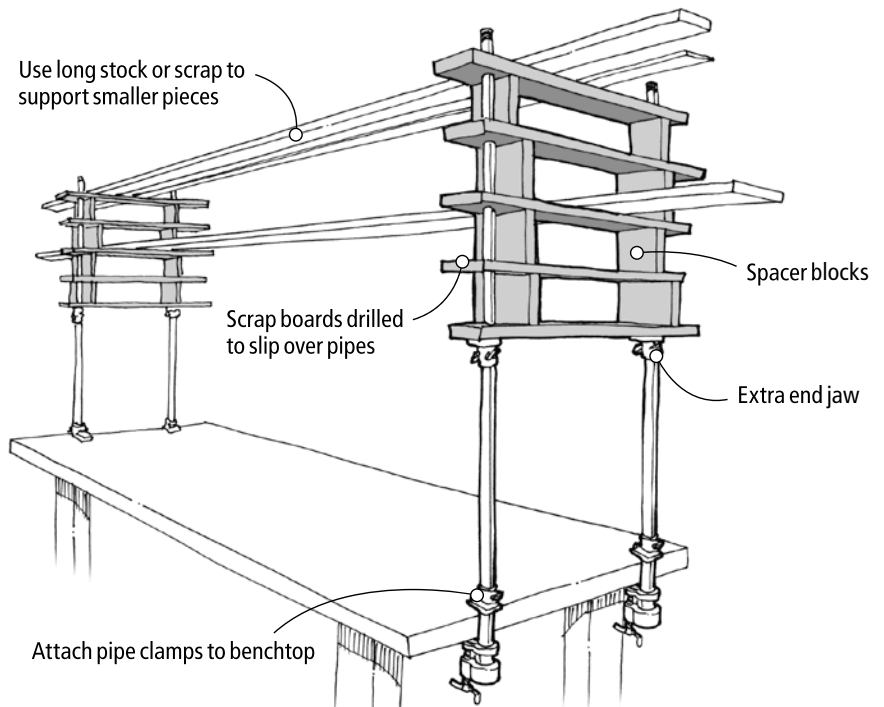
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High and Dry

After painting and finishing mouldings, doors and various project parts, I'm always at a loss for drying room in my shop. To solve the problem, I designed a system of drying racks made from pipe clamps and wood scraps.

To make the racks, I cut a bunch of MDF scraps to a common length and width. I then drilled holes in them slightly larger in diameter than the pipe on my clamps. At the same time, I sawed up some spacer blocks to insert between the MDF scraps to make shelves of a sort, as shown at right.

To set up the racks, I just secure the pipe clamps to the edges of my bench, and slip the drilled scrap MDF boards over them. Placing spacer blocks between the MDF boards, I stack the pieces as high as needed, then lay the finished stock across the boards to dry. Alternatively, I can lay long strips of scrap across the boards to serve as support for smaller workpieces. By slipping an extra clamp jaw facing upward on the clamps for the bottom shelf to rest on, I can raise the entire stackable sec-

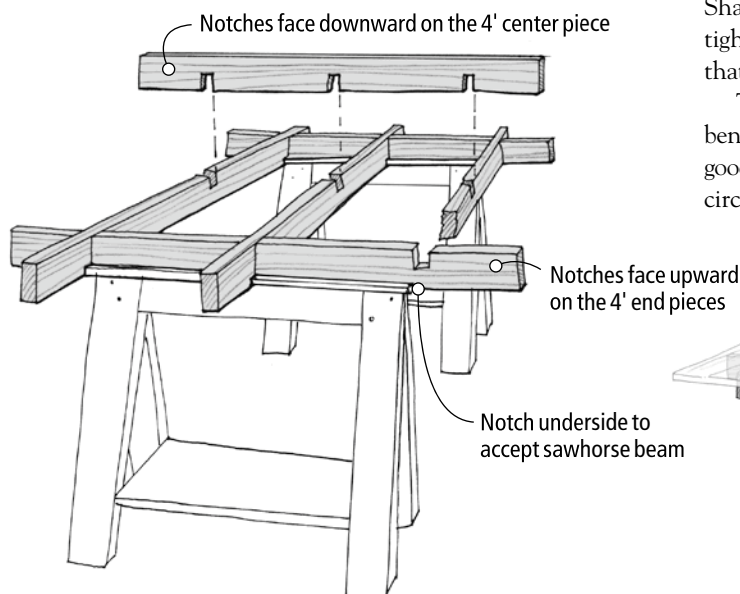


tion of the rack up above my benchtop, leaving me free to work below the drying stock.

*Roger DuBois
Dudley, Massachusetts*

A Knockdown Benchtop

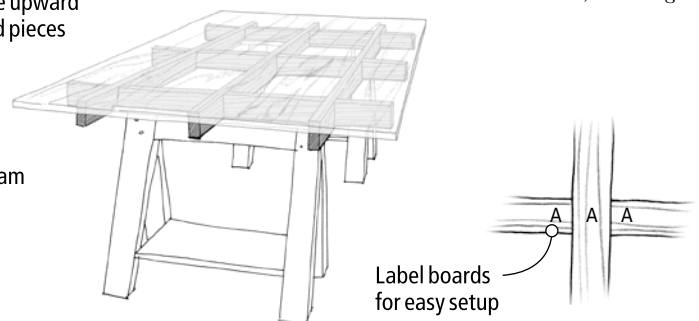
Being cramped for shop space, I needed a bench that could be easily set up and broken down. It had to be large and strong enough to support the heavy furniture that I refinish, as well as my benchtop tools. I also needed it to serve as a support for sawing full sheets of MDF and plywood into manageable sizes.



I decided to build a grid of 2 x 4s that would straddle a pair of sawhorses, and that could be broken down and stored in the corner as a few sticks when not in use. Using three 8'-long 2 x 4s and three 4'-long 2 x 4s, I sawed and chiseled out three notches halfway through each piece to join the six pieces as shown. For a sturdy grid, cut these half-lap joints to create a snug fit. (I letter-coded mine for easy assembly.) Shallow notches in the underside of the end pieces hold the frame tightly to my sawhorse beams. Alternatively, you could attach cleats that straddle the tops of your sawhorses.

The top surface of my grid sits at about waist height. To serve as a bench, I cover it with a sheet of plywood or MDF. When cutting sheet goods, I simply lay them across the grid and set the blade on my portable circular saw to project only slightly through the workpiece.

*Leslie Harrison
Bremerton, Washington*



Improve Your Clamp Pads with Magnets and Tape

After too many times of struggling to glue up projects while juggling project parts, clamps and clamp pads, I realized I could make at least one part of the operation a lot easier by simply improving my clamp pads.

I start by making my clamp pads from $\frac{1}{2}$ "-thick pieces of MDF with the edges slightly chamfered. I make most of my pads $1\frac{1}{2}$ " wide and $2\frac{1}{4}$ " long. I drill a recess into one face of each pad, and epoxy a $\frac{1}{2}$ "-diameter rare earth disk magnet into it, making sure that the face of the magnet is slightly recessed from the face of the pad. The magnets hold the pads to the jaws of my metal clamps tenaciously, eliminating one set of loose items that have to be held in position during glue up. I further improved the pads by wrapping them with plastic packing tape to resist excess glue.

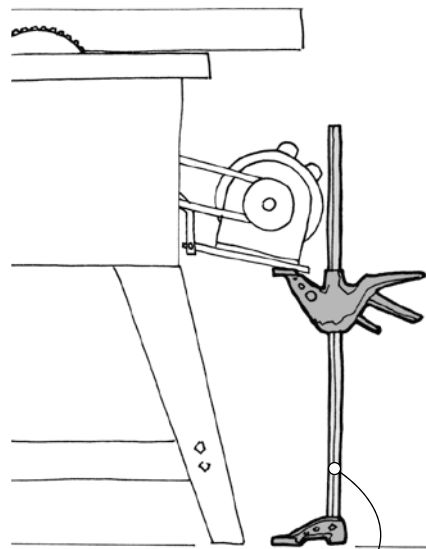
Ken Burton
New Tripoli, Pennsylvania

A Helping Hand at Motor Alignment

I've never had a fun time aligning and adjusting the pulleys and belt tension on contractors' saws. It seems I always need an extra pair of hands to hold the motor in place after adjusting everything. When I try to tighten the motor bracket bolts, the belt tension always seems to pull everything out of whack.

However, the last time I was making these painful adjustments, my gaze landed on a one-handed clamp that was set up as a spreader. A light went on, and I was soon using the one-handed clamp as a temporary jack under the motor bracket to support the weight of the motor while I tightened the fittings. **PW**

David Thiel
senior editor



Use a spreader clamp as a temporary motor support

DeWalt's Flush-cutting Jigsaw a Strong Competitor

We don't usually use the Tool Test column as a compare-and-contrast opportunity, but when looking at the newest jigsaw from DeWalt, we had to. Bosch has been a recognized leader in the jigsaw category for years, so we put the DW331K up against the Bosch 1590EVS. The result: DeWalt is a strong competitor in the jigsaw category.

Both saws' specifications are nearly identical: variable speed, four-position orbital action, blower, toolless shoe adjustment, toolless blade change and dust collection available. Even the prices are within \$10 of each other.

Some of the differences are slight, but may be significant to the individual user. The Bosch had a 90dB sound rating while the DeWalt came in at 94dB. Also, the DeWalt has a slightly higher strokes-per-minute count (3,100 versus Bosch's 2,800). Plus, the Bosch weighs in at 6.9 pounds, while the DeWalt is slightly lighter at 6.3 pounds.

Overall we found the performance of the jigsaws nearly identical. Both had low vibration during use, provided superior performance in cutting melamine and solid lumber, and in handling sharp curves in thick wood.

The main differences are two features. The Bosch offers a precision blade guide that offers slightly better blade control in turns. The DeWalt offers what is actually an accessory to allow cuts right up to the front edge of the shoe. This is an extension blade (shown in the jigsaw at right) that is pretty clever. But don't think you can just buy the extension blade and put it in your existing jigsaw. Your guard would need to be redesigned to allow clearance for the blade.

The bottom line is neither of these features pushed one jigsaw over the other. Both are good saws, so we called it a tie. The flush-cutting feature may help break the tie for your needs.

The last generation of DeWalt jigsaws fell short of our expectations, so with this new model (and a similar 18-volt cordless version for \$249) DeWalt was a very strong contender for the "best-in-field" position.

—David Thiel

For more information, circle #179 on Free Information Card.



SPECIFICATIONS

DeWalt DW331K Jigsaw

Street price: \$159

Motor: 6.5 amp, 500-3,100 spm

Weight: 7.5 lbs

Performance: ●●●●○

Price range: \$\$\$\$

DeWalt: 800-433-9258 or
dewalt.com

Lie-Nielsen Convex-soled Plane Has Many Uses

As my woodworking has evolved to encompass more curved and sculptural forms, including chair seats and the like, I've turned to tools with curved cutting surfaces, from rasps to travishers to specialty spokeshaves.

But what I really needed was this new plane from Lie-Nielsen Toolworks.

The 100½ is based on the now-discontinued Stanley version that was marketed to model-makers, patternmakers and luthiers.

But in typical Lie-Nielsen fashion, the company has refined the design to make it more useful. The Stanley version had a spoon-shaped sole that was curved in a tight 7/8" radius across its width and in a 12" radius along the sole's length. The Lie-Nielsen's sole has a much shallower curvature (3" by 27"). This reduced curve allows the plane to take a wider shaving in most applications, such as chair seats.

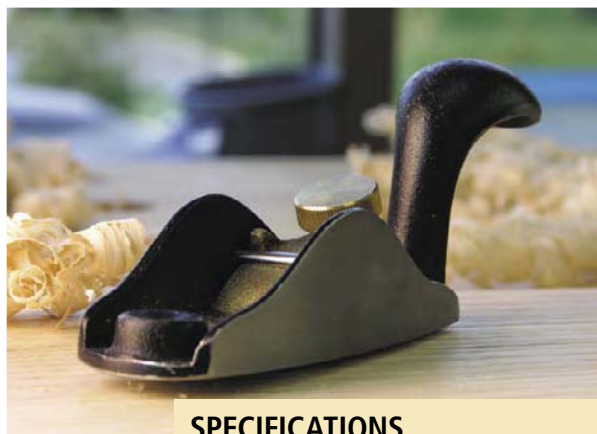
However, the biggest improvement is that Lie-Nielsen made its version of the plane with the bevel of the cutter facing up (like a block

plane) instead of down (like a bench plane). This is a significant improvement because it allows you to easily alter the cutting angle of the tool, which helps cut reversing or weird grain with less tear-out – a real advantage in curved work. Plus, the lowered position of the blade keeps it from digging into your hand like the original version.

The 100½ has seen a lot of use in my work. It replaced my travisher as the tool of choice for hollowing chair seats. Plus, it excels at tweaking mouldings and working any coved shape. The short length of the plane (5" overall) and its so-called "squirrel tail" at the back of the tool make it a comfortable extension of my hand.

—Christopher Schwarz

For more information, circle #180 on Free Information Card.



SPECIFICATIONS

Lie-Nielsen 100½

Street price: about \$85

Sole length: 3½"

Iron width: 7/8"

Iron: Cryo-treated A2

Performance: ●●●●●

Price range: \$\$\$\$

Lie-Nielsen Toolworks: 800-327-2520 or
lie-nielsen.com

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Get the Advantages of Hide Glue Without the Glue Pot

Traditional hide glue has many advantages for woodworking. It's reversible—a little heat and water allow you to disassemble a joint. And the glue can be tweaked (by adding urea) to have a longer open time.

But most hide glues require that you mix them yourself, keep them heated in a glue pot (carefully watching the temperature and for mold growth) and they have an odor that puts off some people.

In response, furniture maker and conservator W. Patrick Edwards developed Old Brown Glue, which has all the advantages of traditional hide glues and none of the disadvantages. Old Brown Glue comes premixed, is liquid at room temperature and has almost no odor (it's as mild smelling as your yellow glue, really). And after using a couple bottles, I am really sold on this glue as an excellent adhesive for assembling furniture and chairs.

Old Brown Glue has a much longer open time than standard yellow glues. You can continue to work with your clamps and parts for as long as an hour before the glue sets up. This is ideal for complex assemblies, especially

chairs, because it removes one of the major stresses of glue-ups.

Equally important is its reversibility. While building one Welsh chair I accidentally glued a leg into the wrong mortise and left it there. A little warm water and heat from an iron and the leg pulled free. With yellow glue I would have been out of luck.

There are some assemblies for which I still favor yellow glue: I like the fast setup when making panels from narrower boards, for example. But when assembling anything complex, I drop a bottle of Old Brown Glue

into a cup of warm tap water (which makes it flow easily) and settle in for a much more relaxed glue-up. —CS

For more information, circle #181 on Free Information Card.

SPECIFICATIONS

Old Brown Glue

Street price: \$8 for 5 oz.; \$21 for 16 oz.

Ingredients: Hydrolyzed collagen, urea

Open time: up to one hour

Clamp time: 12 hours

Performance: ●●●●●

Price range: \$\$\$

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



Oneway's 1224 Lathe Offers Increased Capacity

For turners who dream of owning a Oneway lathe, the model 1224 is a good way to make that dream a reality. While it's not the least expensive Oneway, its additional capacity (for only about \$200 more than the smaller 1018) makes the choice a no-brainer.

The 1018, with 10" swing and 18" between centers, is in the mini-lathe category even though in every respect other than capacity it's in a class by itself. The 1224, with a 12" swing and 24" between centers, sufficiently increases capacity to satisfy all but the more serious bowl turners. We do wish the between-centers capacity were 6" more to handle standard table leg lengths. A 24" bed extension is available for an extra \$275.

I turned a 10"-diameter hard maple bowl on the 1224 and it was a joy. Its performance was superior to a larger 16" swing capacity lathe I routinely use. The first thing you notice about this lathe is its fit and finish, and the extremely smooth operation of the tail stock and banjo, which glide across the bed ways, but clamp very positively. Turn the machine

on and you barely hear it run. The spindle turns in four precision headstock bearings.

For a relatively smaller lathe, it weighs in at 300 pounds, some of which is in its heavy-duty steel bench. It's powered by a 1 hp motor configured for either 110 volt or 220V. An electronic drive controller reverses and provides infinitely variable rpm from zero to 4,500 while using a two-step pulley. The headstock spindle is a No. 2 morse taper with 1" x 8 threads per inch. At just less than \$2,000 it's a lot of lathe. It can be ordered directly from Oneway, or through Woodcraft, Craft Supplies USA or Packard Woodworks. —Steve Shaney

For more information, circle #182 on Free Information Card.



SPECIFICATIONS

Oneway 1224 Lathe

Street price: \$1,995

Features: Weld design kills vibration; four-bearing spindle headstock

Performance: ●●●●●

Price range: \$\$\$\$

Oneway Manufacturing: 800-565-7288 or oneway.ca

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TOOL TEST

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Shop Fox Overarm Router

I'm a tool junkie, but I'll be the first to admit this overarm router doesn't belong in everyone's shop. But ... if you're doing any kind of repetitive pattern work, sign-making or just want to pretend you have a CNC router, then this is a really cool tool.

The concept is very simple. A standard router body (it will accommodate most routers on the market) is mounted in a collar that is attached to dual cylindrical ways that are fitted with a pneumatic piston. A foot pedal connects to your air hose and controls the up-and-down motion of the sliding bracket.

One of six different diameter pins is then inserted into the table to guide any pattern you'd like. The foot pedal leaves your hands free to control the movement of the pattern and your finished piece. An adjustable depth collar controls the depth the bit bites.

This tool is fairly light (60 lbs.) and it mounts easily to a benchtop. Initial setup is important to ensure accurate alignment, but after that, it's a lot of fun and a tool that you'll find lots of excuses to use. —DT

For more information, circle #183 on Free Information Card.



SPECIFICATIONS

Shop Fox Overarm Router (W1736)

Street price: \$595

Max stroke: 5 1/2"

Throat capacity: 18"

Collar sizes: 4 1/4", 3 1/2", 3 1/4" & 3 21/64"

Performance: ●●●●○

Price range: \$\$\$\$

Woodstock Int'l: 800-840-8420 or
woodstockint.com



REAL LENGTH PINNER

A few years ago a new pneumatic tool was introduced that I fell in love with – the 23-gauge pinner. Significantly thinner than an 18-gauge brad, and headless, these tools made it possible to attach moulding quickly leaving such a small hole that it wasn't even worth putting putty on.

One downside to the pinners was that because of the thinness of the pins, the longest fastener was only 1" in length. That's a decent length for many applications, but I kept finding places I would have liked to use a pin instead of a brad, but 1" was too short.

Now Grex Power Tools has introduced the P630 pinner that fires 23-gauge headless pins up to 1 3/8" in length. This is very cool. We found the pinner to be well made with a small nose that makes positioning the fasteners easy. The magazine is also user-friendly, offering adjust-free fitting for any length pin.

We tested the P630 in a variety of hard and softwoods, and were pleased with the gun's ability to sink the full 1 3/8" length without pause. A double trigger safety adds a good layer of safety, without unduly interfering with operation.

However, there is one drawback to my enthusiasm: As of our publication deadline, the P630 was retailing for about \$225, which is about \$100 more than the shorter-length competitors.

For a distributor near you call Grex at 888-447-3926 or visit grexusa.com for more information. —DT

ABOUT OUR TOOL RATINGS

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

—David Thiel, senior editor

Bosch Trimmer Not Just for Laminate

Bosch has upgraded and redefined its line of trim routers to make them more durable and convenient for woodworking operations – though the tool was originally designed for the laminate-installation industry.

The base is beefier and offers an easier fine-depth adjustment (one revolution is 3/64"), while still maintaining parallelism to the bit. A slick thread by-pass feature makes coarse height adjustments simple as well.

A conventional spindle lock and single wrench replace the old two-wrench system (one wrench acted as a spindle lock). And an overmoulded contoured grip improves the tool's comfort when in use.

The tools are available in a single-speed model (PR10E) or in a variable-speed model (PR20EVSK) as tested. A kit (PR20EVSNK, \$199) includes the variable-speed router, an offset base, tilt base and underscribe guide.

The 5.7-amp motor provides good power with soft starts. The variable speed is for larger profile bits – traditional trimmers run too fast for most profiles. A 10' rubber cord and edge guide are included. These are all good changes to an already good tool. **PW** —DT

For more information, circle #184 on Free Information Card.



SPECIFICATIONS

Bosch PR20EVSK Palm Router

Street price: \$120 (PR10E: \$99)

Motor: 5.7 amp, 16,000 to 30,000 rpm

Performance: ●●●●●

Price range: \$\$\$

Bosch: Tools: 877-267-2499 or boschtools.com

Lie-Nielsen No. 4^{1/2} Smoothing Plane

Heavy, precisely made and surprisingly easy to wield.

Woodworkers tend to get obsessed with their smoothing planes. No other plane requires as much tuning and no other plane rewards its user with the same gossamer shavings. I have 10 smoothers (I can quit any time, dear) and so it's always interesting to observe which one I unconsciously reach for.

In all honesty, it's not this plane. For most smoothing tasks I favor the Lie-Nielsen No. 4 in bronze, equipped with a high-angle frog.

But whenever I have a tabletop or large cabinet side, the No. 4^{1/2} is the plane I grab. And as I put it to work I always wonder why I don't use it more. It is a jewel.

With a body that's 2^{7/8}" wide, 10^{1/4}" long and nearly 6 pounds, this plane is much bigger than its smaller cousins in the smoother family. Though fans of wooden planes will disagree, I like heavy smoothers. Extra mass keeps the tool from jumping out of the cut and makes the plane easier to start. Is it more tiring to use? Perhaps. But because a smoothing plane takes just a few passes on a board, it's a non-issue. (And no matter what plane you use, it is far less boring than power sanding.)

ABOUT OUR ENDURANCE TESTS Every tool featured in our Endurance Test column has survived at least two years of heavy use in our shop here at *Popular Woodworking*.

Since this tool was introduced in 1999, Lie-Nielsen has upgraded it. Most noteworthy is the fact that you can buy this tool with a high-angle frog. This so-called "York pitch" frog raises the blade to a 50° angle, up from 45°. If you work with hardwoods, order the tool with the high-angle frog (it doesn't cost more) because it does make a performance difference. I don't think you need the 45° frog.

My conclusion is based on working with two of these planes in three different configurations: with a 45° frog, a 50° frog and an experimental 55° frog made by Lie-Nielsen. After considerable use in curly cherry and maple, I found that the 50° frog was the best compromise. With the 45° frog there was more tear-out. With the 55° frog the plane was a bit hard to push and the iron seemed to dull faster (though there was even less tear-out with the 55° frog than with the other two frogs).

Aside from the frog, Lie-Nielsen has made two other notable upgrades. The company now uses cryogenically treated A2 steel for its irons instead of high-carbon steel. During my test with the 55° frog, I also compared the original iron to the new A2 iron. The A2 goes longer between sharpenings. Some woodworkers complain that A2 can't get as sharp as high-carbon steel. While this might be true, I get A2 plenty sharp for my picky tastes.

The final improvement was the most

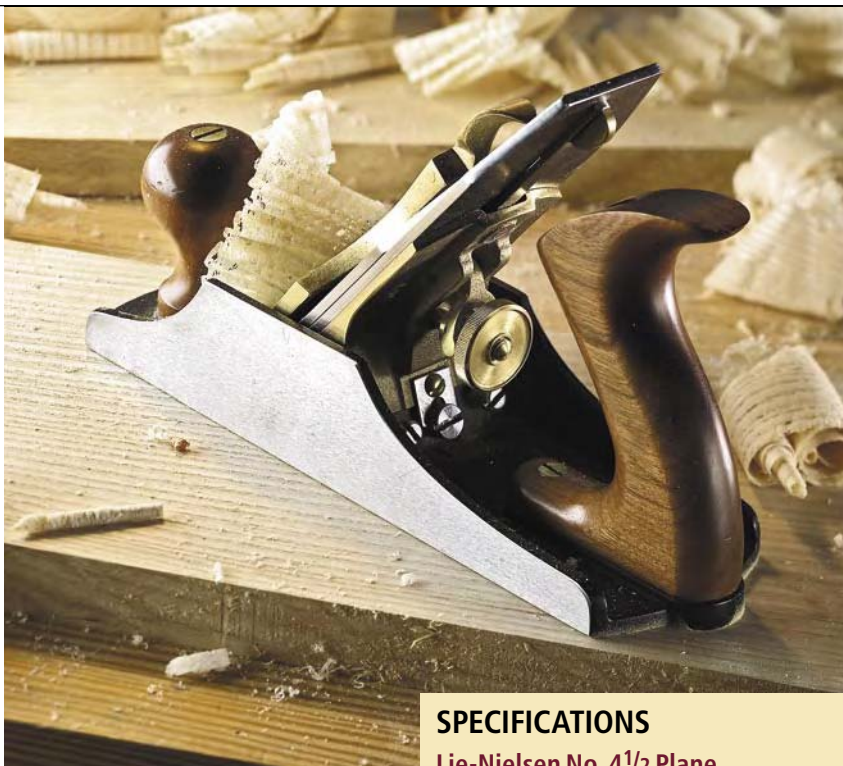


Photo by Al Parrish

SPECIFICATIONS

Lie-Nielsen No. 4^{1/2} Plane

Street price: \$300

Iron: 2^{3/8}"-wide cryo-treated A2 steel

Sole flatness: Better than .0015" in all places; no gaps visible under straightedge

Squareness of sidewalls: Small amount of light observable under engineer's square, but unmeasurable to a .0015" feeler gauge

Upgrades: Available with a stock 50° frog for no extra charge; additional 50° frog, \$75; also available with a corrugated sole and rosewood handles (both untested)

For more information: Contact Lie-Nielsen Toolworks at 800-327-2520 or lie-nielsen.com

important one, in my opinion. Lie-Nielsen stopped using the springy Stanley-style chipbreakers. Lie-Nielsen replaced this fussy and unreliable design with an "improved chipbreaker," which is now standard equipment on all the company's bench planes. This chipbreaker is thick, flat and milled on the underside so it has a metal lip that mates with the iron. The design isn't perfect – I've had one improved chipbreaker that needed a lot of work. But these chipbreakers are indeed much improved compared to the previous design, which could require a couple hours of tuning in really bad cases.

With these upgrades, and Lie-Nielsen's commitment to quality, this tool is worthy of being your only smoothing plane, especially if you tend to build large-scale furniture. **PW**

— Christopher Schwarz

Cope-and-stick Joints

Run the moulding and make the joint with this time-tested technique.

The so-called cope-and-stick joint – a.k.a. the rail-and-stile joint, the rail-and-pattern joint, etc. – is an efficiency expert's dream system. The joint is virtually synonymous with raised-panel doors. However, that's a little parochial; you can use it for constructions other than doors, and the panels don't have to be raised. But its utility in doormaking is more than enough to merit a place in your power-tool joinery repertoire.

Typically, two separate bits are used. One is the sticking (or stile or pattern) bit, and the other is the cope (or rail) bit. In one pass, the so-called sticking cutter forms the panel groove and the decorative edge profile. With this cutter you machine one long edge of the stiles, and the top and bottom rails, and both edges of mullions and intermediate rails. (To my understanding the term "sticking" stems from the profile being formed directly on the frame member – it's "stuck" there – as opposed to it being a separate strip that's attached.)

The cope cutter forms, all in one cut, a stub tenon (or tongue) that mates with the panel groove and the cope of the sticking profile. Copes are cut across the ends of all rails and mullions. Perhaps it's a bit of stretch to say this, but a coped joint won't peek open seasonally the way a miter will. Finish carpenters cope architectural trim at inside corners rather than mitering it for just this reason.

The joint thus is cut by milling every frame piece with one bit and selected pieces with the second. I've never timed it, but I'd bet



Photo by Al Parrish

The moulding profile cut in reverse forms an integral part of the cope-and-stick joint.

that with a little experience, you can set up and cut the joinery for a door in about 10 to 15 minutes.

To fully grasp what I mean about efficiency, compare that two-step process against this routine of the traditional door maker:

- Lay out each joint.
- Excavate the mortises with chisels and a mallet, with a hollow-chisel mortiser, or maybe with a router and jig.

- Next, cut the tenons and then fit them to the mortises.

- Cut the decorative profile.

- Cut the panel groove.

- Trim the profile at the joints, an operation usually called mitering the sticking, so the joints close and the profile on the rail meets the profile on the stile in a crisp miter.

I've recently done this. It's a lot of setups. It required a hollow-chisel mortiser, three

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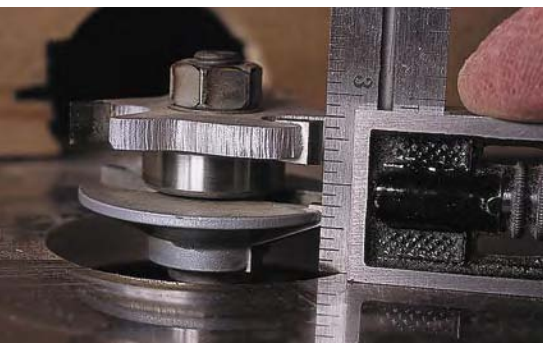
Bits are available as pairs of matched cutters or single bits. Single bits are either height adjustable or stacking with a reversible cutter.

Step photos by the author

by Bill Hylton

Bill is the author of several woodworking books including "Bill Hylton's Power-Tool Joinery" (Popular Woodworking Books). To purchase, visit your local bookseller, call 800-448-0915 or visit popwood.com.

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Set the height of the cope cutter by measuring the position of the tongue.

router-table setups and two table saw setups. And to get an acceptable assembly, I actually had to use one of those old-time cordless tools—a chisel. With cope and stick, it's two router-table setups and you're done.

The trade-off (there's always a trade-off) is strength. The joint is easy to make, but it isn't as strong as a mortise-and-tenon joint.

Is it strong enough for the average frame-and-panel application? Personally, I think the joint is fine for doors on cabinets and cupboards, and for casework components. Provided it is machined accurately and glued well, it's plenty strong. If the strength of a mortise and tenon is deemed essential—for heavier assemblies such as architectural doors, for example—there are good ways to reinforce the cope-and-stick joint, such as with dowels and loose tenons.

To make a frame using this joinery, you need the proper bits and a mid-power, table-mounted router. With a few exceptions, the cope-and-stick bits can be run full-tilt in a 1½-horsepower router.

Preparing the Stock

By industry convention, cope-and-stick bits are designed for ¾"-thick stock. Because this stock thickness is standard in most areas of the United States and Canada, you shouldn't have problems if you buy dressed stock.

You do have some leeway. You can finesse the bit height setting to reduce the profile depth and increase the width of the panel-groove shoulder, or to increase the profile and reduce the shoulder. The problem when you creep below 11/16" in thickness is in fitting the sticking profile on the edge and still having enough stock to support the panel groove. As the thickness creeps above 7/8", the problem is



Use a block of scrap to push the end of the rail into the cutter for the cope. It will prevent tear-out and give you better control.

the capacity of the cope cutter. You may find it leaves a wafer of waste attached along the stub-tenon shoulder.

For doors especially, the stock must be flat, straight and true. You can get away with using slightly bowed stock for a frame-and-panel unit so long as it isn't a door. If the wood in a frame-and-panel unit is bowed (not crooked, not twisted, just bowed), the unit will be bowed. If the unit is a structural part of the case, it will be anchored to other elements that may pull it into line and hold it there. But if it is a door, it won't hang flat, and that problem you won't be able to conceal.

Dress the chosen stock to whatever thickness you've settled on. You also need several pieces for testing the setups, bearing in mind that these particular pieces can be a secondary wood. The important thing, to me, is to plane all the stock to a consistent thickness. I achieve consistency by planing all of it at the same time.

Now rip the stock to width, then crosscut the parts to length. When you cut the rails, you have to account for the sticking width. Usually, but not always, the width is 3/8". So if, for example, you're making an 18"-wide door and using 1¾"-wide stiles, the distance between the stiles is 14½". But to account for the sticking, you need to add 3/4" to the length of the rails (3/8" for each stile, or twice the width of the profile).



Use one of the coped pieces to set the height for the sticking cutter.

Cutting the Joinery

If you have just purchased a bit or set of bits to do cope-and-stick joinery, I think you should spend a little time getting familiar with it. Take as much time as you need to make both cope and stick cuts. Here's your goal: a setup block with an edge stuck and an end coped. With that in hand, you can quickly set up the bits any time you need to.

The usual routine is to cope the rail ends first, then stick all the stiles and rails. So that's the routine we'll follow here.

Before doing any setup or cuts, reflect on the fact that the cope cut is cross grain. That means you need to back up the work to prevent splinters from being torn from the back edge by the cutter. Depending on the size and number of rails, I'll gang them up and feed the lot of them past the cutter, pushing them along the fence with a square scrap. The pusher acts as a backup, preventing any splintering.

Some woodworkers prefer to use a more formal guide, such as a coping sled. There's no shame in that at all. However a sled does impact the bit height setting so you have to accommodate the sled base's thickness.

The first setup task, of course, is the bit. Secure the cope cutter in the router's collet. Then establish a height setting. Knowing the industry standards, you won't be wrong to measure 7/16" to 5/8" from the tabletop (or coping sled base) to the corner of the tenon-cutter. You'll get an 1/8"- to 3/16"-wide shoulder on the stub tenon.

If you already have a setup block—one that came with the bits or one you made—tuck it into the bit and adjust the bit up and down. If you are using a coping sled, you must, of course, set the block on the sled when gauging the bit elevation.

Set the fence next, positioning it with its face tangent to the pilot bearing. It helps to use a zero-clearance facing. The zero-clear-



Make the sticking cuts by running the long edges along the fence. Featherboards will keep the stock flat on the surface of the router table.

ance fit is most important on the infeed side of the cutter. If your fence is split, you can feed the infeed half of a sacrificial fence into the spinning bit, right up against the pilot bearing. With the solid fences on my router tables, I use an expendable strip of thin plywood or hardboard to make a zero-clearance opening as shown in the photo above.

Of course you need to make a test cut. If you have a setup block, fit your test cut to its stucked edge. If not, look at the cut and assure yourself it's not obviously misaligned.

The cope cuts should be completed in one pass. Repeating a pass can enlarge the cut and create a loose fit. In theory, a second pass can enlarge the cut only if there's some movement in your setup. In practice, there probably is a "skoshe" of movement possible, no matter how firmly you grip the work.

Pay attention when you turn the rails to cope the second end. You want to turn them, not flip them over. Mark the face that's supposed to be up as you make the cope cut. Before you cut, look for the mark.

Rout the sticking second. Chuck the sticking bit in the router collet, and adjust its height. It's great if you can do this without moving the fence, but that's not always the



A zero clearance opening in the fence will help prevent chipping as the cuts are made.

case. If you can get away without resetting the fence, you'll save some time and effort.

If you have a setup block, use it, of course. Otherwise, set the bit against a coped workpiece. Make a test cut, and fit it to one of the coped rails. You want the surfaces flush, and running your fingers across the seam will tell you if you've achieved that. If some adjustment is necessary, make it and run a new test piece across the bit. Keep adjusting and testing until you have the fit you want dialed in.

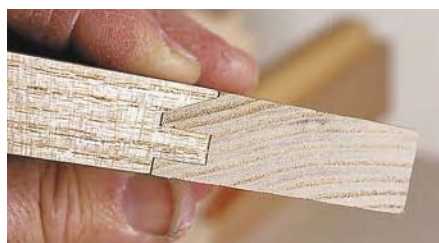
Set featherboards, if you favor their use,

positioning them just fore and aft of the bit, where you need the pressure.

When everything is set up properly, after you've adjusted and micro-adjusted the bit height, created zero-clearance support around the bit, positioned the featherboards, and done a test cut that resulted in a pleasing fit, rout on. Stick the stiles and the rails. You may find that it won't take as long to do the work, as it did to set up for it. Taking your time with the setup will guarantee you smooth sailing when you put the parts together.

Assembly

Assembling a cope-and-stick frame is pretty straightforward. Work on a flat, true surface. Apply glue judiciously to the ends of the rails. Tighten the clamps gently, alternating back and forth, and keeping the rails flat on the clamp bars. Very little pressure is required, and over-tightening the clamps will likely distort the joints and thus the assembly. Make sure the assembly is square and flat by comparing the diagonal measurements and by checking with winding sticks. **PW**



The pieces should come together flush on their faces (left), not offset (right).



Cope-and-stick joinery is an efficient method for assembling doors and other panels.

Yankee's Shop True to Name

Two days on the set of 'The New Yankee Workshop' reveal surprising truths about the way Norm Abram works.

We're lost. I'm trudging through two feet of snow in what looks to be someone's backyard and there's no sign of the image found on millions of woodworkers' television screens every Saturday as they prepare for another half hour with Norm Abram. Where is the blue barn door? Where is the leaded glass window? Where is the iconic "The New Yankee Workshop" sign?

A few driveways and turnarounds later, just when I had decided that all of it – the shop, the sign, the setting – must be part of an elaborate set and therefore fake, we stumble on television's most famous woodshop.

I can't tell you the exact location of The New Yankee Workshop for two reasons. One, even with directions, I don't know if I could find it again. Two, I promised to keep mum. But I will tell you this: None of it's fake. What looks like the front of the shop on TV actually is in the back, to better hide its location. And if you slide that famous barn door open and step inside, you'll find yourself in a very real, very normal, working woodshop.

Abram, host of the show, has received considerable flak and teasing for his remarkably well-equipped shop. But two days with Abram proved that there's a lot more dust on

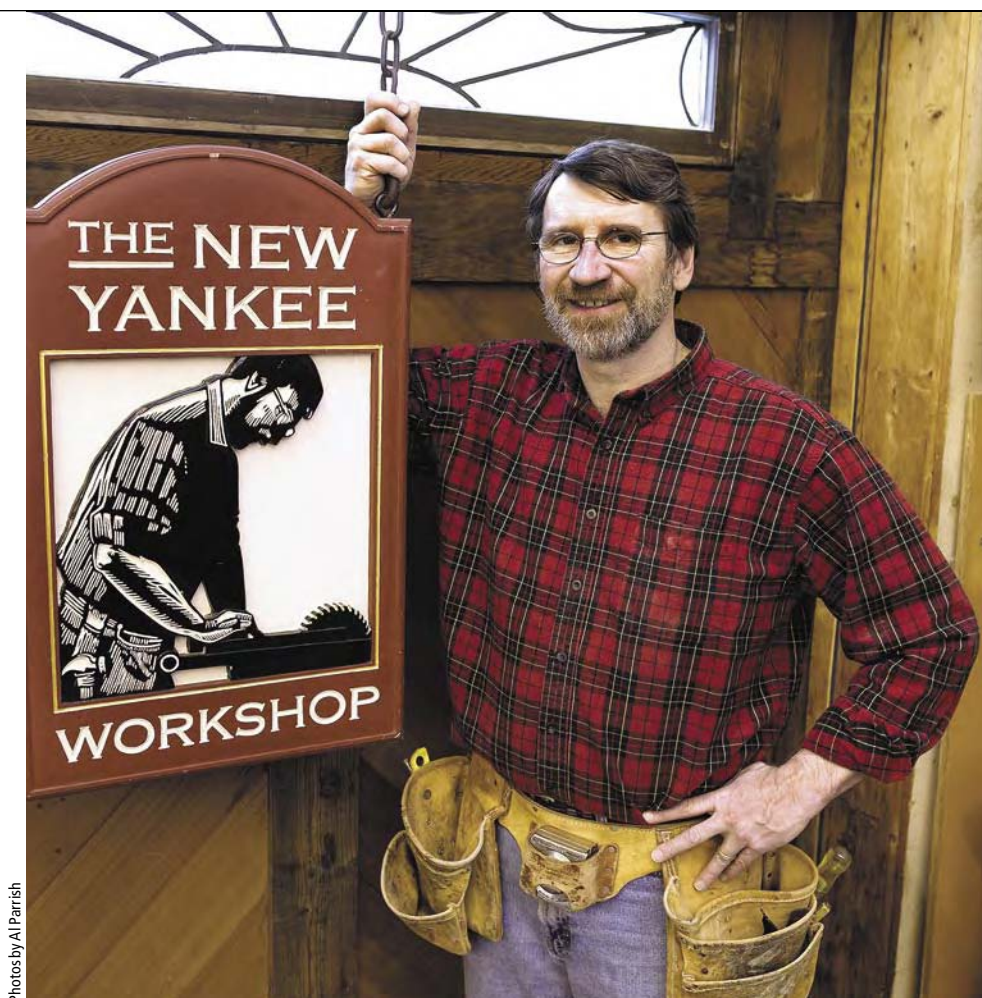
this show's set than glitter. Here, the legendary frugal Yankee blood runs deeper than you might think – Abram's woodshop and practices are surprisingly normal.

The Birth of a Star Woodworker

Abram is a celebrity. He's recognized in airports, restaurants and grocery stores. He's appeared as a guest on late-night television, afternoon talk shows and national morning news programs. His likeness has been featured on "Saturday Night Live" and "Home Improvement." Fans have devoted web sites to him. His woodworking methods and cache of power tools are criticized as much as they're coveted. A variation of his first name has become part of woodworking's lexicon – "Normite" is Internet slang to describe someone who uses power tools only. *Esquire* magazine has called him the most famous carpenter of all time; excepting Jesus.

by Kara Gebhart Uhl

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



Photos by Al Parrish

How did this happen?

The carpenter-turned-celebrity story begins more than 30 years ago when Abram spotted an ad for a carpentry job pinned to a bulletin board at the University of Massachusetts at Amherst. After spending two years working toward a mechanical engineering degree, Abram switched majors and was in his fifth year of college studying business administration. It was the early 1970s and office jobs were scarce. Within mere credits of earning his degree Abram got the carpentry job, quit school and moved to Vermont.

By this time Abram was well-versed in carpentry. His summers during high school and college were spent remodeling and building custom homes with his father's construction company. His carpentry skills and knowledge of business administration proved beneficial – he was quickly promoted to construction site supervisor. Not wanting to take the next promotion, which would have put him in an office-like environment, Abram founded a general contracting firm, called Integrated Structures Inc., in 1976.

One of his first contracting jobs was building a barn on Russell Morash's property. During this time Morash, a producer and director for WGBH, was busy creating television's first "how-to" home-improvement series, "This Old House." Morash was impressed with Abram, his work and the small size of his scrap pile.

"He was quiet, effective, uncomplaining and met deadlines," Morash says of Abram. "He was also unmarried and had no life," Morash adds, laughing. So, in the winter of 1978, Morash invited Abram to help renovate the TV series' first on-air project, a rundown Victorian in Boston's historic Dorchester section. Abram agreed.

Abram hoped his family members might catch him walking in the background, carrying a ladder. But he proved to be too good a carpenter. It wasn't long before he was named master carpenter on the show and Morash attached a microphone to his flannel shirt.

"Norm was nervous as hell," Morash says. "But he was good – credible, believable and compelling."

Several years later, with "This Old House" still widely popular, Morash thought TV audiences also would be interested in a series on woodworking – hence, "The New Yankee Workshop." But why would Morash choose Abram – a carpenter – to host a how-to TV series on building furniture? Morash, a self-proclaimed "wannabe carpenter who built the occasional nightstand," says the thought of a carpenter not being able to build fine furniture never really occurred to him.

"I never thought he couldn't do something," Morash says. "In his very quiet way, he would figure it out."

And Abram did figure it out. "The New Yankee Workshop" recently concluded its 17th season. Abram also is one of the two original cast members still appearing on "This Old House," which recently celebrated its 25th season as a nationally aired show.

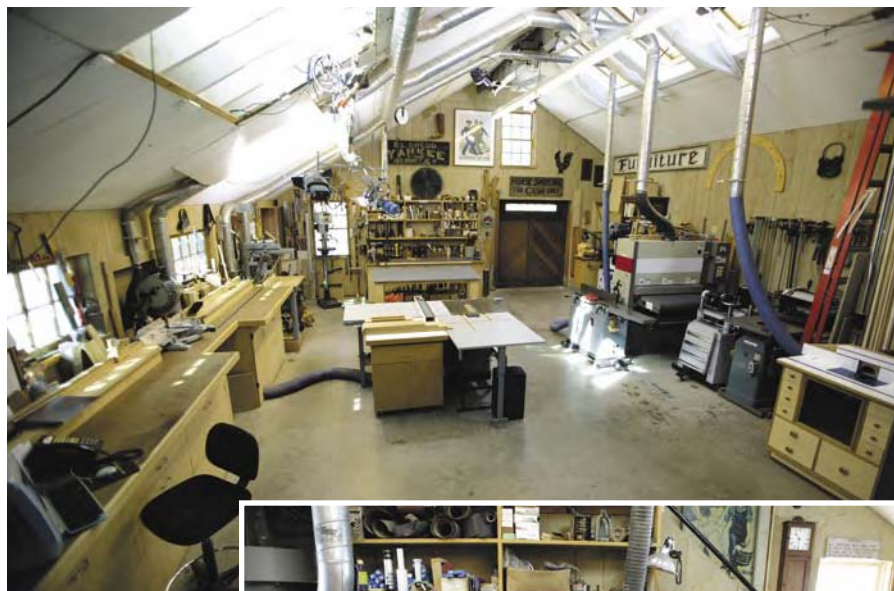
A Familiar Woodshop

Because of the show's success, TV viewers already are familiar with the layout of Abram's shop. But here are a few things you might not know: Most of the lumber is stored in an outside building. Finishing takes place in a separate room, which has a doorway leading to a room filled with gardening tools. This room used to be the utility shed for the show "The

Victory Garden." (The grounds surrounding the shop used to be the setting for the show.) The shop has an indoor staircase leading to a second floor, which is where Morash's office is located, as well as the bathroom.

Although Morash owns the building, it's

Abram's primary woodshop. While Abram has a small shop in the basement of his own home, he does all of his serious woodworking here. Retired machines and tools typically go to Morash's personal woodshop, which is located on his property in Nantucket, Mass.



The 36' x 26' saltbox-shaped shop doesn't look like a TV set except for a few camera lights hung from the ceiling. At right you can see the back wall of the shop. The stairs lead to Executive Producer and Director Russell Morash's office and a bathroom.



If you were to walk through the sliding barn door, this is what you would see to your left. Many of Abram's machines are on mobile bases so they can be easily tucked into a corner when not in use.

Many of the woodshop's fixtures that make the shop unique, such as the miter saw stand, the router station and the work hutch, are projects Abram has built for the show. (For a virtual tour of the workshop, visit newyankee.com and click the "Tour the Shop" link.)

7 New Yankee Workshop Myths

Despite the knowns, myths still run rampant. Yes, there's a Timesaver (a very wide wide-belt sander) in the shop that's probably worth more than my salary. There's also an excess of clamps and quite a few drills and routers. But much of the shop is actually quite Yankee-esque: Hand-me-down tools cover the shop's walls and old Maxwell House coffee cans (storage bins) abound. So instead of taking the time to describe placement of tools, I thought it prudent to instead dispel some of the more common myths.

1. The New Yankee Workshop is a professionally designed set for TV production.

There aren't hidden holes in the walls for camera lenses and there aren't missing walls. Several dusty lights hanging from the 16'-high ceiling are the only indication that a TV show is shot in the shop. Otherwise, the space feels and functions like a woodworking shop.

Shortly before the first show aired Abram

and Morash worked together to transform an existing building into the workshop. They designed the shop using a floor plan and a couple elevations drawn up on an 8½" x 11" piece of paper. While sitting on an airplane, they sketched out where they wanted the tools.

The saltbox-shaped shop is 36' x 26' (this doesn't include the finishing or lumber storage areas). One wall is only 8' high, hence the saltbox shape. The high ceiling (which has several skylights) is great for swinging long boards around, and for tucking away the lighting needed for the show. The shop's concrete floor features radiant heat.

However, the shop isn't perfect. Abram says it was a serious mistake to not put dust collection ducts in the floor. Another problem with the floor: It's concrete. After a long day of building, Abram says he longs for a softer wooden floor.

2. Abram only uses machines and tools the show's underwriters give to him.

Unless you're familiar with Delta Machinery (one of the show's several underwriters), you probably wouldn't know that Delta tools abound. In accordance with PBS guidelines, stickers are carefully placed over manufacturer names on all the tools and machines in order to create a generic shop.



This massive miter saw stand and storage center was a project on the show. Directly underneath the miter saw is a roll-around scrap bin.

Most of the tools and machines used on the show are gifts. However, Abram says he refuses to use a tool just because a certain manufacturer gave it to him, even if it makes the manufacturer mad.

"We don't use anything because it's given to us," Abram says. "We use what we use because they work. We're going to use the tools we think are best."

Abram is careful about discussing his favorite tools and machines because he works for a show on public television and doesn't want to be seen as endorsing a particular brand. However, long-time viewers all know which tools have become mainstays in the New Yankee Workshop (think: red clamps) because they're used in project after project.

3. Almost everything in The New Yankee Workshop is expensive and new.

The Timesaver aside, the tools in Abram's shop are the same tools seen in shops across the country. Yes, he owns more than one router (actually, there's a drawer full of them). But most woodworkers own at least two routers and most professional woodworkers own several for projects that require several setups.

Almost all of the tools are well-used and well-worn, and many of them are hand-me-downs: An old Disston hand saw hanging on the wall belonged to Morash's father.



Norm Abram's shop does have a decent collection of hand tools. Abram "hides" his chisels in this wall-mounted tool chest, which was a project on the show. Lately, he's become fond of Japanese hand saws. Also note his measuring and marking tools. Abram says these are the most important tools he owns.

As far as the Timesaver is concerned, OK, it's a bit much. But to Abram, it is what it's called – a time saver. Although Abram tries to keep his weekends free, he typically works 12½-hour days Monday through Friday. From early spring through late fall, a new episode of "The New Yankee Workshop" is shot every other week. Therefore, Abram typically has 1½ weeks to build each project, from start to finish. And on top of that, he builds each project twice. The first time he works out all the kinks, alone. The second time most of the process is filmed.

4. The New Yankee Workshop is virtually void of any hand tools.

The invention of the word "Normite" is just one example of how prominent the "power-tool-only" reputation has become. Abram says that many people believe that if they own the same number of power tools Abram uses on the show, then they could build the projects he builds, too. Abram says this belief isn't true – woodworking requires skill and much of that skill requires being able to cut a tenon with a hand saw just as easily as you would with a table saw – something Abram has proven he can do.

Several projects from the show have required hand work. Abram hand-cut dovetails when building the Federal-Style Game Table, for example. But Abram says two problems exist with incorporating hand tools into the show: Viewers of the show love power tools and there's not enough time.

Of course, this doesn't mean Abram isn't fond of hand tools – in fact, he's quite particular about them. For example, he keeps a collection of inexpensive chisels in bright yellow plastic trays propped up against a window in his shop. This isn't because they are his favorites. Rather, these are the ones he uses for quick-and-dirty chisel jobs. When working on a project that requires fine chisel work, he'll use his better ones, which he keeps safe in his hanging tool cabinet.

5. Abram has a crew of woodworkers building projects for the show.

Abram builds each and every project alone, start to finish. His first step when building a project is to find a piece of furniture he wants to build and record the furniture's dimensions in a notebook. This process is always filmed.

Abram also takes digital pictures of the piece, which helps him in his planning.

If the project is complex, Abram will create a couple sketches – using these sketches, his digital pictures and the recorded dimensions, he'll then get his necessary material. "I always have very little leftover," Abram says. "There's so much deep Yankee blood in me – I don't cut many extra pieces."

Abram does have one shop assistant, Wade Burcher. Burcher's main responsibilities are to keep the shop clean, the tools sharp and the machines well-tuned. Burcher, who has been with the show for a couple years, is himself a woodworker and has watched the show since he was a child. (He's also a whiz with "New Yankee" facts – Morash and Abram claim he knows more about the show than they do.)

6. Abram knows everything there is to know about woodworking.

Abram is quick to admit that there are several woodworking skills he has yet to master, including carving and marquetry. These two skills in particular are ones he'd like to learn, if he had the time. Finishing also is his weakness, he says.

7. Abram never makes a mistake.

"People always ask, 'Do you make mistakes?'" Abram says. "Yeah, I make mistakes." Morash says that viewers are always asking for

a bloopertape. However, the fact of the matter is, there isn't one. Because Abram builds each project twice, rarely does he make a mistake while building a project during a shoot.

But, Abram is human. Hanging on the wall in the shop is a piece of wood that Abram botched while building the Butler's Table. The show's staff made sure it was put on prominent display. "The beasts that we are, we feasted on this," Morash says. "It was an example of his fallibility. It was cruel, inhuman and we will pay for it in our next life."

Morash says part of the appeal of the show is that there is a certain satisfaction in seeing Abram building something without making a mistake. "It's beautiful workmanship going together to form something wonderful," Morash says. "There's a calming influence to watching someone do something well."

A Woodshop That Lives Forever

Much of woodworking is a practice in patience, and for years viewers have appreciated Abram's studied approach to the craft. Abram says patience is a trait he inherited from his father, a man who didn't believe in shortcuts. Patience is what allows Abram to approach new tasks in a methodical manner, allowing him to understand a new technique or tool after experiencing it just once.

Morash laughs as he describes a typical scene in the shop whenever a new machine arrives: He and Burcher are tearing the box apart, ready to put it together, while Abram is quietly standing in the corner, reading the machine's instruction manual.

While Abram isn't planning on quitting the show anytime soon, he also doesn't plan on hosting the show forever. "Everything has to have an end point," Abram says, adding that this show's end point will be when he stops having fun. "I'll be 56 this year," he says. "By 60, I want to be in charge of my own life."

Morash recognizes that the show must have an end point, too. He says he fantasizes Abram's shop someday being on display at The Smithsonian National Museum of American History, similar to the museum's exhibit of Julia Child's kitchen (Morash produced several of her shows). And while the display most likely will include all the glitter of a Timesaver, if it's true to the show, there will also be some coffee cans, Abram's well-worn leather tool-belt, and some sawdust on the floor, too. **PW**



Everything in Norm Abram's shop isn't brand new. Here you can see some well-worn tools stored in an old coffee can, Yankee style.

Norm Abram's ADIRONDACK CHAIR

Editor Steve Shanesy builds
an improved Adirondack chair with
Norm Abram in The New Yankee
Workshop. Build the chair and
learn how Abram works.

I've become keenly aware throughout the years that patience allows time for opportunities to come along that might never have been possible. Such is the case with this Adirondack chair built in The New Yankee Workshop with Norm Abram.

Although projects similar to this one are rather common fare for most woodworking magazines, *Popular Woodworking* hasn't offered one to readers for more than 10 years. The project has been discussed, of course, but for one reason or another, it never happened. Then one day the phone rings and a representative of "The New Yankee Workshop" asks if we'd like to work with Abram to build the most popular project ever shown on the show.

Abram would build a chair and give it away as a promotion for the show and I'd build a duplicate as a

project for the *Popular Woodworking* readers. Perfect!

OK, some of you are certainly wondering, "What is it like working with Abram right there in The New Yankee Workshop?" So let's get that part out of way. The most surprising thing was just how "Norm-al" it was, if you'll pardon the pun.

When you pare away all the myths and misinforma-

tion, Abram is just a very likable, easy-going, hard-working, down-to-earth woodworker in a reasonably well-equipped, but not extravagantly so, woodshop. He was very much at home there. And it's not a TV studio set with woodworking equipment, but a real woodshop. How fancy? I've seen far more extravagant shops belonging to home woodworkers than this one.

Working with Abram was fun, to be sure. But I spent years working in commercial shops building hundreds of projects while working with others. And while Abram is a celebrity, his pleasant personality and easygoing manner made me feel right at home, too. (To learn more about Abram and his shop see our Great Woodshops column on page 34.)

An Improved Adirondack Design

Now back to the project at hand: After getting acquainted at The New Yankee Workshop, Abram and I first inspected the original Adirondack he built, one based largely on a design his father had used years ago. It had weathered well and withstood the elements for more than a decade in continuous outdoor duty. He explained it was made from cypress, an excellent choice for outdoor projects,

by Steve Shanesy with Norm Abram

Comments or questions? Contact Steve at 513-531-2690 ext. 1238
or steve.shanesy@fwpubs.com.



Photos by Al Parrish

and he had laid in a supply for our new chairs.

We next reviewed the chair plans, one of those famous “measured draw-ings” Abram offers viewers at the conclusion of each show. This copy had some notes about minor modifications Abram intended as improvements. The last thing we did before cutting wood was review several templates he made for the original chair and saved throughout the years. We used these patterns for the curved parts. Drawings for these are included as part of the project plans presented here.

If you begin the project by preparing the patterns and stock to the rough sizes the building will move along pretty quickly. We completed our chairs in less than a day while working at a steady, but moderately easy, pace.

Starting at the Bottom

Essentially, this chair is built from the ground up so the first pieces required are the two side members that slope back from the front, vertical legs. Use the pattern to trace their shape on the stock, then cut them out using the band saw. Abram suggested we nail the two sides together at the ends in the waste material and stack cut them both to save some time. Then we drum-sanded the sawn edges to smooth the surface.

Next use a gauge block and a miter saw or table saw so you can repeat the same length cut exactly for the lower rear crosspiece, the front crosspiece and the seat slats. Use the pattern that provides the curved shape of the lower rear crosspiece. (Abram’s frugal, Yankee blood became evident when he pointed out that by using slightly wider stock than necessary for this part, the waste piece makes the perfect matched curve needed



Cut both chair side pieces at the same time by nailing them together in a waste section of wood. Band saw to the template line then sand the edges smooth.

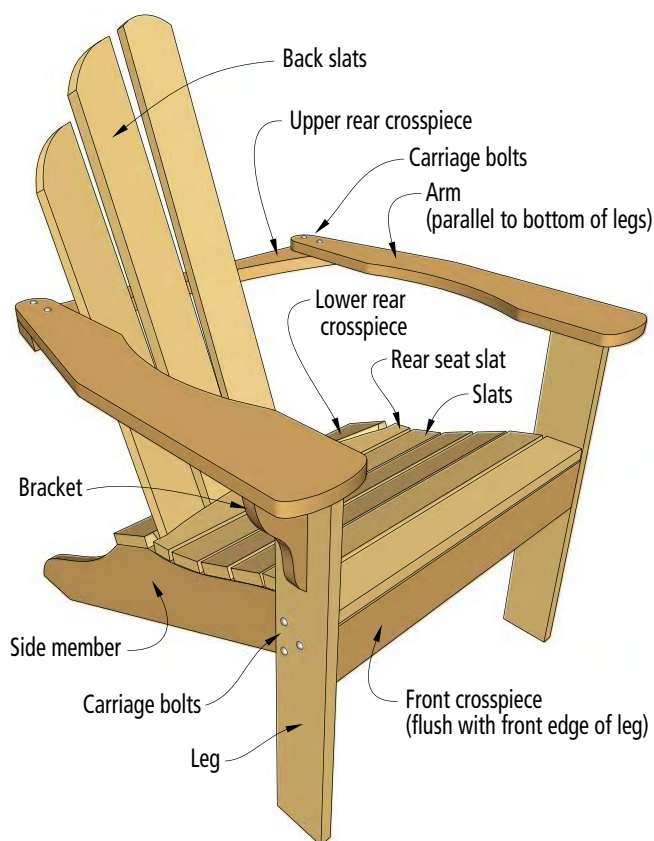
for the rear seat slat.) After band sawing, sand the edges smooth and be sure to set the waste piece aside for later use.

A Little Assembly Work

The first assembly chore is joining the two sides with the front and lower rear crosspieces. The crosspieces overlap the sides and care should be taken that the ends are flush to the outside edges of the sides. This will help keep your chair square as you build.

The chair parts are assembled using mostly screws, or in a few

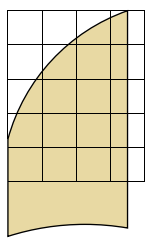
instances, carriage bolts, nuts and washers. We used stainless steel fasteners knowing they’d stand up to the rigors of life outdoors. These are more expensive than coated or plated fasteners, but in the end are a far better value. Screw lengths are 1⁵/₈” except where noted. We also used outdoor adhesives. Abram used 3M brand Marine Adhesive Sealant 5200. Because my chair would be shipped to the *Popular Woodworking* shop in Ohio, I just screwed my parts together so it could be disassembled and more easily shipped.



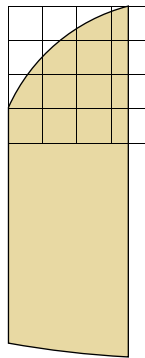
NORM ABRAM’S ADIRONDACK CHAIR

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
2	Side members	3/4	5 1/2	34 3/4	Cypress	
1	Lower rear crosspiece	3/4	5 1/2	22	Cypress	Use waste for rear seat slat
1	Front crosspiece	3/4	3 1/2	22	Cypress	
2	Front legs	3/4	3 1/2	23 1/4	Cypress	
2	Arm brackets	3/4	3	6 5/8	Cypress	
2	Arms	3/4	5	27 9/16	Cypress	
1	Upper rear crosspiece	3/4	4 5/16	26 1/4	Cypress	
1	Center back slat	3/4	3 1/2	30 3/4	Cypress	
2	Intermediate back slats	3/4	3 1/2	29 5/8	Cypress	
2	Outer back slats	3/4	3 1/2	25 1/4	Cypress	
5	Seat slats	3/4	2 1/2	22	Cypress	

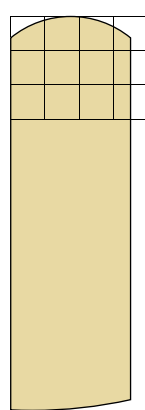
1 square = 1"



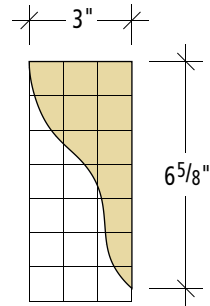
Outer back slat



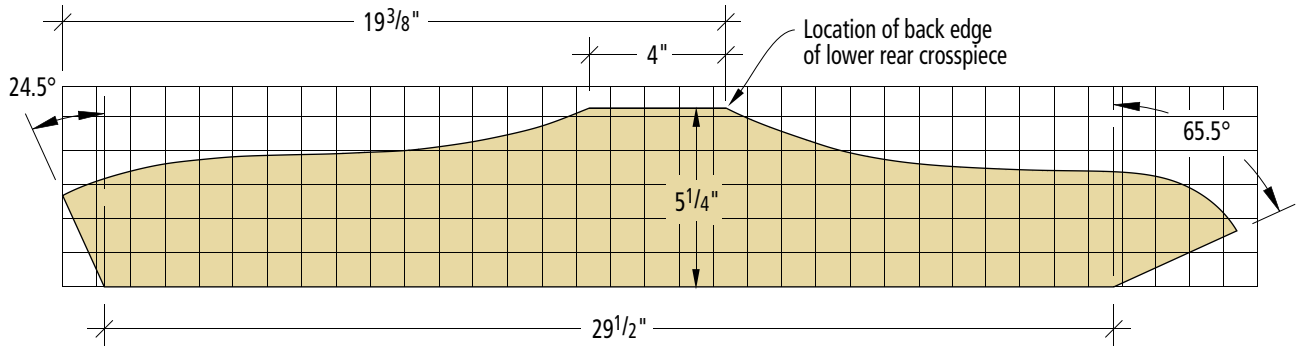
Intermediate back slat



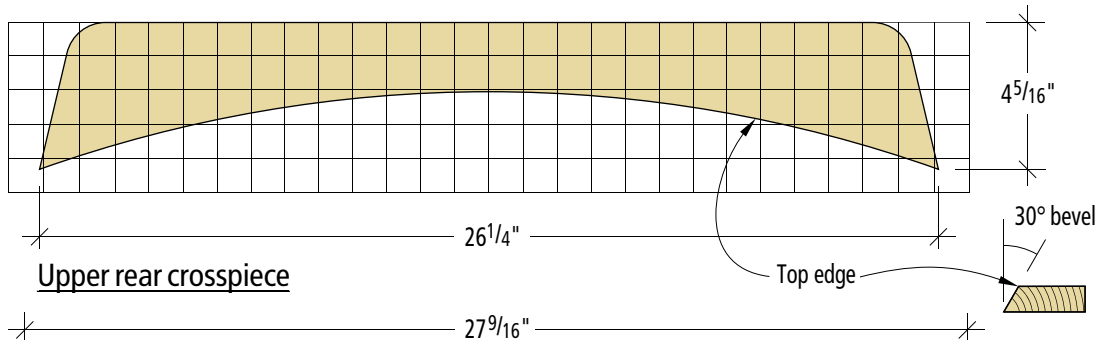
Center back slat



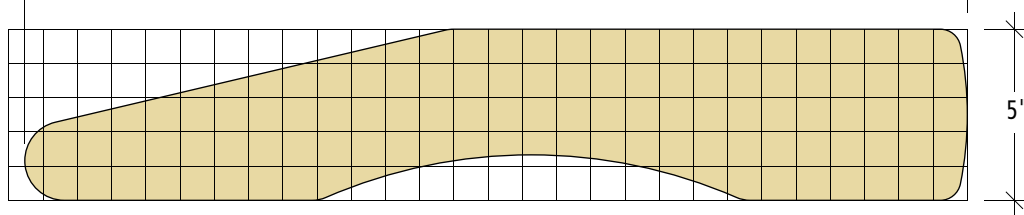
Arm bracket



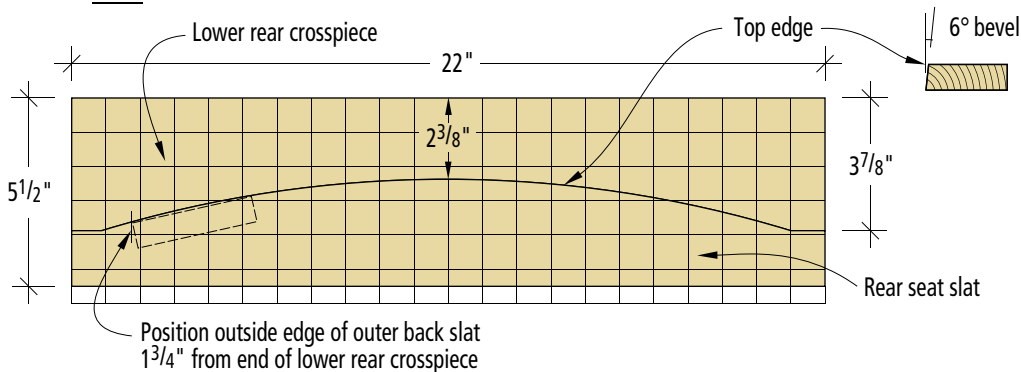
Side member



Upper rear crosspiece



Arm



Lower rear crosspiece & rear seat slat

Start the assembly by gluing and screwing the lower rear crosspiece to the chair sides. For lasting results, use a marine grade or waterproof glue, and stainless steel screws.



Later, back home, I re-assembled my chair using Titebond III because I couldn't find the product Abram used. In the Midwest, I guess we just don't have so much need for marine-grade adhesives as they do nearer the coasts.

All screw holes should be pre-drilled for a couple reasons; to prevent splitting by drilling a pilot hole and to countersink sufficiently to accept a wood plug later. The plug not only helps the appearance of the chair, but will also add to the chair's durability. We used a bit that drilled the hole and counterbored for the plug in the same operation.

Set up the two sides on the bench and first attach the lower rear crosspiece. When that's in place, turn the work over and fasten the front crosspiece. Use a

pair of screws for each connection placing them about $\frac{3}{4}$ " from the edges of the board.

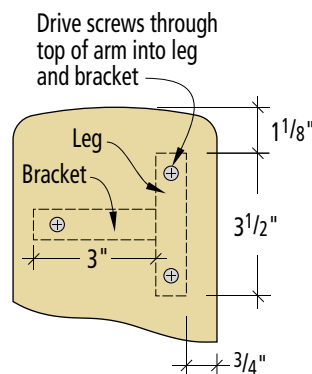
Next the two front legs are attached using three, $\frac{1}{4}$ " by 2"-long carriage bolts. Clamp the legs in position before drilling. The correct position is $11\frac{3}{4}$ " from the bottom of the leg to the bottom of the front crosspiece.

When locating the bolt holes, arrange them in a triangle as shown in the diagram below. Following the diagram carefully prevented me from placing a hole where a screw for the front crosspiece might be located.

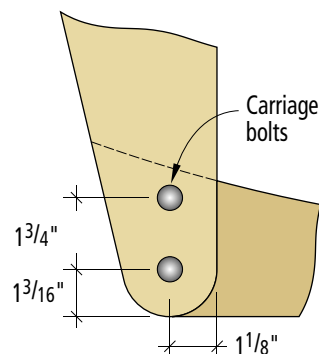
Attach the legs with the carriage bolts, heads to the outside. When tightening the nuts, prevent the head from turning by first seating the bolt head with a hammer blow, engaging the square corners underneath the head in the wood.



Drill $\frac{1}{4}$ " holes through the side members and front leg to accept stainless steel carriage bolts. Use a clamp to hold the parts in position; the leg should be flush to the side's front edge and $11\frac{3}{4}$ " up from the leg bottom to the bottom edge of the front crosspiece.



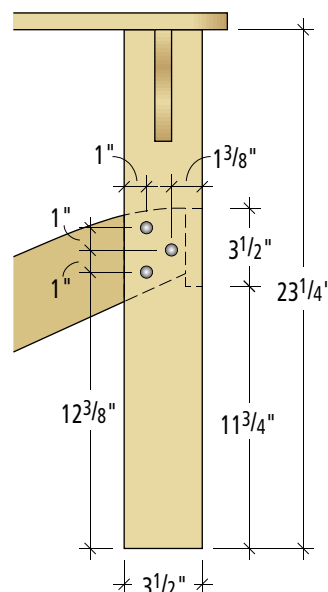
Arm installation over leg & bracket



Arm installation over rear crosspiece

Arm and Arm Supports

The next parts to prepare and attach are the arms and arm brackets. Each requires use of a pattern and should be cut on



Centers for leg bolt holes

the band saw. Sand the edges as before. Additionally, the top edges of the arms should be eased using a $\frac{3}{8}$ " roundover bit in a router. We routed only one edge, which designates it a top. So doing will create

a right and left arm so choose your edges accordingly.

We attached the arm brackets first. The top, or wide part of the bracket, is positioned flush with the top of the leg and centered on

the leg's width. Clamp each one in place then drill and countersink for the upper screw in each bracket. Repeat for the lower screw but use a shorter, $1\frac{1}{4}$ " screw.

With the arm brackets in place,

attach the arms to the front legs and bracket. Use the diagram at left to position the arm correctly before fastening. Again, be sure and use adhesive on each step of assembly as you proceed.



Bolt the legs and side members together, bolt head to the outside with a nut and flat washer inside. Seat the square shank below the head with a hammer blow. The shank will prevent the bolt from turning in the hole.

Building the Back

Now prepare the upper rear crosspiece. Prepare the part by using the pattern provided on page 41 for the inside curve. Note the inside cut is not only curved, but is cut at a 30° angle as well. Tilt the band saw table appropriately then saw the curve. Then return the band saw table to 0° , or square, and cut the ends. Sand the edges.

The upper rear crosspiece is attached below the chair arms. Use clamps to hold the piece in place as you position it correctly, that is, with a $20\frac{1}{2}$ " distance between the inside edges at the backs of the arms. That might leave up to a $\frac{1}{4}$ " overhang of the arms at the outside edge. There should be sufficient space to secure the arms and crosspiece with two carriage bolts at each end. Use a spring clamp to hold the parts in



Position and clamp the arm bracket then drill and countersink for two screws. The top edge of the support should be flush with the top of the leg and centered in the width dimension of the leg.



Use three screws to attach the arm to the leg and arm bracket. Carefully position the arm for a $\frac{3}{4}$ " overhang of the leg. Use a spacer to help position it. The arm overhangs the front edge of the leg $1\frac{1}{8}$ ".



Cut the upper rear crosspiece's inside curved edge at a 30° angle. Then return the band saw table to 0°, or square, and cut the round ends.



Hold the upper back crosspiece in place with clamps so that the arms are 20½" apart, then drill each side for two carriage bolts.

place while drilling the ¼" holes for the bolts. When done, install the four bolts.

At this point, your Adirondack chair should begin to take shape. Aside from plugging the screw holes, only installation of the back and seat slats remain before the job is done.

Back Slats and Seat Slats

The back slats are the first slats to make. Prepare the back slats by using the patterns for the top edges as shown in the diagram on page 41, then band saw the shapes. Both back and seat slats should have their top edges rounded over using a ¼" roundover bit in a router mounted in a router table. Fan out the back pieces in their proper order to make sure you rout the correct edges.

Now install the back slats. To get the right look, proper spacing of the slats is important. Start with the center slat, placing it dead center in the back. I used four screws for each back slat, inserting one in the bottom, then made sure the top was positioned properly, then I secured it with three more. Be careful drilling the screw holes and countersink for the upper crosspiece as these must be done on an angle, drilling straight into

the crosspiece, but at an angle to the back slat.

Next, install the outer back slats. Position the bottom of the slat 1" from the inside of the side piece. Secure it, then position the upper portion so that it touches the inside edge of the arm. Fasten it. Once both outside pieces are in place, the remaining two intermediate slats are merely positioned with equal spaces between their adjoining slats.

Now it's time to install the seat slats. Start at the front with the front edge overhanging the front crosspiece by about ¼". Put one screw in each end and use two screws equally spaced attaching it to the front crosspiece.

Continue to add seat slats allowing ¼" spacing between them and fasten each slat with one screw at each end. The final seat slat is the one with the curve, which nests into the curve of the back. Leave space between this slat and the back so water can easily run off.

Finishing Touches

Before finishing up the chair, give in to the temptation to try it out! It's a surprisingly comfortable chair, definitely not the seat to offer a difficult mother-in-law.

Before a final sanding, I grabbed some fall-off cypress and cut about 60 plugs for filling the holes left from countersinking the screws. I used a narrow chisel to pop the plugs loose from the board. I glued the plugs in the holes, leaving them proud. A flexible, fine-tooth saw easily removed the excess plug material.

When all the plugs were glued in and trimmed, I gave my chair

a good sanding (#150 grit). The relatively soft cypress sands easily. While sanding, I made sure any sharp edges were eased.

I decided to leave the cypress unfinished and allow the elements to eventually turn the light brown natural color to a silver gray. I figure by the time that happens, the color will complement what I expect my hair color to be in another 10 years. **PW**



Start installing the back slats with the center slat first, then the outer slats. The last two intermediate slats are then easily positioned with equal spacing between their neighbors.

WOODWORKING ESSENTIALS

BY NICK ENGLER

CHAPTER

7

Advanced Techniques

In this chapter I'll be sharing some advanced techniques you can use on your table saw to do some amazing things. How about cutting coves for crown moulding? That's just one application for a coved shape, and with a couple of simple jigs you can match any size cove you want.

And how do you get an odd-shaped piece of wood such as a tree slab into shape to move on to the next wood-working step? A couple of tricks with a sled make this advanced technique easy.

Pattern sawing is another trick I'll discuss. If you have a project that requires multiple multi-sided shapes, this technique will save you time.

And finally, my favorite: How to bend a straight board into a curved board without steam bending. I'll show you how to do it all with a technique called kerf cutting.

Once you try these advanced table saw techniques, there's no end to the ways you'll be able to put them to work in your woodworking projects.

Cutting Coves

The concept of cove cutting on a table saw might sound strange. You're essentially using the side of the blade's teeth to make a dishing cut along the length of a board. While this isn't an operation most saw or blade manufacturers would suggest, it isn't bad for the blade or the saw as long as the cut is taken slowly and in small increments. And it's also plenty safe as long as you use the correct jigs and techniques.

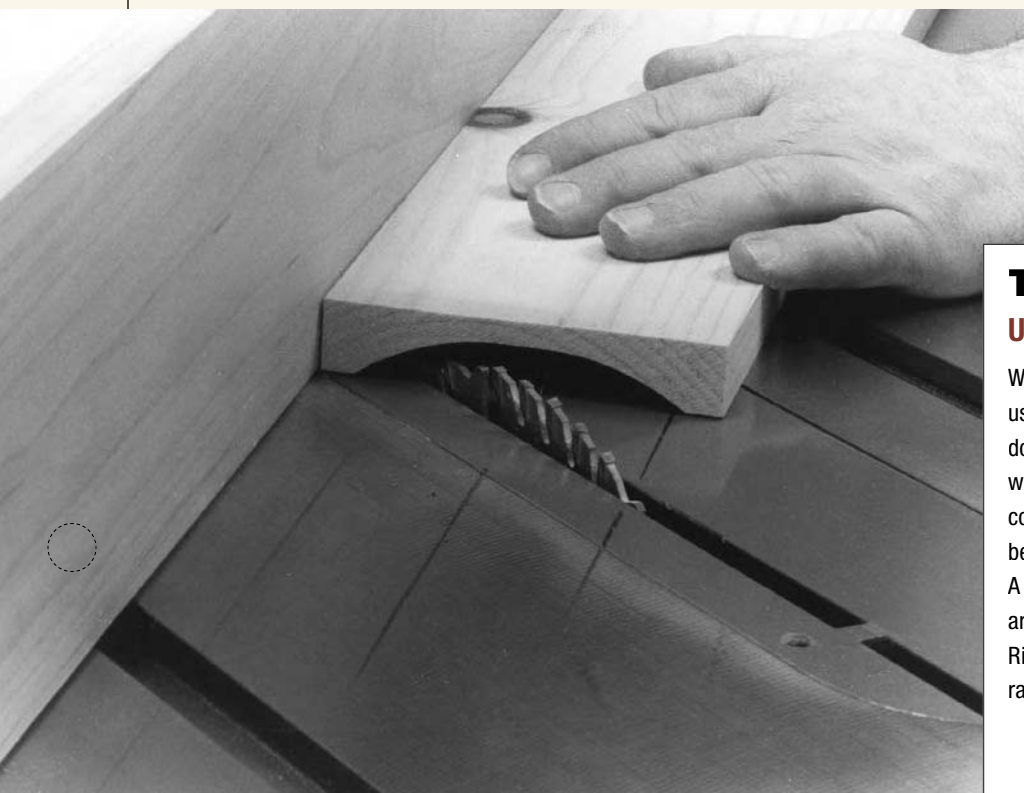
The depth of the cove is determined by the height of the blade above the table. The width of the cove is determined by the angle of the board to the saw. This is where it gets a little tricky. To determine the coving angle, some woodworkers use a trial-and-error method until they get what they want.

Photos by the author

TOOL TIP:

Using The Right Blade

When cove cutting on the table saw it's helpful to use a blade with the proper tooth configuration. I don't say necessary, because you can make this cut with any type of blade. But it's more helpful to use a combination or ripping blade than a crosscut blade because the inside of the cove will be easier to sand. A crosscut blade uses an alternate, top-bevel tooth arrangement that will leave score marks on the cove. Ripping and combination blades add a flat-topped raker tooth, leaving a cleaner surface on the cove.

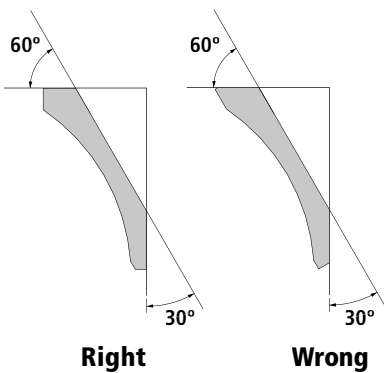


TIPS & TRICKS

TRIM TIP:

Sprung Mouldings

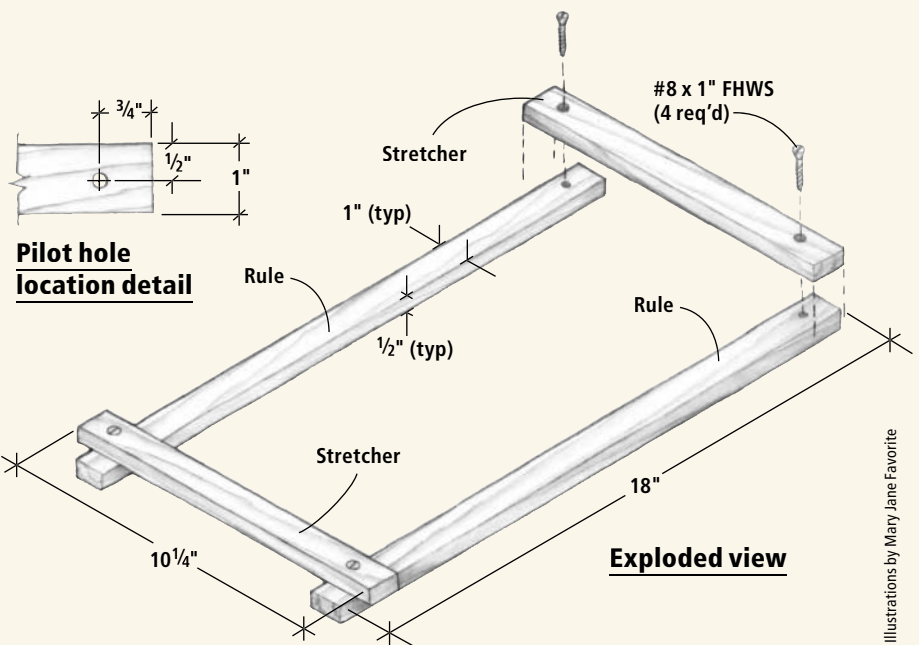
One of the most common usages for cove cuts is in making crown moulding. This type of moulding is referred to as a sprung moulding because it will lean out from the surface to which it's attached. The two mounting faces of a sprung moulding can be cut at any angle, but the two angles must add up to 90°. To complete the moulding you need to double-bevel the edges of the moulding stock on the table saw. If you cut only one bevel (shown at right) the remaining faces will look odd. The example (below left) has been double bevel cut and now looks like a proper crown.



TRIM TIP:

Mixing Covs

By combining covs made on your saw and other profiles using a moulding cutterhead you can create complicated mouldings for dozens of projects.



Parallel Rule Jig

A parallel rule consists of four pieces of wood – two rules and two stretchers. Join them at the ends with screws, making a parallelogram. All the screw holes must be centered between the edge of the rules and stretchers, and they should be precisely the same distance from the ends of the boards. Tighten the screws until they're snug, but not so tight that the parts won't pivot easily.

I prefer something a little more precise, so I use what is known as a parallel rule jig. You can make one for yourself very simply by following the illustrations and instructions above.

Once your jig is made, raise or lower the blade to the desired depth of the cove. Next, adjust the parallel rule to the width of the cove by widening or collapsing the rules. Then place the parallel rule on the saw table so the rule straddles the blade, front and back.

Turn the rules at various angles to the blade while slowly spinning the blade by hand. Find the position where the teeth of the saw blade brushes both rules. Holding the parallel rule in that position, draw two pencil lines across the

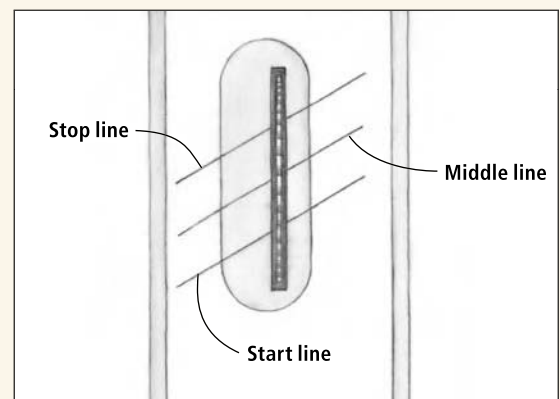
saw table that trace the inside edge of each rule. The angle formed by the saw blade and either one of these lines is the coving angle.

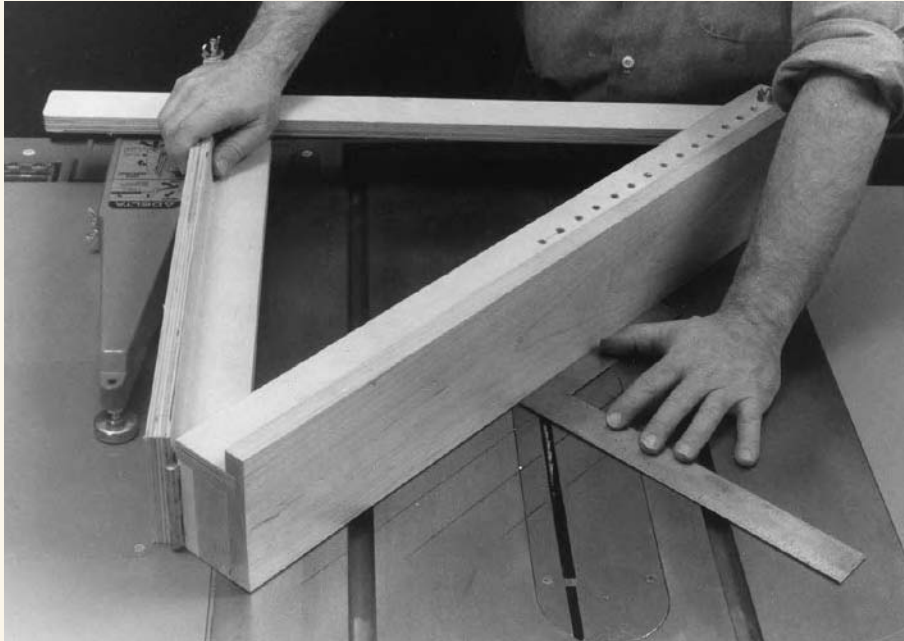
The next step is to determine the distance from the lines (and the blade) to position your guide on the saw. The illustration below will help you find this information.

To guide your cut, you can simply clamp a straightedge to the saw table or you can use a coving fence positioned at the proper angle and distance from the blade, as shown above right. Conveniently, I've included plans for a simple coving fence at the end of this chapter.

You now have all the information and parts to cut your cove. The photo above

Measure the distance between the two lines made with the parallel rule, then draw a third line halfway between and parallel to them. This marks the precise middle of the cove cut. Use all three marks as references to determine both the angle and the position of the coving fence on the saw table. For example, if you want to cut a cove down the middle of a 5"-wide board, the fence must be parallel to and 2 1/2" away from the middle reference line.





Fasten the coving fence to the rip fence and adjust the angle parallel to the three reference lines. Then move the rip fence sideways until it's the proper distance away from the lines. When the fence is positioned, turn on the saw and raise the blade.

shows the steps to set up your fence on the saw. Remember to place the fence or straightedge on the infeed side of the blade. The rotation of the blade helps hold the stock against the fence.

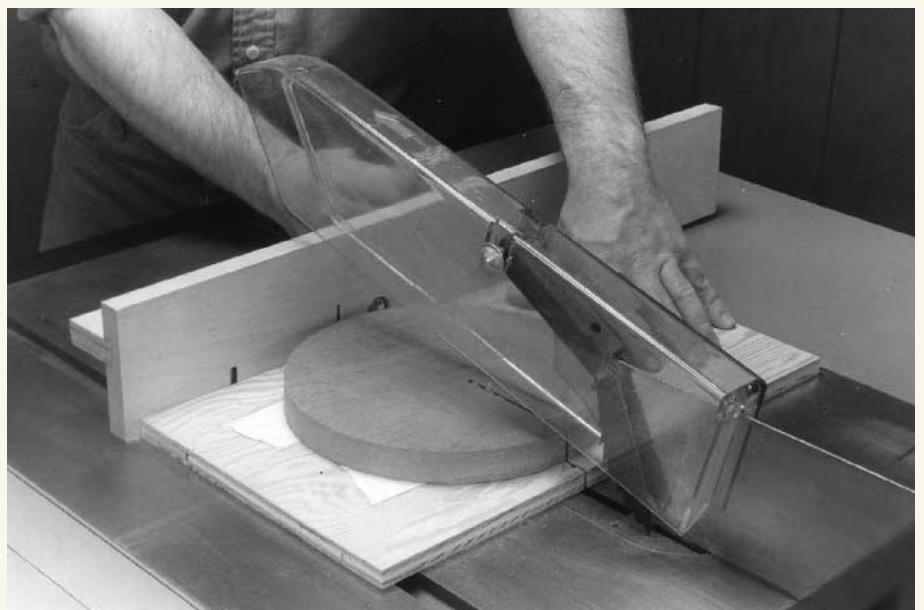
Adjust the saw blade so it projects no more than $\frac{1}{16}$ " above the saw table. Turn on the saw and place the workpiece against the fence. Slowly feed the workpiece from the infeed side of the saw and against the direction of rotation. After completing the first pass, raise the saw blade another $\frac{1}{16}$ " and make a second pass. Repeat until you have cut the cove to the desired depth and width. On the last pass, feed the wood very slowly – this will make the surface of the cove as smooth as possible and reduce the amount of sanding needed.

Cutting Odd-shaped Boards

Occasionally, you will need to rip or crosscut a board that doesn't have an edge straight or square enough to hold against the rip fence or miter gauge. Sometimes the board is crooked or warped, other times it's cut or shaped to a particular pattern or contour. The best solution would be to straighten one edge before you cut, but there are times when you can't do this for whatever reason.

To safely cut an odd-shaped board, mount it on a holder that has at least one good guiding edge. This holder doesn't need to be a complex affair; a scrap of plywood with several straight edges makes an excellent holder. Nail the workpiece to the plywood or secure it with double-faced carpet tape. Place the holder against the rip fence or miter gauge, and feed both the holder and the workpiece past the blade (shown below).

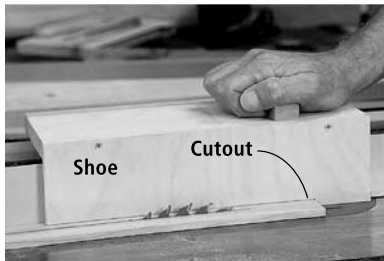
To cut an odd-shaped piece that has no guiding edge, secure it to a rectangular scrap of plywood with nails or double-faced tape. Place one straight edge of the plywood against the rip fence or miter gauge, then guide the piece over the blade, cutting both the plywood and the piece.



TIPS & TRICKS

PRO TIP:

Small Material Safety



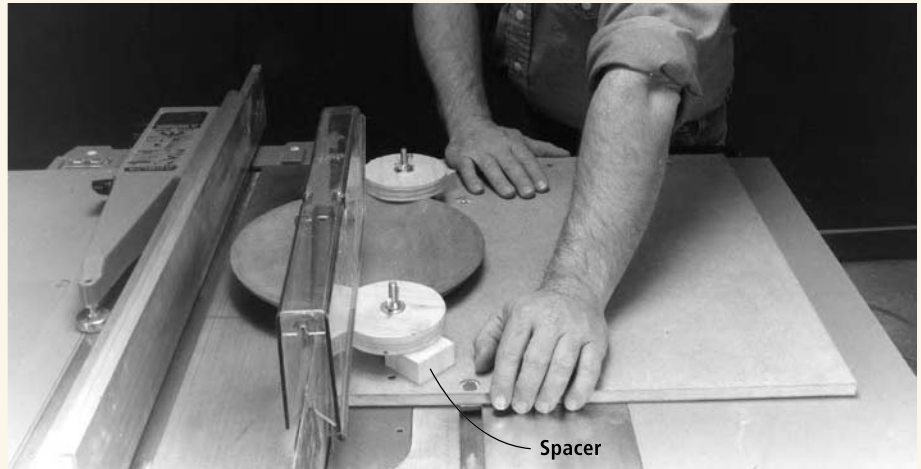
Cutting and machining small parts can be one of the biggest challenges a woodworker faces. Beading, mullions, muntins and small mouldings are difficult to make accurately and safely. Small pieces can bend and twist when meeting a saw blade. The usual methods of controlling stock can make it hard to move the parts and add unnecessary labor.

The advice of milling large pieces and cutting the small parts from them sounds sensible, but isn't always practical, and it's rarely efficient. You still reach a point where you're working with small pieces in close proximity to a saw blade.

Here's one method I've found to keep control of small pieces on the table saw while keeping my hands at a safe distance from the blade. Plus, it virtually eliminates the chance of kickback.

When ripping small stock on the table saw, a zero-clearance insert is a must. The other essential is a push block (shown above) that rides along the table saw fence. The top of the push block is the same width as the rip fence, and the two vertical pieces keep it securely held in a straight line.

On the blade side, the actual shoe is held on with a couple of screws, so it can be easily replaced when it gets worn, or replaced for holding different size material. The cutout in the shoe should be close to the thickness of the wood to be ripped, so that the push block doesn't tilt during use. A small piece of scrap on top serves as a handle, keeping my hand well out of harm's way.



Whether cutting a straight edge on a round object, or adding a straight groove in the center of an oval piece (as shown here) this sliding table holds the odd-shaped piece in place and references off the miter slot to ensure a straight cut.

You also can use a sliding table to hold the piece as shown above. The table itself is simply a piece of medium-density fiberboard or plywood with a runner attached that is sized to fit in your miter-gauge slot. Secure the piece to the jig using the built-in, disc-shaped clamps, letting a portion overhang the sliding table's edge.

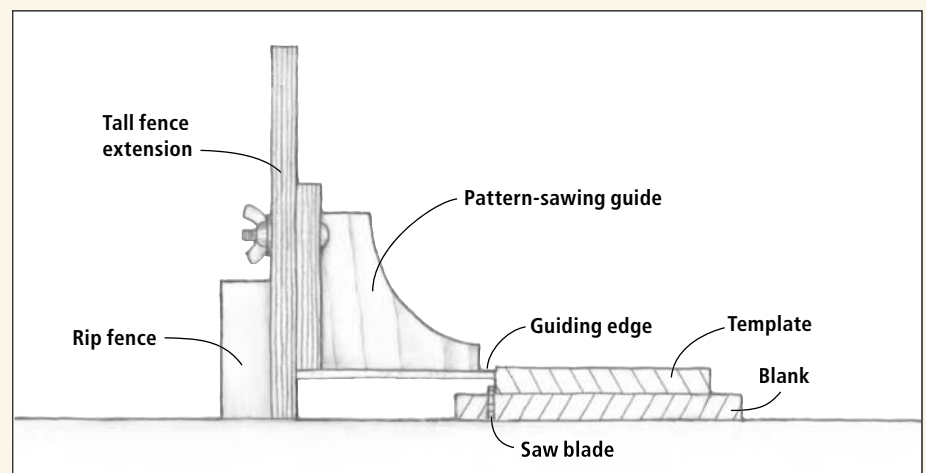
Don't let the disc-shaped clamps tilt or tip when you tighten them. If they do, they will put sideways pressure on the workpiece and it may shift as you cut. To prevent this, place a spacer under the clamp, opposite the workpiece, to keep the clamp level. When the workpiece

is secured, fit the jig in the miter-gauge slot and slide both the jig and workpiece forward past the saw blade.

This same sled and clamp configuration can help you work with rough-cut log sections, not just flat materials. Simply use longer bolts for the clamps and you can cut up to a 3"-thick chunk of wood. You're only held by the maximum depth of cut of your blade.

Pattern Sawing

Many woodworking projects require that you make duplicate copies of certain parts. This is easy enough when the parts are rectangular – simply rip the stock to



Position the pattern-sawing guide so the outside edge is parallel to the saw-blade plate and flush with the outside edges of the saw teeth. The guiding edge of the jig must be high enough above the saw so that it will contact the edge of the template, but not the blank.

the same width, then cut the parts to the same length. But what if the parts are cut to a triangle, pentagon or some other odd shape? As long as all the sides of that shape are straight, you can reproduce precise copies by pattern sawing.

To saw a pattern, first cut a single part to the shape you want. This will serve as the template for all of your duplicate parts. Then cut rectangular blanks for the duplicates, making each blank slightly larger than necessary.

Adjust the height of the saw blade to cut through the thickness of a blank. Mount a tall fence extension to the rip fence and attach a pattern-sawing guide to the extension. I've included plans at right for making a pattern-sawing guide that will work on nearly any table saw.

Align the outside edge of the guide (farthest from the rip fence) with the outside edges of the saw teeth. Then adjust the height of the guide so the bottom surface is $\frac{1}{4}$ " to $\frac{1}{2}$ " above the blade.

Fasten the template to a blank with nails, screws or double-faced carpet tape. Holding the edges of the template against the guiding edge of the jig, saw each side. Repeat for each blank until you've made all the parts you need.

It's also possible to cut a curve on the table saw – up to a $\frac{3}{4}$ " arc per foot when cut in $\frac{3}{4}$ " stock. Stock thicker than $\frac{3}{4}$ " isn't recommended as it's pushing the limits of the blade.

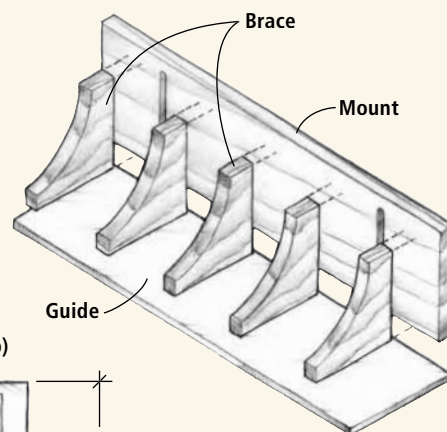
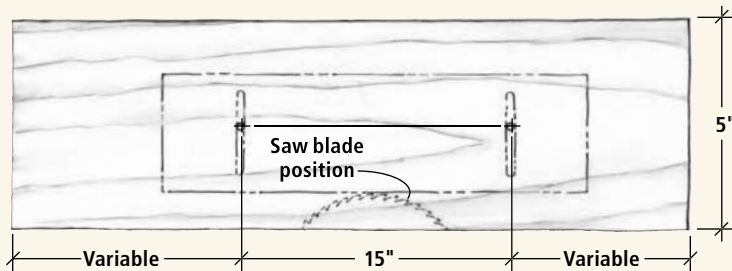
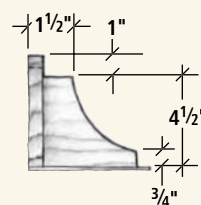
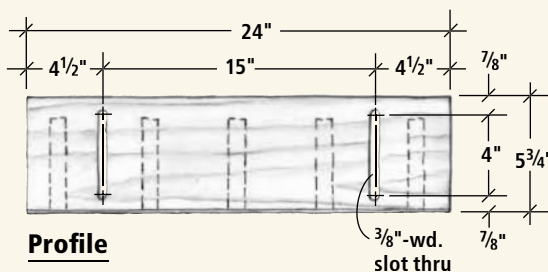
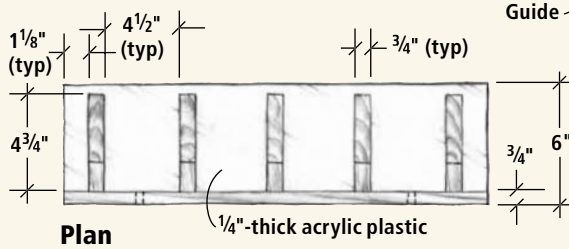
You use the same pattern-sawing guide as used with straight cuts. By keeping the curves shallow, the kerf can't bind on the blade because the offset of the teeth keeps the concave side of the kerf away from the blade body.

As with the straight cuts, start with a template affixed to the duplicate piece. If the offcuts will be too large to fit between the blade and the rip fence, trim the offcuts before cutting.

Attach the template to a blank and rest it in front of the saw blade on the infeed side. Butt one of the template edges against the guiding edge of the jig. Turn the saw on and push the template forward, cutting one edge of the blank. Turn the template and cut another edge, repeating until the pattern is cut.

Pattern-sawing Guide

The mount and the braces are made from hardwood, but the guide is made from clear acrylic plastic. This lets you see the saw blade and monitor the saw cuts as you make them. Cut the parts to size and rout the slots in the mount. Fasten the braces to the mount with glue and screws, then attach the guide with screws. Drill mounting holes in the tall fence extension and bolt the jig to the extension.



TIPS & TRICKS

PRO TIP:

Extra Bending Flexibility

While the whole idea of kerf bending is avoiding steam, a little hot water can help. If the wood is hard to bend or breaks when you bend it, soak a towel in boiling water. Then wrap the kerfed portion of the board in the towel and let it sit for 10 to 15 minutes. Unwrap the towel and bend the wood immediately, before it has a chance to cool.

PRO TIP:

3D Bending

Straight kerfs will give you a nice curved piece of wood. But what if you want to play a little and twist a piece of wood? Kerf bending still works, except rather than cutting kerfs perpendicular to the wood, you're going to cut them on a diagonal.

There's probably math out there to find exactly the correct angle to set your miter gauge, but happily, it's not necessary. Start with a 30° setting, using fairly tight kerf spacing, about 1/4" between each kerf. When you've made your cuts you can carefully twist the spiral to test the flex. The math isn't necessary because you can usually bend the spiral more or less to match your required shape. If you do need a tighter spiral, reset the miter to 45°.



Remember, shallow curves are OK, but if you feel any resistance during the cut, stop the saw and find another way to cut your curves.

Kerf Bending

Most often when you think of bending wood, pictures of steam bending and lots of clamps come to mind. Steam bending is a good way to bend smaller thicknesses of wood. But when you need to bend a 6"-wide apron for a demilune table there's a better way than steam bending – it's called kerf bending.

You can bend a board of any thickness and width if you first cut several kerfs in one side – usually the side you won't see on the assembled project. These kerfs must not sever the board, but should leave about 1/16" to 1/8" of stock at the bottom of each cut.

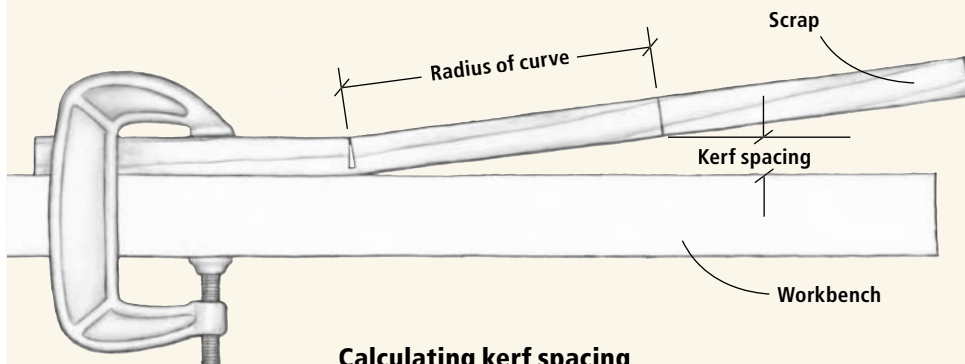
The depth of the cut and the thickness of the stock at the bottom of the kerf will depend on the species of wood – some must be cut thinner than others to bend easily. Experiment with scraps until you can make a smooth, even bend without cracks or splinters. Even if you cut deeply without cracking or splintering, you need to be cautious of leaving "flats" showing on the curved surface.

Kerf bending isn't only for solid wood. In fact it may even be a more common practice with plywood. This makes lots of sense. With the cross-grain orientation of the layers in the ply, you can get great strength from two thin layers when you kerf-cut the rest of the layers.

The radius of the curve you want to bend determines the spacing of the kerfs – the tighter the radius, the closer the kerfs. To get a smooth, even bend, the kerfs must be evenly spaced. Gauge the spacing of each kerf by driving a small nail into the face of the miter gauge extension and using it as a stop. (See photo at right.)

If you happen to need a curved piece that will be visible from both sides, kerf cutting still works. After kerfing one side, a form is used to bend the piece to the required shape. Then a layer of thin material (usually 1/8" thick) of the same species is glued to the kerfed side and clamped in place.

This is also a valuable technique if you are trying to achieve a free-form curved piece, rather than attaching the piece to a frame. The glued "veneer" will serve as a form to hold the planned shape. This is great for making glass-topped tables and even bookcases.



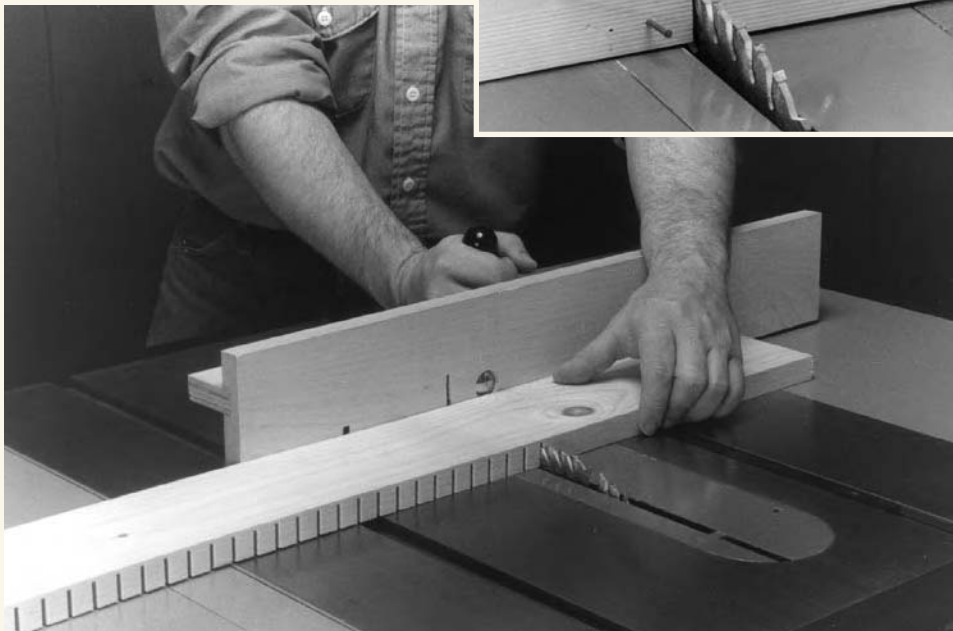
Calculating kerf spacing

To determine the proper spacing between the kerfs, cut a single kerf in a long scrap board of the same thickness and species as the wood you want to bend. Fasten the board to a workbench, placing the clamps to one side of the kerf. Measure along the board out from the kerf and away from the clamps, and mark a distance equal to the radius of the bend you want to make. Lift the free end of the board until the kerf closes. Measure the distance from the board to the workbench at the radius mark – this will give you the spacing. In practice, I've found it best to space the kerfs a little closer than necessary, so the kerfs don't quite close when you bend the wood. Also, I never space the kerfs any farther apart than 1". If they're too far apart, the bend won't look smooth.

Cut the kerfs only in the area where you want to bend the wood. After kerfing, carefully bend the wood to the radius needed. To prevent it from straightening out again, brace it or fasten it to the project (see photo below).

S-curves also are possible by kerfing the wood on opposite sides. This could

require adding a veneer layer to both sides of the wood to hide the kerfs, but it can offer a new dimension (or three) to your woodworking designs. **PW**

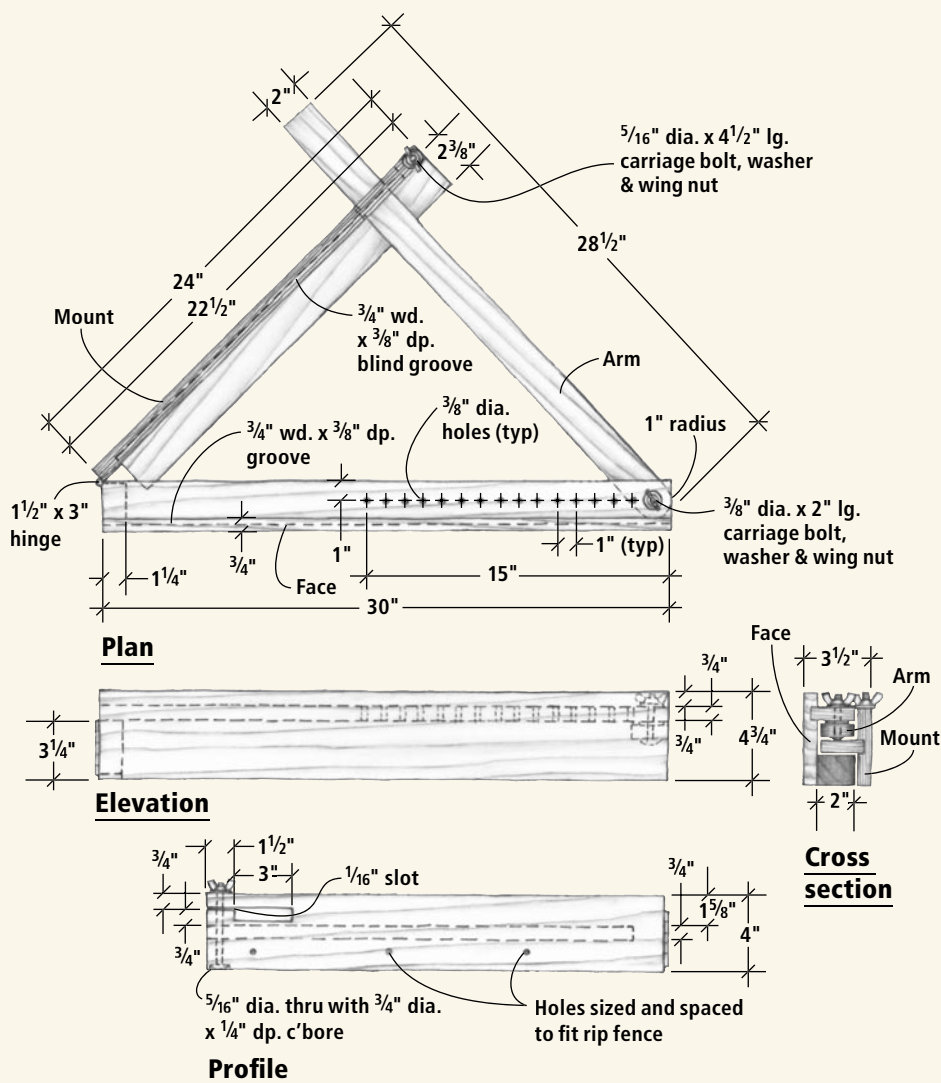


Fasten an extension to the miter gauge, positioning it to pass over the blade when you cut. Cut a single kerf in the workpiece and through the extension. Drive a small brad into the extension to the right or left of the cut (shown above). The distance between the brad and the cut must be equal to the spacing between the remaining kerfs you want to cut. Place the workpiece against the extension with the first kerf over the brad. Cut a second kerf, move the board so the second kerf is over the brad and repeat.



When you bend the wood, you must fasten it to something to hold the curve. If you can't fasten the board to the project itself, fasten a brace to the board.

Glue the mount and the mount brace together to make the mount assembly, then glue the face, face brace and hinge block together to make the face assembly. Hinge the two assemblies together and attach the arm to the face brace with a carriage bolt, washers and nut.



For woodworkers, the table saw is the most important machine in their shop. This series aims to give you all the information you need to get the most from this versatile tool.

Chapter 7 Advanced Techniques

Do things you never imagined were possible with your table saw.



IN PAST ISSUES

Chapter 1 (ISSUE #143)

Intro to the Table Saw

An in-depth look at the basics of table saw setup.

Chapter 2 (#144)

Using the Blade

The most important part of the saw is the blade.

Chapter 3 (#145)

Basic Joinery

The saw is great for making some simple joints.

Chapter 4 (#146)

Customize Your Table Saw

Simple saw additions can enhance your shop time.

Chapter 5 (#147)

Advanced Joinery

A closer look at some of the more intricate joints.

Chapter 6 (#148)

Special Techniques

Learn how to turn your saw
into a multi-faceted tool.



**COMING NEXT ISSUE:
THE FIRST CHAPTER OF A
NEW SEVEN-PART SERIES ON
CASEWORK CONSTRUCTION**



Photo by Wolfgang Busse

learning Curves

A cambered cutting edge is essential for fine finishing cuts with a hand plane – and it has many other surprising uses.

Plane blades that are sharpened straight and square are essential in all shoulder and rabbet planes, and they have other applications such as when shooting an edge with a bench plane. However, I have a very strong preference for using cambered edges in most of my bench planes, most of the time.

There are two powerful arguments for using a slightly curved blade. The first has to do with perfecting the square edges of your work. Let us suppose that you are preparing the edge joints for a tabletop and your powered jointer's fence was a few degrees off square and that you wish to correct the errors of squareness in the edge of your timber.

I have no magic built-in spirit level, which would allow me to plane a perfectly square edge with a straight blade in my plane, and I have no idea how this could be done. The curved blade is a sophisticated device, which allows us to take three different kinds of shavings without having to adjust the lateral-adjustment lever at all.

by David Charlesworth

David is the author of two books and three DVDs that cover many aspects of hand-tool use and building fine furniture. He teaches classes in his shop near the coast in Devon, England. For more information, visit his web site at davidcharlesworth.co.uk.



To accurately plane a board's edge, position your thumb and fingers as shown.



Use your fingernails as a fence to help maintain the plane body square to the edge of the board.

1. If the plane is centered over the edge of the wood, then an even-thickness shaving will be removed and no change will be made to the angle of the edge.

2. If the center of the plane is moved so that it is over the left-

hand side of the edge, a tapered shaving will be removed and the left-hand side of the edge then will be lowered.

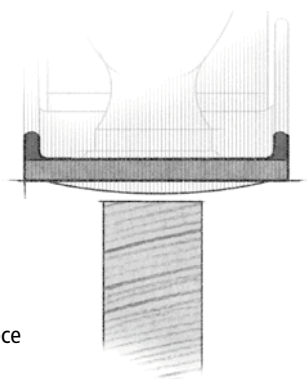
3. If the center of the plane is moved so that it is over the right-hand side of the edge, a tapered

shaving will be removed and the right-hand side of the edge then will be lowered.

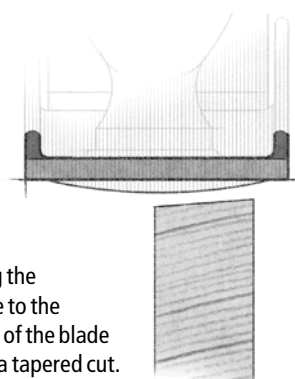
In all these positions the plane is kept completely flat against the edge by firm pressure from the ball of the thumb on the plane body

casting. I do not use the front knob at all. The thumb is always positioned over the center of the edge, regardless of where the center of the plane is. I use the surface of my fingernails as a fence to keep the plane from wandering about during the length of the stroke. The grip on the back handle is gentle, so that we do not twist the plane sole out of contact with the edge. (Editor's note: You can find more details of this technique in Charlesworth's second book and second DVD; see the Supplies box for details.)

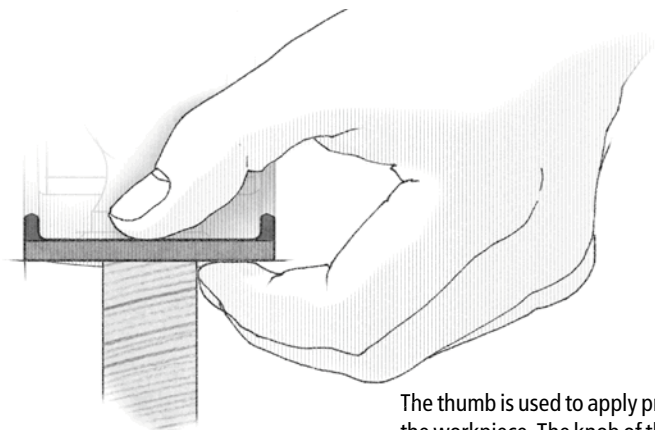
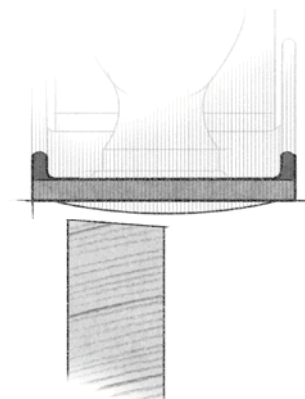
Finally, by carefully allowing the plane to drift from side to side towards the high points during the cut you can also correct a twisted edge. This surely has to be the most cunning plan of all time. Of course the curved blade needs to be well centered in the plane for all of these techniques and I will



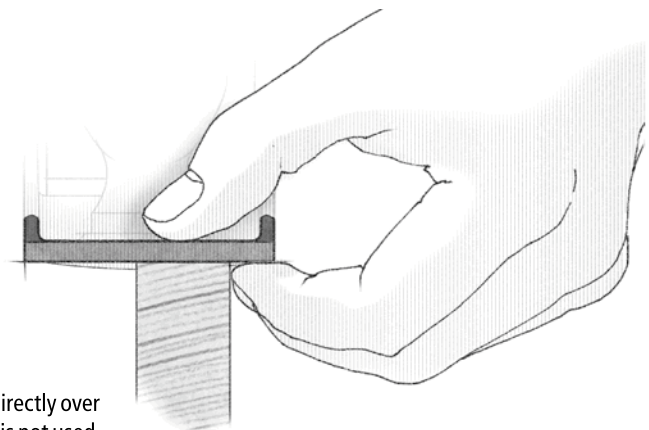
Centering the curved blade over the workpiece produces a square cut.



Offsetting the workpiece to the centerline of the blade produces a tapered cut.



The thumb is used to apply pressure directly over the workpiece. The knob of the plane is not used.



Illustrations by Matt Bantly

be describing my method later in this article.

The second powerful argument for a curved blade is that you will not leave whiskery tracks (sometimes called “steps”) from the corner of the blade when you plane across a wide surface. The surfaces you leave will be minutely scalloped in their width, but the depth of these depressions is small indeed and they can be removed easily by sanding if desired. I will explain my method for taking a set of shavings from a surface in a future article.

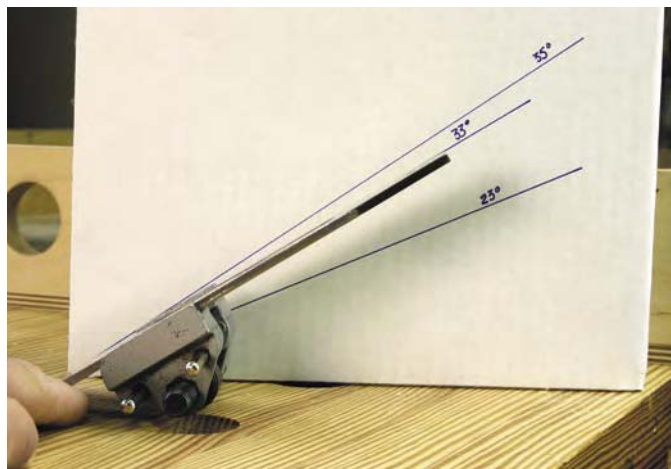
Blade Angles

I like to grind my bench plane blades at 23°, which is a little lower than tradition suggests. All sharpening and shaping is then done at 33° on a coarse waterstone, such as an #800- or #1,000-grit stone. This is 3° steeper than usual. I then polish the extreme tip of the narrow bevel on an #8,000-grit waterstone at 35°.

Because there is a significant difference between the grinding angle and the angle formed on the #800-grit stone, very little metal needs to be removed for either sharpening or shaping a blade. Shaping a curve does require more metal removal than normal sharpening, but much less than if a single bevel were used.

Forming a Curve

I take a freshly ground blade and set it at 33° in an Eclipse-type side-clamping honing guide (see the Supplies box for information on purchasing one). The information for blade projection cast on the side of the guide will not mention 33° so you will have to experiment to find the necessary distance. I draw the angles I want on white card or melamine-faced scrap. The angle is checked by sighting across the blade with the card propped behind. Once I have found the



Scribe the angles you use most often on a white piece of cardboard, which is most useful for setting a blade in your honing guide.

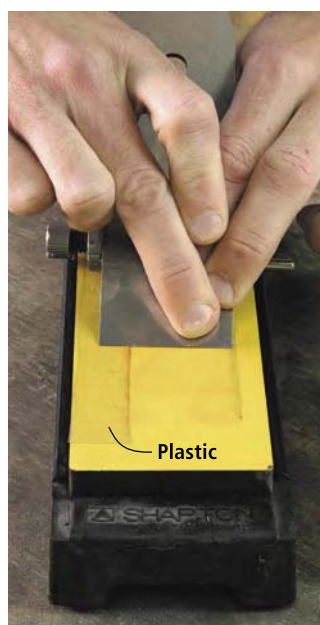
correct projection for a blade I measure the distance the cutting edge projects from the honing guide and scribe this measurement directly onto the top of the blade so that it's always available. This saves time in the future. It is also worth noting that different thickness blades will require slightly different projections to achieve the same honing angle.

I prefer the Eclipse-type guide because it has a narrow roller. Jigs with wide rollers tend to dictate to the user. We need some lateral tilting to form a curve, and the narrow roller is easier to tilt than a wide one. I have an old honing guide with a barrel shaped roller, indicating that creating curved blades is not a new idea.

Expert sharpeners produce a curve on a flat stone by subtly applying more pressure to the outer corners of the blade while honing to and fro. I have broken this process down into simpler stages so that the beginner can succeed from the start. I noticed that many students were struggling to start a curve with my old method, which depended on point pressure only. The new technique was developed during a short course a couple of years ago.

The idea is that a $\frac{5}{8}$ "-wide strip

of thin plastic is laid along one long edge of the #800-grit stone. This tilts the blade slightly; and as pull strokes are made, metal will be removed from the opposite corner of the blade. Finger pressure is placed over the area of blade that is touching the stone. Some woodworkers have told me that the plastic sleeve that comes with a cheap 6" ruler is ideal for this



Place a thin sheet of plastic on your sharpening stone and apply finger pressure on the opposite corner. This helps form the curve on your edge.



The Eclipse-type side-clamp honing guide (left) has a narrow roller that allows you to more readily rock the guide when forming a curved edge.

job. I use strips of plastic from the covers of cheap ring files; we originally used cardboard, but it did not last long. I think precise thickness is not important, but something around .012" to .015" will do.

If you coat the grinding bevel with a permanent marker before starting, you will see that an elongated triangle of metal has been removed. It is difficult to specify how many pull strokes will be needed. I press fairly hard on coarse stones and would expect to achieve a result after about a dozen strokes.

The plastic is then placed on the opposite long edge of the stone



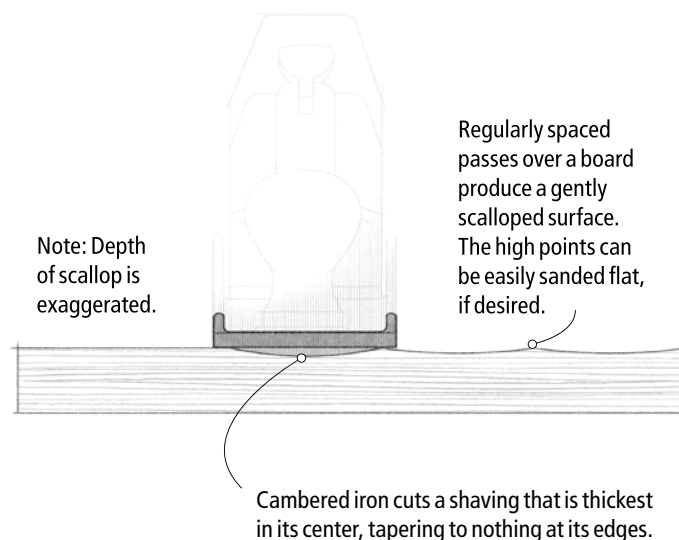
Here is what the corner of your iron will look like after about a dozen strokes. The shiny narrow triangle is where metal has been removed.

and the process is repeated on the opposite corner of the blade. Try to produce a symmetrical result. We now have a blade with three straight facets, whose shape is an approximation of a curve.

To judge the shape, I offer the edge up to a piece of flat plastic. I would expect to see gaps of about .012" at either outer edge. This is approximately the thickness of a quality business card.

I now use point pressure about halfway from the center to the corner of the blade by stacking my forefingers on top of each other. The two positions for this pressure are indicated as positions "4" and "5" on the diagram below. This operation is done without the plastic strip. It's important that weight is kept off the jig itself and only applied to the blade, near the edge. The idea is to create new, smaller flats at the meeting points of the three previous flats. Fewer strokes will be required at these points, possibly six. A certain amount of balance and judgment will be required here. However we do get good feedback from the surface of the stones, and it is usually possible to see a track on the surface where the blade is touching.

The blade edge and shape can now be examined again against the flat plastic. If you have suc-



ceeded it will appear as a gentle symmetrical curve. If it is not, just take more strokes, with the finger pressure in the appropriate position. You will see that I have indicated five possible finger positions for a $2\frac{3}{8}$ " plane blade.

When satisfied, clean the blade and the roller of the guide to avoid contaminating the superfine #8,000 grit stone, which is used next. This stone is prepared by spraying the surface with a little water from a plant mister. A Nagura is then rubbed over the surface to produce a little muddy slurry or paste. The blade projection is shortened slightly in the

jig, to raise the blade angle to 35°. Four gentle strokes are then made with the finger pressure in each of the five positions shown in the illustration. This polishes the tip of the coarse stone bevel, and is all that is required for a razor edge.

Sometimes, mostly for fun, I take a couple of extra strokes on the polishing stone. During a pull stroke, I start with finger pressure on the right, and try to transfer it steadily to the left. My forefingers are on the two outer edges of the blade. If done well, this will draw an elongated X on the surface of the stone. This is just a fun way of trying to smooth those five facets



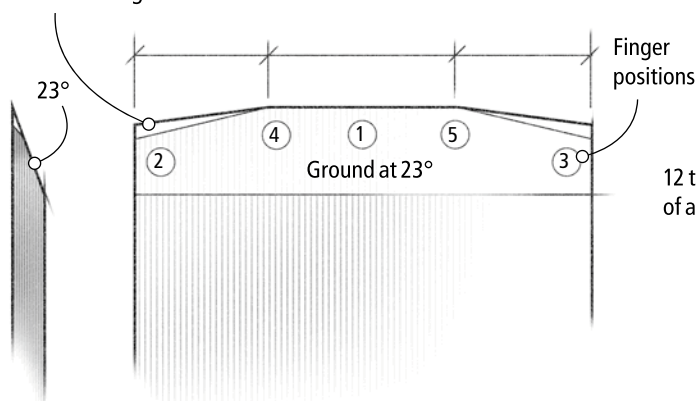
To smooth out the curved edge, remove the plastic from the stone and hone using finger-point pressure at five stations on the iron.

into an even smoother curve. It is not necessary, but a good exercise in controlling finger pressure. (It seems to go better when accompanied by a sound effect, such as a rising or diminishing hum!)

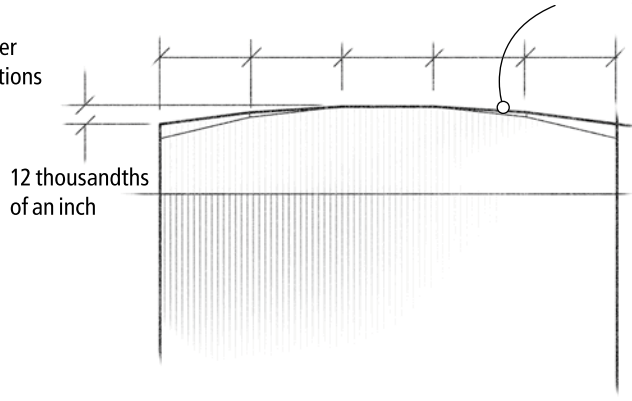
The wire edge created on the unbeveled face of the blade is then polished off in the usual way, using the ruler trick on the #8,000-grit stone. (For more on this procedure, see "The Ruler Trick" in the November 2004 issue.) I always dry the blade and coat it with a thin smear of camellia oil, as this protects against rust. The whole process is much quicker to do than it is to describe.

Honed on #800 grit at 33°

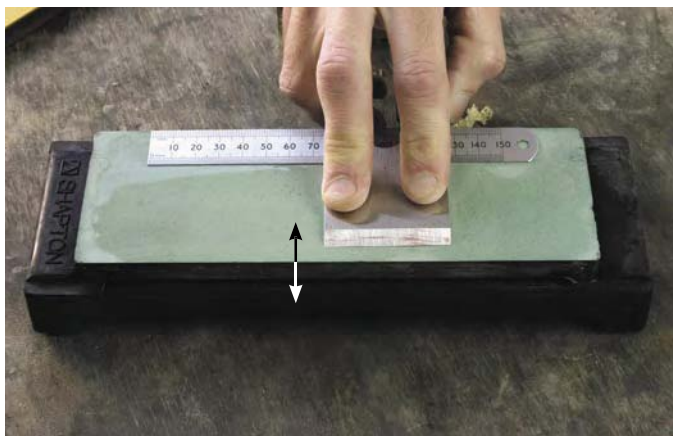
Honed on #800 grit at 33°



Start with 3 facets.



Blend 5 flats to form a curve.



To polish the unbeveled side of my plane iron, I use an inexpensive metal ruler as shown. The ruler allows you to remove only a small amount of metal quickly and repeatably.

Different Curves For Different Work

When planing relatively narrow edges, say about $\frac{1}{2}$ " to $\frac{5}{8}$ " thick, I find I need a pronounced curve on the blade.

When planing a wide surface such as a tabletop, I use less curve. The gaps seen at the edges of the blade, when it is offered up to a flat surface might be around .006", roughly half as much as you would employ for edge planing. If you have a very shallow curve in your blade, the plane would need moving a very long way to the right or left, to have any squaring effect at all. When the plane is moved this far off center, it can be quite difficult to keep it balanced flat on the narrow edge.

Resharpenering A Curved Blade

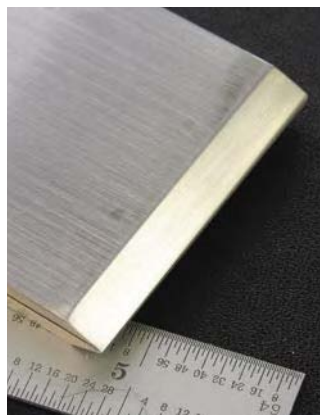
When the blade dulls, it is likely to be worst in the center. I set it in the jig at 33° and go to the #800-grit stone. Using point finger pressure in the center, I find how many strokes it takes to produce a minute wire edge. The small wire edge is a signal that enough metal has been removed to get past the wear on the blade. The same number of pull strokes are then performed

with the stacked finger pressure in all the remaining four positions i.e. halfway to each edge, and just inside each edge of the blade. This will maintain the existing curved shape. If you wish to change the shape, more strokes are used in the appropriate positions.

After cleaning the tool and roller of the honing guide, adjust the projection to give 35° , and do four gentle polishing strokes on the superfine stone in all the finger positions. Polish the wire edge off using the ruler trick.

With each sharpening, it will take more strokes to produce a wire edge. This is because the #800-grit bevel gets wider with each sharpening, and you are honing a larger area of steel. After about seven sharpenings, I regrind the blade and start the cycle again.

When grinding, I never go right to the edge of the blade. A small sliver of the #800-grit bevel is left at the tip, as this contains the shape that we have worked so hard to produce. Grinding right to the edge shortens the life of a plane blade, and it's not necessary unless you have a large chip in the cutting edge. Sharpening a recently ground blade takes me about four minutes.



I like to set my chipbreaker close to the cutting edge for fine planing. Here it is shown $\frac{1}{64}$ " from the edge of the iron.

Setting up the Plane

I use a No. 5 $\frac{1}{2}$ bench plane for the majority of my work because I like the weight and the length. It is tuned up as a super smoother, with the sole lapped flat and the

mouth set very fine, about .004" wide. (I recommend $\frac{1}{32}$ " for beginners.) This plane is used to perfect the surfaces that come from my machine planer. I do not take heavy shavings, so the chipbreaker is set very close to the edge of the blade. I prepare the front edge of my chipbreaker, with a slight camber as well, which allows me to set it as close as $\frac{1}{64}$ " to the blade edge. The connecting screw needs to be tightened very firmly.

When placing the blade and chipbreaker assembly into the plane, I hold the plane in my left hand with the frog's surface horizontal, having brushed away any loose shavings or dust. This prevents the blade from sliding down the frog and colliding with the front of the throat. This would blunt the blade before we even get started. It is not a bad idea to



When reinstalling the iron, I recommend holding the plane so the frog is level to the floor. This prevents the freshly sharpened iron from slipping down the frog and striking the plane's body, perhaps ruining your edge.

SUPPLIES

Side-clamp honing guides are available from most woodworking catalogs, including:

Woodcraft

800-225-1153 or woodcraft.com

Lee Valley Tools

800-871-8158 or leevalley.com

Tools for Working Wood

800-426-4613 or toolsforworkingwood.com

David Charlesworth's three DVDs on sharpening, planing and shooting boards are available for \$25 each or the set for \$70. His two books, "Furniture-Making Techniques" Vol. I and II are \$18 each.

Lie-Nielsen Toolworks

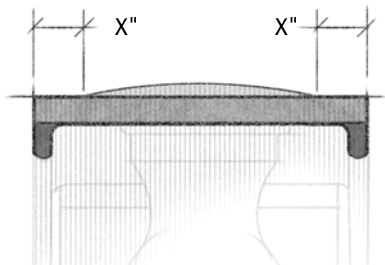
800-327-2520 or lie-nielsen.com

Prices correct at time of publication.

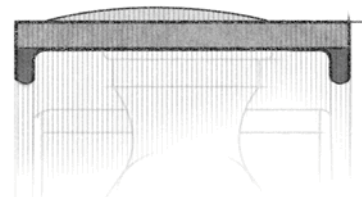
A sheet of paper below your plane allows you to easily sight the blade as you position it laterally in the mouth of the plane.



When setting a balanced shaving, the protruding curved blade is centered relative to plane body.



This setting is balanced, i.e. centered.



This setting is unbalanced, i.e. off center.

This is the view we get when sighting against illuminated paper.

retract the blade adjuster wheel by a couple of turns, too.

It is easy to see that when the blade-adjustment dog is engaging the slot in the chipbreaker, but care is needed to ensure that the lateral adjusting disc is engaged in the plane's blade slot. I wiggle the lateral lever a few times to see that it is so, and try to set the lever in approximately the right position.

The lever cap is now installed, and everything held firm with my left-hand thumb, while the lever cam is closed. I now advance the blade with the wheel, watching from the top, to see that the blade edge is not crooked enough to bang into the front edge of the throat.

Setting the Plane for a Fine Finishing Shaving

The plane heel is now placed on a sheet of well-lit white paper on the bench. Lighting the blade is not helpful. I hold the front knob with my left hand and sight down the sole. The right hand is available to advance the blade and adjust the lateral lever. Start with enough blade projection so that you can see it clearly, and adjust the lateral lever for a "balanced shaving." The projecting blade will appear as a black shape against the white background. I now retract the blade, just until nothing shows.

A Setting Trick

The setting can be confirmed with a small piece of thin wood. I use a close-grained hardwood, about $\frac{1}{16}$ " thick, by 1" wide, by $1\frac{1}{2}$ " long. The long edge is held firmly down to the front sole and moved backwards over the throat, as if trying to take a shaving off its whole length.

I now advance the blade, very slowly, until the shim is just shaved by the center of the curved

blade. You will encounter a phenomenon called backlash when you change from retracting the blade to advancing it. The wheel will turn freely for a while before you feel resistance. The blade will not advance at all while this happens. Once resistance is felt, the blade will begin to move. This "dead spot" is caused by play in the adjustment mechanism. It can be as much as two whole turns on an old worn plane. Less backlash signifies a high quality mechanism. All mechanical systems have some, and as long as you always set the blade while advancing the blade's projection, it will not trouble you. Conversely, if you set the proper projection while retracting the blade, you are likely to lose all blade projection as the blade works its way back into the body.

When winding the blade out, I turn the wheel as little as "three minutes on the clock," – that's an old-fashioned analog clock! – at a time. We only want a few thousandths of an inch projection for fine work, and it is easy to go too far, and then you have to start the whole process again.

This is where the setting shim is so useful. You can judge shaving thickness by feel. You can also confirm that the blade projection is well balanced.

To do this, rub the long edge of the shim to and fro, as if tak-



This small block of wood is invaluable for determining if the iron is positioned in the center of the mouth of the plane.

ing full-length shavings from its edge. Start at the outer edge of the throat and progress towards the center of the plane, and you will be able to hear, feel and see exactly where the curved blade edge first protrudes. With luck a small shaving will stay wrapped round the blade. Now repeat from the other edge of the throat. This will confirm whether the curved blade is well centered in the plane. Some woodworkers perfect the final lateral adjustments by tapping the top of the blade with a small hammer. This may be easier than trying to make minuscule adjustments to the lateral lever.

I don't worry if the balancing is not perfect, as long as I know where the blade is! My final move is to take test shavings off the edge of a practice board. These can be measured with dial calipers to assess their thickness.

Suitable Shaving Thickness

For final finishing of difficult hardwood I take a .001"-thick shaving. For general cleaning of a machined board, I take a .002" shaving. In hardwood it is difficult to push a plane that is cutting much more than .004" to .006".

I do hope that this article helps you to get the most out of your bench planes. They are one of the most wonderful, versatile and accurate tools in your kit. **PW**

NEW DIAMOND STONES DESIGNED FOR CREATING A CURVED CUTTING EDGE QUICKLY

Achieving a perfectly curved and polished cutting edge on your plane irons is an essential skill that many new hand plane users struggle with. Getting the right amount of curvature in the right place on the iron takes a fair amount of practice, patience and an observant eye.

Eventually, it is a skill that becomes second nature. And David Charlesworth's methods outlined in this article will give you a tremendous leg up in acquiring this skill. As with everything in woodworking, of course, there are several ways to get the same result. A new type of diamond stone is just now becoming available that sharpens a perfectly curved edge the first time you use it. I've sharpened about 25 plane irons with the product and am quite impressed with the results it gives.

The Odate Crowning Plate was developed by woodworker and author Toshio Odate, and David Powell, the founder of Diamond Machining Technology Inc. (DMT). In essence, the stone is a 3 1/4" x 7 1/4" piece of cast iron that has been machined so it has a slight and consistent concavity across its width. Then it is plated with diamond particles – it is available with #60, #45, #30 and #9 micron grits. The amount of concavity corresponds to a slight 37 1/2' radius. In more technical terms, the chord to arc height on a 3" width is .0025".

In practical terms, I've found the stones produce an edge that's just slightly more curved than what I achieve using finger pressure on a flat stone. This actually makes setting the curve in the center of the plane's mouth easier, though it reduces the width of shaving you will make.

Powell says you can reduce the curvature of the iron on the plate by skewing the iron slightly as you sharpen. I've also found you can increase the curvature by using finger pressure on the corners as you sharpen the iron on the plates.

Also note that even the finest version of this stone (#9 micron) isn't fine enough to polish a plane iron's edge – you'll still need to finish up the edge on your polishing stone. There are two ways to go about this. You can use finger-point pressure as described in this article, which works very well in my experience. Or you can dress your polishing stone so it also has the same concavity as the diamond stones. Powell is making a convex diamond stone that will dress conventional sharpening stones expressly for this purpose. This dressing stone was not available at press time so we were unable to use it in our trials.

The bottom line is this: Veteran sharpeners probably won't need these stones (though I find they help me achieve consistency even when I'm having a bad day). But if you struggle with achieving a curved iron, the Odate Crowning Plate will fix your problem immediately and perfectly.

The stones are about \$100 each. If you wish to purchase only one, I recommend the #30-micron stone, which shapes the edge quickly and takes you to the point where you can refine the edge with a #1,000-grit stone and then your polishing stone.

The stones are available from Powell Manufacturing Co., 396 Washington St. #114, Wellesley, Mass. 02481 or 781-237-4876.

— Christopher Schwarz



The Odate Crowning Plate allows you to achieve a curved edge on your plane iron with about a dozen strokes without varying your finger-point pressure.





Leaning Shelves

We improve a contemporary design to make it sturdier, a bit curvier and easier to build.

Photo by Al Parrish; special thanks to Longworth Hall, Cincinnati

It was about 1 a.m., and I was at the grocery on a bleary-eyed run to buy orange juice for the family's breakfast. The only other shopper that hour was a woman tooling through the frozen food aisle. Perched atop her mound of food was a box that contained the disassembled parts to some shelves much like these.

At that moment it became official; these shelves are now everywhere – even among the pork rinds and toaster pastries at the corner store.

And so this begs a question: Why would we tackle such a ubiquitous design for the magazine?

Simple. We can make them better than the stuff at the store.

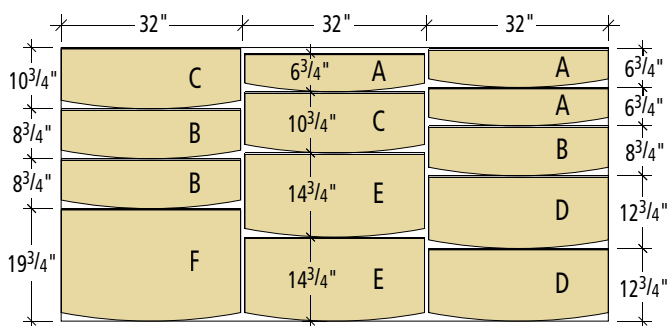
Many of the so-called leaning shelf designs I've examined have flaws. Some rack unacceptably. Some use a lot of extra material to become sturdy. Many have top shelves that are too narrow (3" in some cases). Others have lower shelves that cantilever too much out the back.

It was time to fire up the CAD software and start drafting.

After numerous experiments and revisions, I discovered that these shelves actually are more of an engineering equation than a woodworking project. The leaning angle and the height of the units work

by Christopher Schwarz

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



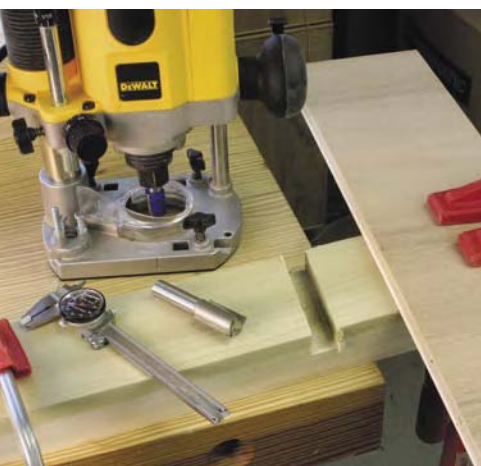
Cutting diagram



Take care when cutting your plywood because every kerf counts. Shown is my stack of finished shelves. That little pile on top of the shelves is the waste that was left from an entire sheet of plywood.



Cutting 85"-long pieces all to the same size is impossible on most table saws. So I gang-cut the pieces on my miter saw. Clamp your mating uprights together and cross-cut them simultaneously. This way if they're a little off, they'll still match.



We've acquired a few straight bits throughout the years. After testing a few I found that the Woodline plywood bit cuts a dado that was closest in size (.714" wide) to the particular sheet of plywood I bought. (Woodline: 800-472-6950 or woodline.com; item# wl-1028-1, \$9).

together to determine the depth of the shelves. Getting these factors to work together to produce sensible shelving is trickier than it first appears. So take care if you want to modify this design—small alterations make big differences.

I also sought to squeeze out the maximum amount of shelf space from the minimum amount of material. After additional work in CAD, I squeezed it down to this: To build two shelf units and one desk unit, you'll need to buy:

- One sheet of $\frac{3}{4}$ " plywood
- Six 8' 2 x 4s
- 35 linear feet of 1 x 4s
- 70' of edge tape

For this investment in material, you'll get 30 linear feet of shelving and a desk—not bad.

Construction is simpler than any bookcase I've built. The shelves rest in dados in the uprights. The uprights are prevented from racking by braces that are pocket-screwed into the shelves and uprights. There's no back, no top and no bottom.

It was so simple, in fact, that I decided to add some visual interest by cutting curves on the braces and front edges of the shelves.

Begin Construction

I always like to begin a project that uses plywood by first breaking the 4' x 8' sheets into smaller sizes—plywood takes up a lot of room in small shops.

Using the cutting diagram at left you first want to crosscut the full sheet into three equal-sized pieces that are $31\frac{3}{4}$ " long. These are a bit oversized so you can trim them down on your saw and remove the factory edges from the plywood. Then you can easily rip the shelves to their finished widths using the diagram as a guide.

Now you need to work on the uprights. Dress your stock as true as possible and then cut it to its finished length.

Now lay out the locations of all the dados on the uprights. Because these dados are cut at a 7° angle I recommend you mark out every joint to avoid a blunder.

Now you should make a few test dados in a scrap piece to find the best bit for the job. Plywood varies in thickness from sheet to sheet. And straight bits designed for plywood come in slightly different diameters, too. Your best bet is to mill a $\frac{3}{4}$ " x $\frac{3}{4}$ " dado in a scrap and see how the plywood shelves fit into it.

Different Diagonal Dados

You need to make two router jigs to cut the angled dados in the uprights—one for the left-hand uprights and one for the right-hand. I know that it seems like you should be able to make just one jig and flip it around, but the geometry doesn't work that way.

I like dado jigs that capture the router's base on both sides. This ensures the router won't wander, and it allows me to make the occasional climb cut without the tool jerking severely.

Also note that a router with flat edges on its base will make your dado locations more accu-



To build a dado jig, draw a 7° angle on your scrap and then build the jig around that line and your router's baseplate using scraps, glue and nails.



I'm sure that some of you will figure out a way to do this on the table saw, but the band saw is far quicker for me. A roller stand holds the bottom end up while I make the cut at the top end.

rate. With some round-base routers, the bit isn't always in the dead center of the baseplate.

Clamp the jig to an upright and your workbench, and rout all the dados – I like to use three passes (increasing depth) to keep from taxing the router or the bit.

Matching Angles

With the dados routed, you can now cut the angles that allow the shelves to tip back against your wall. Set your miter saw to make a 7° miter. Clamp two mating uprights together and trim the feet simultaneously.

Now you need to cut the long miter on the top of the uprights. The best way to do this is mark your cut line, cut it close on the band saw and clean up the cut with a hand plane.

Marking out this angle looks like a challenge, but we have made it easy for you. At the top of the upright, make a mark halfway across the width of the upright at 1 $\frac{3}{4}$ ". Now make a second mark. This one should be where the bottom edge of the top shelf hits the back edge of the upright. Join those two marks with a line.

Finish up your work on the uprights by routing a $\frac{1}{4}$ " x $\frac{1}{4}$ "

rabbit on the outside corner of each upright – this adds a shadow line and gives you a bit of forgiveness when lining these units up against your wall. Now sand or plane your uprights to prepare them for finishing.

Shelves and Braces

Because the braces need to fit tightly between the uprights, I cut them each about $\frac{1}{2}$ " longer than

necessary at first and trim them to fit the assembled unit.

The first step on the braces is to cut a 7° bevel on one long edge of each part. To accomplish this, I beveled the blade of my table saw to 7° and ripped one long edge of a spare brace. I then placed it up against an upright to make sure the geometry worked.

If you're going to add a curve to your braces and shelves, you

should make two routing templates to ensure the curves are consistent – one template is for the shelves and the other template is for the braces.

I make both templates from one piece of plywood because the curves are the same radius – one is an inside curve and the other is an outside curve.

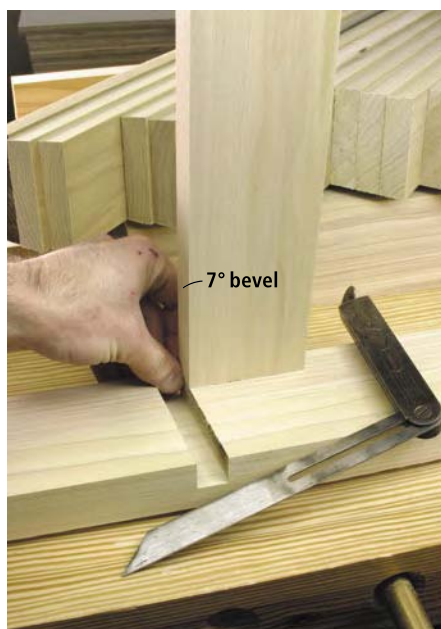
Once you've created the two curved templates, I recommend



With the angle cut, clamp two mating uprights together and plane down to your line. The longer the plane the straighter your surface will be.



I used poplar for my uprights, which is easy to plane. After removing any bow with my jointer plane, a pass or two with a smoothing plane is all this forgiving wood needs to be ready to finish.



With the 7° bevel cut on one edge of a brace, check it against an upright. You've hit the right angle when the brace fits in perfectly where the dado meets the back edge of the upright.



To make the two templates, bend a flexible scrap between two nails as shown. Bend the scrap 1½", hold it in place and trace a line on both sides of the scrap. Now you've marked lines for both the inside and outside curves. Band saw between these lines and clean up the sawn edge of the two templates.



When routing the braces, you might have to climb cut some sections because the grain is likely to reverse on you in the curve. If you take a light cut and hold the tool securely, this is a generally safe operation. But do take care.

you nail some scraps to the template that will position your braces and shelves exactly where you want them on the template for routing. This will save you time.

Before you break out the router, however, use the templates to mark the curves on your braces and shelves, and then cut close to this line using your band saw.

Then rout the curve on the braces and shelves using a pattern-

cutting router bit. Now you want to add edge tape to the front and sides of the plywood shelves. I quite like the Fastedge edgebanding from FastCap. It's peel-and-stick stuff, which makes it especially suited for curves. And it's available in a wide variety of sizes, lengths and species. For a dealer in your area, visit fastcap.com or call 888-443-3748. Expect to spend about \$22 or so for a 50' roll.

Odd Assembly

To fit the braces, you should assemble each unit, clamp them up and then trim the braces to fit snugly between the uprights.

Assembling this project was a head-scratcher at first. The best method was to clamp the top of one upright to my bench with its foot stuck in the air. I then inserted the shelves into their dados and added the second upright.

Once you get the unit to this point, you can put a couple clamps on it, and adjust the shelves and uprights so everything is where it is supposed to be and is square.

Now fit the braces between the uprights by trimming them to length on your miter saw. With all the braces fit, drill pocket-screw holes on the back of each brace.

I put two screws into each upright and three into each shelf.



Iron-on edgebanding is a pain on outside curves (it's even worse on inside curves). The peel-and-stick tape shown here from FastCap cut my edgebanding time for this job in half. I was impressed.



Once you get all the shelves where you want them, mark where the uprights intersect the shelves on the underside of each shelf. This will help you reassemble each unit.

This created an assembled unit that resisted racking and could endure some heavy books.

Screw everything together and then mark on the backside the location of each part so you can easily reassemble after finishing.

Get your shelves and braces ready to finish by sanding or hand planing them. (Yup—I plane plywood all the time.) Break all the edges with sandpaper.

To finish the shelves, I first painted the uprights and braces with a black paint – two coats did the trick. Then I sprayed on a semi-gloss lacquer topcoat and sanded between coats.

To ensure the shelves stayed in place on hardwood floors I screwed a couple rubber feet to the bottom of each upright. To ensure the desk unit was completely stable, I anchored it to the wall with a #10 screw and a metal “L” bracket.

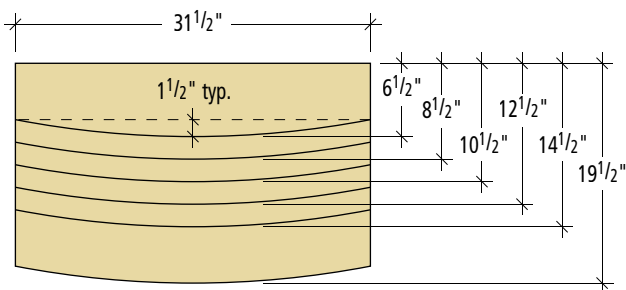
To be sure, all this effort is more work than driving to the grocery store to buy a commercial unit. But I take comfort that these are sturdy enough to last a good long time. I wouldn’t be too surprised to run into that same lady in the middle of the night as I’m buying doughnuts and she’s buying a shelving unit to replace the first one that got too wobbly. **PW**



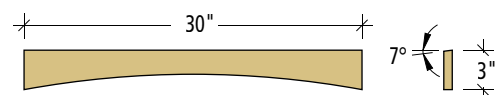
This project is where pocket screws really shine. Whenever you’re working at an odd angle or near edges like this, a pocket screw can be your best bet. The other reason I chose them is because I wanted to finish the parts separately and assemble the project on-site.

LEANING SHELVES

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	
		T	W	L		
Desk Unit						
<input type="checkbox"/>	2	Uprights	1½	3½	85	Poplar
<input type="checkbox"/>	3	Braces	¾	3	30	Poplar
<input type="checkbox"/>	1	Desktop	¾	19½	31½	Plywood
<input type="checkbox"/>	1	Shelf	¾	8½	31½	Plywood
<input type="checkbox"/>	1	Shelf	¾	6½	31½	Plywood
Shelf Unit						
<input type="checkbox"/>	2	Uprights	1½	3½	85	Poplar
<input type="checkbox"/>	5	Braces	¾	3	30	Poplar
<input type="checkbox"/>	1	Shelf	¾	14½	31½	Plywood
<input type="checkbox"/>	1	Shelf	¾	12½	31½	Plywood
<input type="checkbox"/>	1	Shelf	¾	10½	31½	Plywood
<input type="checkbox"/>	1	Shelf	¾	8½	31½	Plywood
<input type="checkbox"/>	1	Shelf	¾	6½	31½	Plywood

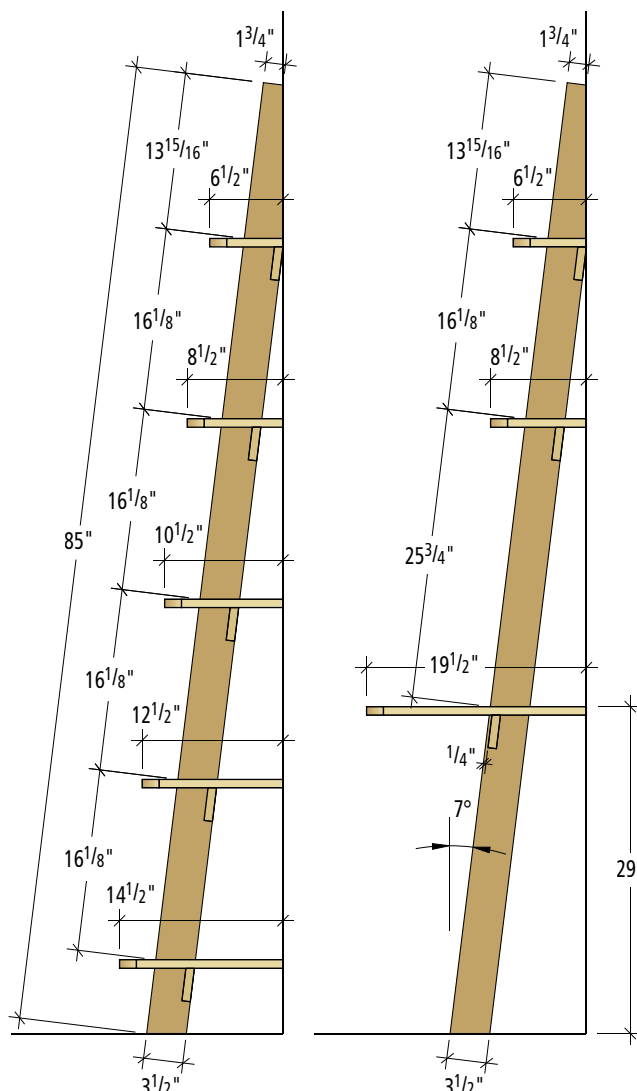


Shelf plan (shelves)



Brace elevation

Brace profile



Shelf profile

Desk profile

A WOODWORKING MITER SAW

Turn a contractor's tool into a precision woodworking machine.

I don't know of too many woodworking shops, whether home or professional, that don't have a miter saw as part of their equipment. A miter saw is a fine alternative to a radial-arm saw or circular saw for rough-cutting lumber. It's also an accurate alternative to the table saw for crosscutting and squaring solid lumber.

My problem with a miter saw is that it's a job-site tool that's been put to work in woodworking shops. Because of that, it has some – let's not call them deficiencies – eccentricities that aren't the best for woodworking.

Miter Saw Eccentricities

Because the miter saw was designed for portability, its table isn't very large and so it lacks adequate support for many woodworking activities. The fence and table capacity is actually too short to conveniently trim a table leg to length, let alone support a standard-length piece of rough lumber.

The fence on a miter saw is designed for carpentry

work and is usually undersized, a challenge to align and allows considerable tear-out at the back of a cut. While some saws have tables that address the tear-out problem below the board with zero-clearance throat plates, that doesn't address the fence that allows for tear-out.

Then there's the question of stops. Often the work on a miter saw requires cutting a number of pieces the same length. Some manufacturers have made a nodding acknowledgement of this need and added a fairly basic stop. But again, it falls short of the precision we'd prefer for woodworking.

There are dozens of plans for building carts and support stands for miter saws that address these issues. We've designed and built some ourselves. But the problem with these accessories is that they can cost as much, if not more, than the saw itself.

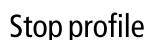
So we've come up with an add-on for your saw that will easily and affordably take your job-site saw into the workshop with capacity and precision.

by David Thiel

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



Photo by Al Parrish



Before we dive into the upgrade, let's take a moment to consider the saw itself.

Woodworkers are tool addicts. If one cordless drill is good, three must be better. So when it comes to miter saws, what we all really want is a sliding compound miter saw. Is that tool's 12" crosscut capacity worth \$500? Not all that often. But in the interest of satisfying the more-is-better desire in all of us, we suggest a 12" compound miter saw (around \$300), rather than a 10" (usually less than \$200). You can usually gain an extra inch in

crosscut capacity with a 12", but it's up to you to decide if the expense is warranted.

Another feature to consider is the type of fence on the miter saw. In our opinion the easiest fence to adjust is a split-fence design, meaning the two fences can be independently adjusted. Many miter saws have a single casting incorporating both fences. If the casting is out of parallel you pretty much need to bend the casting (which isn't all that easy) to align the fences to 90° to the blade.

ROE: Rabbet one end; BOE: bevel one end; BROE: bevel/rabbet on ends

If you already have a saw with a single fence casting, by adding our complete fence and bed system to your saw you'll be able to shim to align everything perfectly.

Why Our System is Better

The woodworkers on our staff gathered together in the shop to stare at our miter saw and decide what we'd change. We came up with these upgrades:

- An auxiliary table that would support at least a 30"-long piece of wood and provide a zero-clearance cut at the blade to reduce tear-out at both exit points.
- A fence that would provide adequate height and a zero-clearance cut at the blade.
- Both the fence and table need to be able to be "renewed" after cutting at a miter or bevel to maintain the zero-clearance capability.
- A stop system that could quickly move out of the way and that would function along the length of that 30" table.
- The system had to be inexpensive, leave the saw portable and be able to adapt to any miter saw.

We managed to come up with a system that meets all our expectations: The hardware comes in at less than \$30 and lumber should run another \$20 (or less if you use shop scraps); by screwing half-lapped replaceable sections to the fence and bed, zero clearance can be maintained indefinitely; by mounting the longer bed and fence (35" capacity) to the left of the blade only (the side where most woodworkers cut from) the overall size and weight was held to a minimum. And the system screws to the existing fence of your saw so it's virtually universal.

Mill Your Own Wood!

Start upgrading your miter saw by first milling the lumber for the fences and beds. And I do mean milling. You need to mill (joint and

plane) your own lumber for these parts to ensure that the pieces will be straight and square.

The bed pieces (left, right and mid inserts) are 5"-wide. You may be tempted to make them wider to support a wider board (as I was), but you'll find that the bed will quickly obscure the miter scale mounted on the saw. Test the board width on your saw to see what width you can get away with. You may need a narrower bed, or you may be able to go wider.

The fence pieces (right and mid inserts) are 3 1/4" wide (high), with the left fence measuring 2 3/4" wide to allow space for the 1/2"-tall T-track. These dimensions also should be checked against your miter saw to make sure the blade guard will clear the fence height when beveled to a 45° cut.

To benefit from the replaceable mid-insert pieces it makes sense to run extra material for more than a couple of sets at the same time you're running the main pieces.

This way the material thickness and the half-lap joints will be easily interchangeable.

I suggest using a stable, tight-grained wood for your upgrade system. Maple or ash (my selection here) works well.

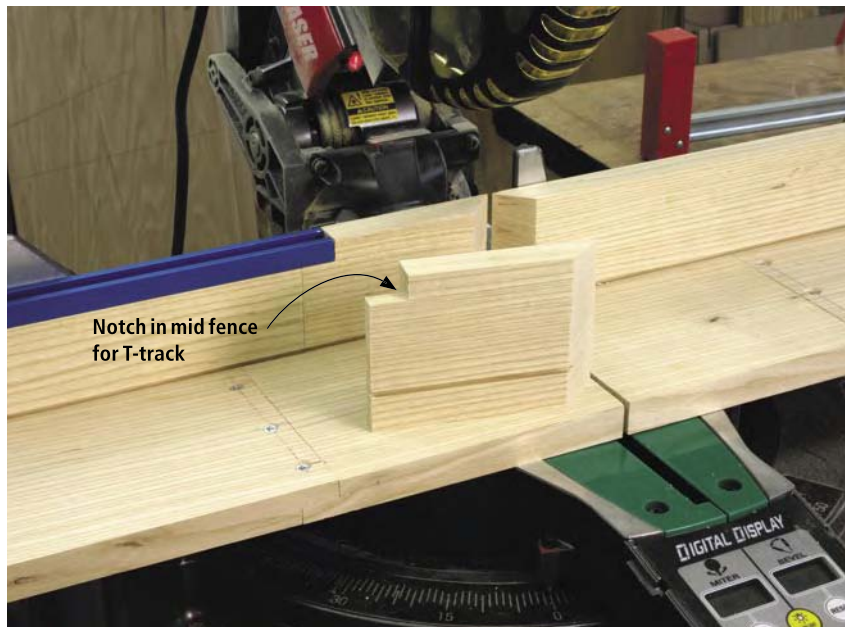
After milling the pieces, head to the router table and insert a 1/2"-diameter straight bit. You need to cut rabbets to form the half-lap joints on the left, right and mid-bed pieces, as well as the left and mid-fence pieces.



A simple 3/4"-wide rabbet is the secret to the mating half-lap joints. After determining the exact center of the board thickness, a 1/2" straight bit is set to cut to that height. The fence is set for the final width of the rabbet, but the first pass is made at the edge of the board.



The second and final pass is made to complete the rabbet. Repeat both steps on each mating piece. Note the sandpaper on the miter gauge fence to keep the piece from moving during the cuts.



A replaceable mid fence is shown notched, grooved and mitered in front of the already attached mid fence. Making multiple copies when making the first will ensure you'll always have a miter saw ready to run.

Dust Removal

I would like to tell you we also came up with a great way to make your miter saw dust free, but we didn't get that lucky. But we did come up with a way to keep dust from building up and making your cuts inaccurate.

By adding an $\frac{1}{8}$ " x $\frac{1}{8}$ " groove to the fence faces just above the bed height, we created a channel that doesn't allow dust to build up in the corner formed by the bed and fence. Sure, you'll still have to blow the dust away every now and again, but this groove will help. Make these grooving cuts on the table saw with a standard ripping blade.

To create the zero-clearance fence opening, you may choose to miter the inside corners of your fence after the fences are attached. I chose to make those cuts prior to attaching. I still used my miter saw, but by cutting the miters first,

I was able to locate the attachment point on the miter saw fence exactly, using the blade to orient the fences.

Lastly, I notched out the top edge of the mid fence $\frac{3}{4}$ " to allow the T-track to cross over the mid fence as shown on the previous page. This makes it possible to adjust the fence stop to within 3" of the blade. Any closer than that and you'll trim the T-track whenever you make a bevel cut.

Half-lap Assembly

It may seem simple enough to quickly screw the mid sections to the bed and fence pieces, but accuracy here will make replacement easier down the road.

Carefully mark the screw locations on both of the bed pieces and on the left fence. It's important to catch the center of the rabbet width, so locate the screw holes $\frac{3}{8}$ " in from the half-lap tongue.



With the fence/bed assemblies ready to attach to the saw, check to confirm that they will sit square when attached. Our right fence was out of square slightly and required shimming. We used strips of masking tape attached to the fence face to achieve a square fit.

To assemble the pieces, I recommend using a clamp to draw the pieces together tightly during screwing. Pilot drill and countersink the holes for the #6 x $\frac{5}{8}$ " flathead screws.

Next, pilot drill and countersink the fence pieces to attach them to the assembled bed pieces through the back of the fences. Make sure at least one of the screws connects the mid-fence and mid-bed sections to keep these pieces stable.



Accurately screwing the mating half-lap pieces together requires clamping the pieces together. Countersunk pilot holes and flathead screws complete the assembly.

Mounting to the Saw

With the bed and fence pieces screwed together, it's time to mount the assemblies to your miter saw. Every miter saw will have different hole locations on the saw fence for attaching auxiliary fences. Some saws may have none at all. You'll need to determine if you need to drill new (or maybe extra) holes in your existing fences to adequately attach the upgrade assembly.

You'll also need to use a good square to check the angle of the fences on your saw, and make sure the beds and fences align evenly when attached to the saw.

One more step, then it's time to move on to the stop. We could have added a hold-down to keep material tightly against the fence. Instead we opted for a more low-tech solution that still does a good job. We added a strip of self-

adhesive sandpaper to the fence faces. You need to add it to the left, right and mid-fence to make sure the fences remain evenly aligned. A little trimming will be required, but a utility knife will make quick work of this step.

T-track and Stop

Your next step is mounting the T-track to the left fence. Cut the track to length using a hacksaw, then pre-drill and countersink the holes in the center of the track, paying attention to where on the fence the screws will attach. Take care to avoid the half-lap joint.

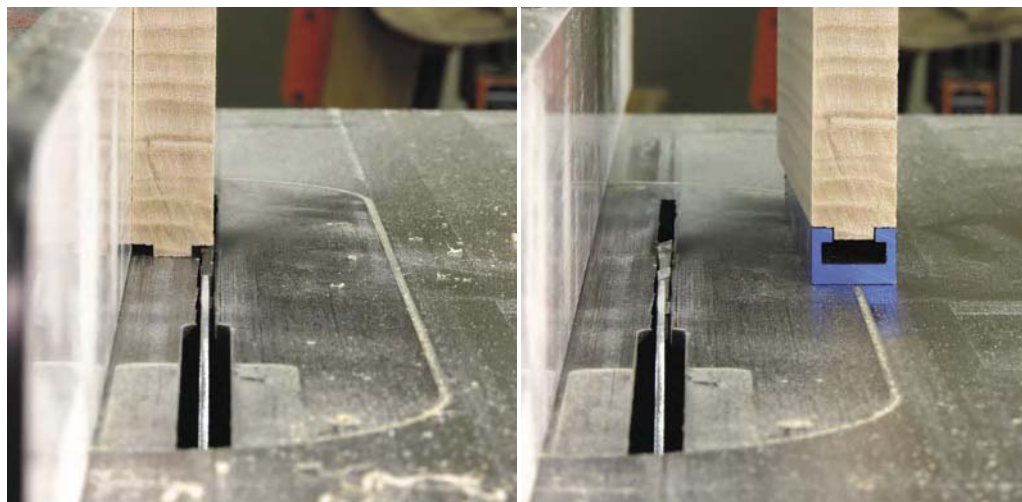
The stop itself is fairly simple, but you'll need to do some fine-tuning as you assemble and attach the pieces. Start by cutting the two stop sides from $\frac{3}{8}$ "-thick Baltic birch plywood. Then notch the two sides at the same time (held together with double-sided tape) on the band saw to leave the mounting tongue.

Next, find a piece of $\frac{3}{4}$ "-thick solid wood that's about $2\frac{1}{2}$ "-wide and about 10" long. Take your fall-off piece from your T-track and head to the table saw. By adjusting the fence location and blade height, cut two rabbets on the bottom of the piece to match the slot in the T-track.

Now crosscut a 2" length from the piece and then head to the band saw to rip the block to the final 1"-wide stop guide and 2"-wide stop center. If you wish, make a second set of blocks for later use, while you're at it.

Assembling the stop block is best handled on the fence itself. Before assembly, add an adhesive-backed tape measure (reading from right-to-left) to the front face of the T-track. You'll need to trim about the first 4" from the tape for it to align correctly with the saw blade.

Next, check the fit of your stop guide block, then drill a hole



To cut the rabbets for the stop guide, I used the table saw. Set the depth and fence location to allow the guide to run snugly in the T-track. The depth of the tongue shouldn't be below the T-track lip, or the bolt won't pull the guide tight.

down through the center of the block for the bolt to attach to the cam clamp. Then mount the cam clamp and adjust the hold to snug the stop guide to the T-track.

The next part is the fine-tuning area. The stop itself needs to be attached to the stop guide so that it will drop flat against the fence face. Drill the screw clearance holes in the stop sides, centering the hole in each tab. As you drill the hole, put a block of wood behind the tab to avoid tear-out as the bit comes through.

Place the stop in position against the guide and check the

fit against the fence face. Then carefully mark and drill pilot holes in the guide block and attach the stop to the guide with two roundhead screws.

The stop should now easily swing up and out of the way of the fence face, or fit flat against the fence for repeat cuts.

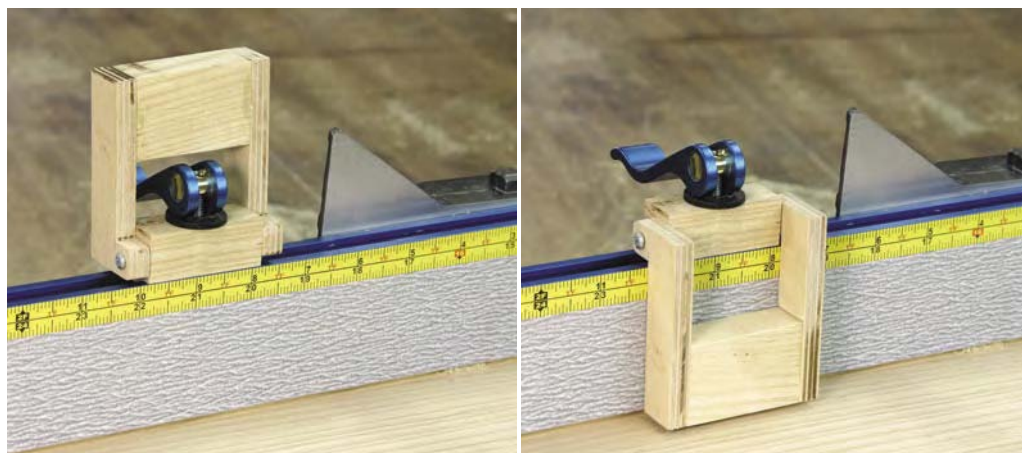
You're now ready to do precise woodworking on a miter saw. Store your extra mid-insert pieces somewhere safe and don't hesitate to change them out to maintain that perfect zero-clearance cut – something your out-of-the-box saw couldn't achieve. **PW**

SUPPLIES

Rockler Woodworking
800-279-4441 or rockler.com

- 1 • cam clamp, $\frac{5}{16}$ " #58252, \$6.49 each
- 1 • T-slot bolt, $\frac{5}{16}$ " x $1\frac{1}{2}$ " #83311, \$.99 each
- 1 • aluminum T-track, 36" #21746, \$10.99 each
- 1 • right-to-left adhesive rule #69124, \$4.99 each
- 1 • profile PSA rolls (#220 grit) #67178, \$5.99 each (store sales only)

Prices correct at time of publication.



The flip stop is a simple design that allows the stop to clear the fence for rough cutting, then drop accurately into place for precise, repeat cuts. The self-adhesive measuring tape added to the T-track ensures accuracy.

\$5 Router

If you can't afford a vintage or new one, build your own using a block of wood, an Allen wrench and a thumbscrew.

Here is a real-life shop problem: The project calls for a shallow slot, or dado, in the middle of a board. Defining the edges using a wide chisel is a first step. But determining the best way to remove the waste is a challenge. The chisel could do it, although gauging the depth accurately would take patience. Using my electric router would solve that problem, yet experience tells me that freehand use of this power tool can lead to stray excursions into surrounding margins. So fence guides would need to be set.

This situation calls for a router plane. An uncommon plane that looks different, it most often elicits the question, "What does it do?" Now you know – it levels dados and hinge gains. Its right-angle blade will allow you to make a flat cut of an accurate depth.

Router Plane History & Use

Router planes have been made with metal bodies by Stanley and other manufacturers for more than 100 years. You can find examples in tool catalogs or flea markets today. Like other planes, earlier router planes were made with a wood body to hold the right-angle cutter. To

save money I chose to build mine using a common, historical wood shape. If you prefer to purchase one instead, E.C. Emmerich (E.C.E.), the same firm that makes the line of Primus planes, sells router planes with a wood body. The 20-S comes with three cutters (call 800-724-7758 or visit ecemmerich.com).

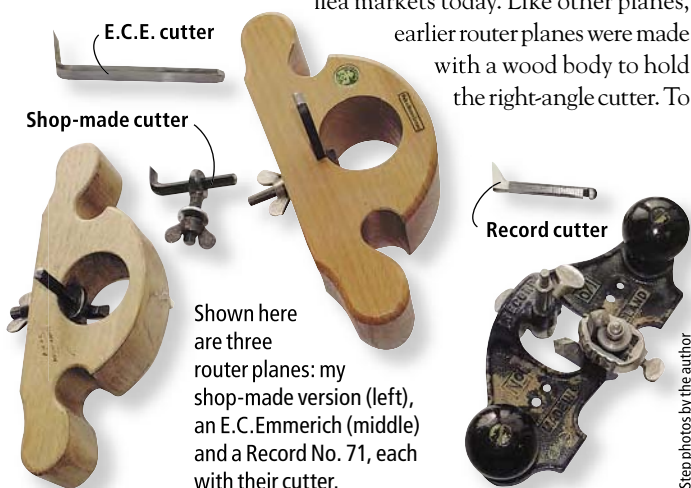
One colloquial name for this tool is "Granny Tooth" plane. It is not at all hard to use. Adjust it to depth and use it in a series of short, choppy push strokes. Just as with power routers, your application may call for more than one setting to achieve the desired depth. In any event, define the edges of the dado with a wide chisel. I find it helps to use the chisel to remove a little waste at the end of the slot so that my final strokes with the router do not split out wood beyond the desired end. Use it once and you will be convinced of the utility of this odd-looking plane. Make your own and you have the added satisfaction of toolmaking as well as tool use, something that was very much part of becoming a woodworker in times past.

Collecting Your Materials

When I set out to make my plane, the challenge was to make the right-angle cutter and the specialty holder to attach it to the wood body. Both these parts were special forgings and castings, processes not familiar to me. The solution to the right-angle cutter is adapting a $\frac{5}{16}$ " Allen wrench. The holder is made from a $\frac{3}{8}$ " malleable iron thumbscrew with a washer and a wing nut. The beauty of this is that they are available from Reid Supply Co. by mail and the parts cost less than \$5.

by John Wilson

John currently operates The Home Shop in Charlotte, Michigan, where he teaches classes and sells Shaker box supplies.



Shown here are three router planes: my shop-made version (left), an E.C. Emmerich (middle) and a Record No. 71, each with their cutter.

Plane

Start by ordering the hardware. I suggest buying two sets to make the most of shipping costs. Plus an extra part gives you a backup in case you make a mistake, or it allows you to build a second plane if you don't. Also, order a slim file for the hexagonal hole.

The wood for the plane body is made from any of a variety of hardwood. You need a piece $1\frac{1}{2}$ " x $3\frac{3}{4}$ " x 10". The toolmakers at E.C.E. use red beech, hornbeam, pear or lignum vitae. In Japan, toolmakers often use a dense oak. My preference for wood that's available locally is white oak or hard maple. You may find something already on hand in your shop.

Making Your Plane

Draw the pattern for the plane on your wood block. Three hole sizes are required: $\frac{3}{8}$ " diameter, 1" diameter, and 2" diameter. If you don't have a 2" drill bit, this can be cut using a scroll saw or a hand coping saw. The two 1" holes are merely to give a smooth curved hand hold, and can be sawn instead. The $\frac{3}{8}$ " hole for the thumbscrew is drilled $\frac{1}{2}$ " from the top surface, centering on the 2" hole opening.

Now cut the profile of the plane. Once the edges

Here is my shop-made router plane made from white oak with a $\frac{5}{16}$ " Allen wrench and a $\frac{3}{8}$ " thumbscrew, washer and wing nut.



Drill the $\frac{3}{8}$ " hole for the thumbscrew. The larger 1"-diameter and 2"-diameter holes can be either drilled or sawn depending on your woodshop's drilling capabilities.



The plane body is sawn on the band saw.



Sand the plane body.



Round the edges with a trim router. The template for the layout of the body is on the bench.



Drill the thumbscrew with a $\frac{5}{16}$ " drill, as shown here. Note that the position is $\frac{1}{8}$ " closer to the thread side of the head.



Use a slim triangular file to make the hexagonal hole for the Allen wrench.

are sanded, round over all edges using a wood rasp, or an $\frac{1}{8}$ " round-over bit in a router as shown in the photo above. Enlarging the $\frac{3}{8}$ " hole to receive the thumbscrew is best done after making the hexagonal hole for the Allen wrench. At this time the thumbscrew will not quite fit into the middle hole, but it will later.

The thumbscrew now is drilled and filed to make a hexagonal hole for the Allen wrench. Start by drilling a $\frac{5}{16}$ " hole in the malleable iron thumbscrew head. This hole wants to be $\frac{1}{8}$ " closer to the threaded stem than the actual center. Do your drilling with the thumbscrew firmly clamped to avoid an accident. I find that

starting the $\frac{5}{16}$ " hole by slightly angling the drill can achieve the desired location. However, once started, drill straight across so the Allen wrench will be held at right angles to the holder.

The hexagonal hole shape is achieved using a slim file similar to the smallest triangular file for sharpening hand saws or the square file in the supplies list. Orient the hex shape so that the cutter will face forward. The malleable iron files relatively easily. You want a tight fit, so keep testing for size as you file.

Now the holder and cutter (the thumbscrew and Allen wrench) are ready to be fitted to the plane body. A $\frac{1}{4}$ " chisel will serve to enlarge the place where the $\frac{3}{8}$ " hole comes into the center opening. You want the holder to recess sufficiently so the cutter is held

firmly against the wall of the center opening.

You are now ready to grind the cutter. The Allen wrench is already hardened and suitable for the plane blade. By having a small container of water handy to the grinding wheel you can keep the temperature from spoiling the tip of the blade. Both legs of the Allen wrench need to be shortened somewhat. Because this is hard steel, a hack saw will not work. Grind a V-groove from all sides until the waste end drops off.

Before grinding the cutter itself, study the cross-sectional drawing at right that shows the angles needed for an effective blade. Specifically, note the need for relief. In the words of the advertisement for stomach acid medicine, "How do you spell relief?" In cutting tools relief is spelled

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Feb. 11, 2006



Here the blade and holder are ready to be fitted into the plane body.



Carve the recess for the head of the thumbscrew as shown here.

out as: "Nothing touches the work surface behind the leading edge." To achieve this, the Allen wrench is ground flat on the bottom, with the angle rising steadily from the cutting edge to the back with about $\frac{1}{8}$ " of rise. This will ensure that it will avoid skating off without being able to cut.

The top surface is ground last to give an approach angle of 30° . Both top and bottom grinding need to result in a cutting edge that lays flat to the work surface. This is a trial-and-error process that will take some fussing to get right. I prefer a belt sander for the finish work. It is an opportunity to use up a partially worn belt. The advantage of the belt sander for finish grinding is achieving a flat surface, good control, and a cool working surface while using water to dip the blade.

A tool is a problem-solving device. The most important part of any tool is your eye for knowing when and where to use it, and your hands to guide it to the solution. So put your new router plane to use right now. Clamp a scrap of 2 x 4 that's 1' long in your bench vise. Draw a slot 1" wide and 6" long. Now use a chisel to define the edges, and chip out a little waste at the stop end of the slot. Set your plane for $\frac{1}{8}$ " deep, and go for it.

A wood plane with its special cutter and holder is in your hands to make it work. It's a valuable new tool for less than \$5. **PW**



Grind the cutter to a 30° angle. Grinding manufacturers don't recommend side grinding but I've always felt safe.



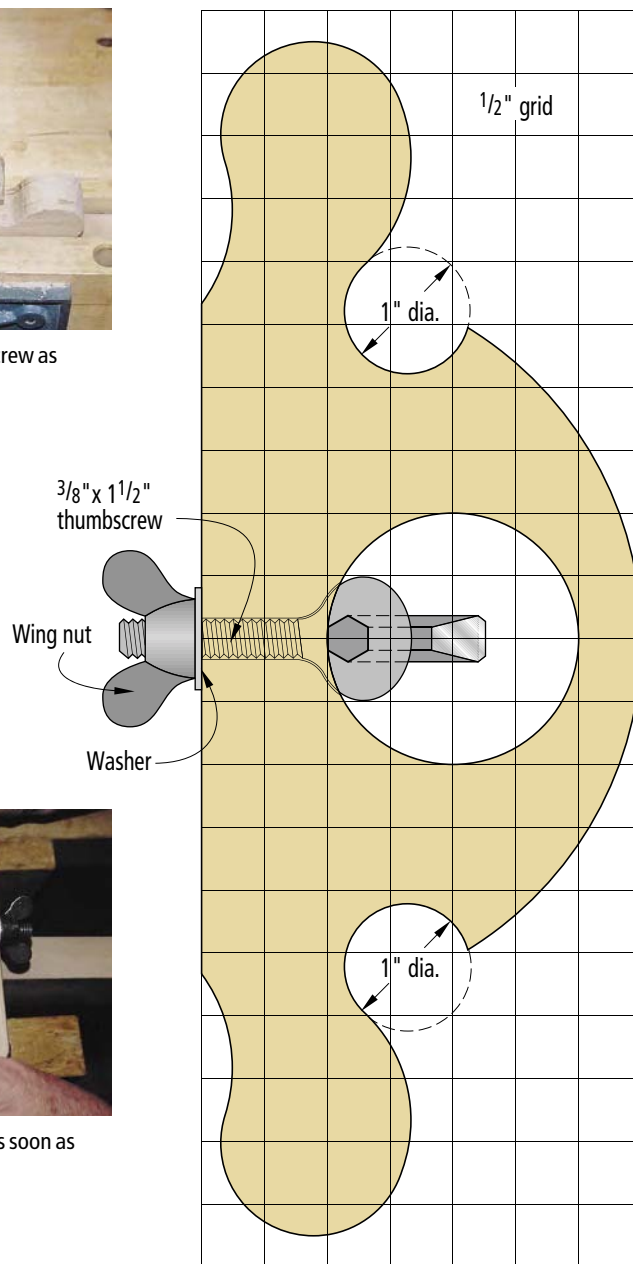
Be sure to give your router plane a trial run as soon as you're done sharpening the iron.

SUPPLIES

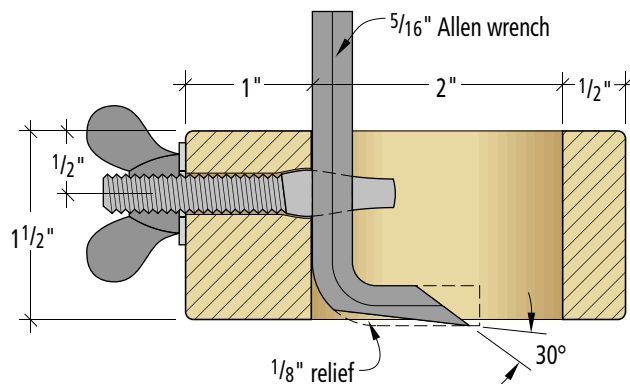
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Plan



Section

POWER-ASSISTED **DOVETAILS** **FOR DRAWERS**



It's hard to blame anyone for turning to a router and template when the job calls for a kitchen's worth of dovetailed drawers. If nothing else, the process is fast. Once you've fine-tuned the router settings, you can knock out a lot of drawer boxes quickly and with perfect regularity. And that's the problem—all that regularity makes for boring joinery.

Boring and uniform: With many dovetail jigs, the spacing of tails and pins is fixed, and those pin-to-pin dimensions don't always coincide with actual drawer heights. Templates that allow adjustable spacing are an improvement, but pin width and slope are fixed by the shape of the router bit, and bits may have thicker profiles than you would like.

These characteristics aren't as important when the drawers are going into a kitchen. But when a drawer is bound for something special—a chest of drawers, for example, or a nice little side table—the look and lack of flexibility in a machine-cut dovetail is all wrong. Hand-cut dovetails have a lot more eye appeal, and their dimensions and spacing can be infinitely adjusted to suit different tastes, species of wood and drawer heights. The only problem is that cutting them by hand and removing all the waste with a chisel and mallet is tedious—about as interesting as watering the lawn.

One way to speed up the process, without detracting in any way from the hand-cut look, is to use a small router to do a lot of the heavy stock removal. I use a laminate trimmer, a small router that can be guided easily with one hand. This approach takes half the time of doing all the work by hand, and with a little practice produces consistently accurate results. Best of all, you won't be limited by a template or the shape of a router bit. It's really the best of both worlds.



Half-blind dovetails cut using this method look exactly like those cut entirely by hand.



Using a marking gauge, scribe a line across the end grain of the drawer front. It should be about one-third of the board's thickness in from the face.



Without changing the setting on the gauge, scribe a line on both inside and outside faces of the drawer sides. These are the base lines for cutting the tails.

Lay Out & Cut the Tails First

Much of the process is identical to doing it all by hand, and the first thing is to prepare the drawer parts carefully. Assuming the drawer is to fit in a case, without the use of any drawer hardware, an accurate fit is essential if the drawer is to work smoothly.

It may seem counter-intuitive, but making a drawer loose for the opening makes it harder to operate because the drawer racks and binds as it's opened and closed.

The drawer front should just fit into the opening side-to-side. Be sure to allow enough clearance in height so that seasonal changes in moisture content won't swell the drawer closed in summer heat and humidity. The drawer sides and the drawer front must be cut dead-on square for everything to work correctly.

With stock prepared, lay out the joint just as you would if no machine were involved. I start by using a marking gauge to strike a

line on both ends of the drawer front about a third of the drawer's thickness in from the front. Without changing the setting, strike a line across each drawer side. This represents the length of the dovetails, and while both dimensions must be equal, the exact length isn't important. Leaving a narrower margin at the front of the drawer looks a little more graceful to me, but it also increases the risk slightly that something will go awry later in the process.

With these lines scribed, change the setting on the gauge so it equals the thickness of the drawer side and mark the inside surface of the drawer front. This represents the length of the pins and I try to get it as close to the actual drawer side thickness as possible. Here's why: In case work,

A small router takes the drudgery out of half-blind dovetails.

by Scott Gibson

Scott Gibson, author of "The Workshop," (Taunton Press) is a writer and woodworker in Steep Falls, Maine.



Reset the gauge so it equals the thickness of the drawer side and scribe a line across the inside face of the drawer front. This represents the depth of the dovetail pins.



Using a chisel to mark out the tails saves time. Just align the center of the chisel on a mark representing the center of each tail and mark the edges. Then use the bevel to draw the tail locations.



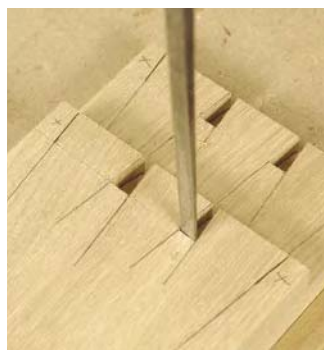
Dovetail spacing is completely flexible, although the layout usually begins and ends with a half-pin. You can make a small "x" where waste is to be removed.



Cut out the tails on the drawer sides with a dovetail saw, taking care not to go past the scribed base line. Unless the cuts are square across the edge of the board it will be impossible to transfer your pin locations accurately to the drawer front.



With the sides of the tails defined by the saw kerfs, use the chisel to chop out the waste. It helps to make the scribe line a little deeper with a knife and pare a small shoulder with a chisel. This prevents the chisel from drifting over the scribe line as you chop.



Use a mallet to chop downward at the base line, then pop out a sliver of waste by working in from the edge of the board. Take it a little bit at a time and work about halfway through the board. Then flip the board over and finish from the other side.

it's more common to lay out the joint so that the pins will protrude slightly when the piece is assembled. They can be belt-sanded or planed flush with case sides very easily. But taking too much stock off a drawer side after the joint has been glued up will ruin the fit.

With lines scribed, set an adjustable bevel for the angle of the tails. By convention, the slope on the sides of the dovetail is 1:6 for softwoods and 1:8 in hardwoods, although I'm not sure it matters that much.

Lay out the tail spacing of the tails along the drawer side with a

pencil. Spacing is entirely up to you, although it's typical to start and end the layout with a half-pin. It also saves time to use a chisel to set the width of the tail at its widest point.

Now cut out the tails on the drawer sides with a saw all the way to (but not beyond) the scribed base line. Split the line to the waste side, as furniture maker and author Tage Frid used to say, and you won't go wrong.

The half-pin waste on each end can be removed with just a saw. The waste between tails can be chopped out with a chisel. Work

from both sides, and when you're finished make sure all the waste has been removed from the inside corners of the tails. Use a chisel or knife to clean out what's left.

Because tails are cut first, it doesn't matter that much if the angle of the cut is slightly off, or if one tail is slightly wider than another. What does matter, however, is getting the saw cuts square to the end of the drawer sides. If those cuts are angled, it won't be possible to transfer the pin layouts accurately to the drawer front, and the joint won't fit properly. Inspect the cuts carefully, and if they're



Check that the tails are clean all the way through, with no remaining waste in the corners. It's also a good idea to check that the cuts are square across the end of the board – if not, correct the problem now by paring the tails with a chisel.



Now transfer the tail layout to the edge of the drawer front by aligning the drawer side on the scribed line on the drawer front and marking the pins with a knife.



Holding the drawer side firmly, use a layout knife to scribe lines on the edge of the drawer front. These lines mark the dovetail pins.



Clamp the drawer front at a comfortable working height, with the inside of the drawer facing you. To help stabilize the laminate trimmer, clamp a scrap of wood to the drawer front. Make sure the clamps are set below the base line.



Adjust the base of the router so the end of the bit just touches the base line. This carbide spiral bit removes waste cleanly. Turn on the router and nibble out the waste between pin lines. Work slowly and be careful not to drift over your layout lines.

not square, true them up with a chisel before going ahead.

Use Tails to Lay Out Pins

The completed tails are used to lay out the pins on the drawer front. I put the drawer front in a bench vise and arrange the drawer side so the front edge lines up exactly on the scribed line on the drawer front. Hold the drawer side firmly and use a sharp layout knife to trace the pins on the end of the

drawer front. Make sure the drawer side doesn't shift out of position as you work.

This would normally be the time to cut to the lines with a saw and chop out the waste with a chisel, and here's where you'll bless the person who invented the laminate trimmer.

What makes it ideal for half-blind dovetails is its small size and light weight, and the fact that it can be guided with one hand. I use

a 1/4" solid carbide spiral up-cut bit, which makes a very clean cut.

When all the lines have been transferred to the drawer front, clamp a piece of straight wood to the front side of the drawer front to give the router base a wider contact surface. A piece of material 3/4" to 1" thick is usually adequate, and it should be clamped so it's perfectly level with the edge of the drawer front. Adjust the bit depth so it meets the scribed line

on the inside of the drawer front as shown on page 76, turn on the router and nibble out the waste between pins.

If you're careful, the bit can be brought surprisingly close to the scribed pin lines – less than 1/16". Work slowly, be mindful of the direction the bit is spinning and keep an eye on the back line as well as the pin line. The bit will leave rounded corners, but it will remove almost all of the waste.

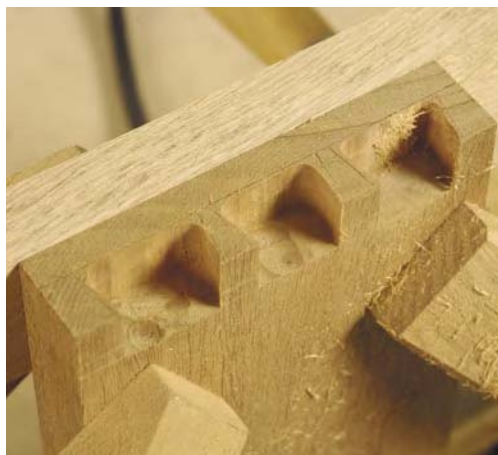
Clean Up the Cuts and Assemble the Joint

Once the router has finished its work, what you should be looking at is a nearly complete joint. All that remains is to pare away the little bit of remaining material on the drawer front pins with a sharp chisel.

Rather than removing all the waste in one swipe, it's best to take smaller bites. Simply place the chisel just a bit back from the routed edge and tap it lightly to pare away a sliver of wood. Work up to the scribed line, finally placing the edge of the chisel right in the scribe line (this is why it's better to use a layout knife rather than a pencil to mark them). A source of raking light will make the lines easier to see, but you can also darken them in with a pencil. You'll still be able to feel the edge of the chisel slip into position when you make the last cut.

Use the same approach to pare away the waste on the back line, and work carefully into the corner, taking a little bit of material off at a time until the corner is completely cleaned out. One thing to watch for is wild grain – it can send your chisel off in the wrong direction and damage the workpiece. If working straight down seems to be causing a problem, try paring in cross-grain from the side. If you do shear off a section of pin (and it happens occasionally), you can always use cyanoacrylate glue and an accelerator to quickly repair the damage.

With both pins and tails cut, the joint can be tested for fit. Ideally, it will take light taps of a mallet or small hammer to bring the two pieces together. Getting a good joint is a matter of practice and feel. If the saw cuts are square and the marks transferred accurately to the drawer front, joints made this way should fit together nicely. Start the joint together to



When you're finished with the router, there should be very little material left to remove.



Begin paring away the waste on the sides of the pins. Take small bites. Finish each pin by placing the edge of the chisel right in the knife line and tapping lightly with a mallet.



When the sides of the pins have been pared to the line, work on the front of the joint. Make sure the front edge and the sides of the pins are square, not sloped, so the joint will go together without splitting the drawer front.



First test the joint by just starting the two pieces together. Pare away any material that would seem to interfere with the joint. Then apply a bit of glue to the sides of the pins and assemble the joint.

check – you can always make a minor adjustment now if something seems too tight – but don't put the joint all the way together just yet. Once you're reasonably sure the joint is going to fit together to your liking, add glue to the sides of the pins and assemble your parts. When the glue is dry, trim the joint flush. The result should look hand-cut because it is hand-cut. You've just had an assist from a power tool perfectly suited for the job. **PW**



You're done. Parts should fit snugly, but if you find you have a gap between a tail and a pin, a sliver of wood and a touch of glue will work wonders.

Rumplestiltskin is My Name

Unlock the secrets of your hand planes by first learning their real names.

Ever-increasing numbers of woodworkers are using hand planes in their shops. Their demand for fine planes has given rise to boutique plane makers such as Clark & Williams, Lie-Nielsen Toolworks, Veritas and Shepherd Tool Co. to name a few.

These users' interest has given rise to another industry, no less substantial than the plane manufacturers: The opinionated and self-righteous wood plane experts! These dreaded, self-proclaimed experts offer their opinions in books, DVDs and yes—you guessed it—magazine articles. They offer gems in dribs and drabs, promising that (with their help, of course) you can magically turn any rough-sawn surface into wood as smooth as gold.

Naturally, each expert's opinion is as individualistic as the woodworker offering it, leaving you no alternative but to buy all of the books, videos and—you guessed it—woodworking magazines available on the subject. Worse still, each new plane acquisition requires a new set of books and videos because the experts never attempt to relate a greater understanding of the larger context that would allow you to answer your own questions. No. You must come to me, the wood plane expert. The only way you can break your dependence on me and my fellow magicians is to learn my name. OK, the plane's name actually.

In the children's story of Rumplestiltskin, the princess gained the upper hand by learning the magician's real name. The proper names for wood planes are no less elusive or powerful. Learning them is absolutely the key to gaining an important advantage in selecting, tuning and using wood planes in your work.

In this, the third in a series of articles on working wood quickly and efficiently with hand tools, we'll begin to explore the mys-



Photos by the author

Learning the true names of your planes will allow you to figure out what they should be used for—leveling your stock, fitting joinery or adding ornamentation.

terious and sometimes contentious world of hand planes. I'll attempt to provide a simple framework that will serve as a reasonable starting place from which you can venture, and to which I suspect you will inevitably return.

'Who Told You That?'

If learning the name of each plane is the secret to unlocking its power, then plane manu-

facturers and we plane "experts" have done everything we can do to keep you in the dark. Stanley listed its 14"-long No. 5 plane as a jack plane and called the 18"-long No. 6 a fore plane. Wooden jacks were typically 16".

Joseph Moxon, a 17th century chronicler of woodworking tools and methods, tells us the fore plane and jack plane are two names for the same tool: a roughing plane. According to Moxon, "jack" was the term used by carpenters, while "fore" (ostensibly describing the order in which the plane was to be used) was used by joiners to describe their roughing planes.

To add to our confusion, 18th-century estate inventories listed both jack and fore

by Adam Cherubini

Adam makes reproduction furniture using the tools and techniques of the 18th century. He demonstrates his craft at Pennsbury Manor in Bucks County, Pennsylvania, on Historic Trades Days. You can contact him at adam.cherubini@verizon.net.

planes in the same shop indicating, at least by then, there was a perceptible difference.

The difference between a try plane and a jointer plane has been long debated. Though the planes may appear identical, their appearance is their only similarity.

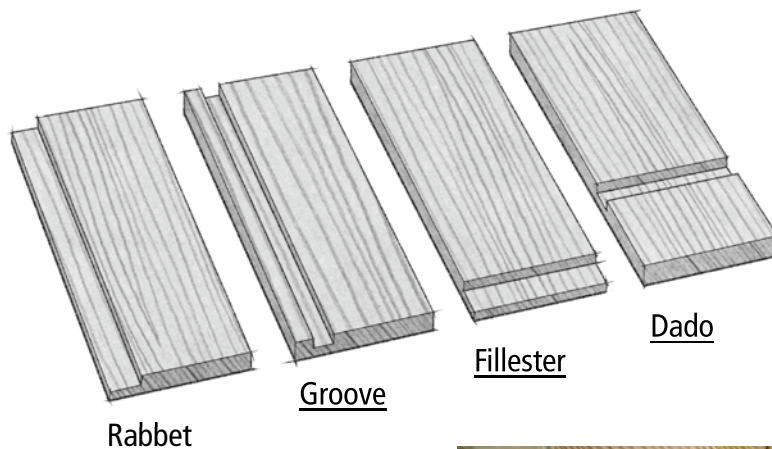
The confusion about the differences between dados and grooves, or fillisters and rabbets, is forgivable for the uninitiated. But when manufacturers call fenced rabbet planes (such as the Stanley No. 78) a “duplex fillister,” somebody ought to call a good lawyer. The first time you try to cut a fillister with a plow plane or a dado with a rabbet plane, you realize either that you’ve been had, or that hand tools are hard to use and not worth the trouble.

Sorting Things Out

Archeologist, historian and tool collector Henry Chapman Mercer (1856-1930) organized the wood planes he collected into three unique categories according to their purpose. Mercer could have organized his planes as others have since then: by the original users’ trade, or the tools’ outward appearance. But Mercer was far more than just a wealthy collector with a penchant for odd things:

“Who has ever fully described this ancient tool, in its 18th century varieties? Owing to the confusing and non-descriptive names given to it, it is hard to understand until we overlook the endless variations in its make and shape and grasp the three purposes of its construction.” – Henry Mercer, “Ancient Carpenter’s Tools.”

It is a shame Mercer’s categories have not received greater acceptance from woodworkers. As it turns out, Mercer’s system is both helpful and robust. It’s an excellent starting place for any would-be planer.



Because many woodworkers use a table saw with a dado blade to cut the joints above, their proper names have fallen out of use. When things were made by hand, every workman knew these names and the different tools required for each.

Leveling Planes

The leveling planes, oft called generically bench planes because they’re needed for every job and therefore never leave the bench, are the jack or fore plane, the try plane and the smoothing plane. All leveling planes benefit from having curved irons for the reason Moxon explained in his “Mechanick Exercises.”

“Should the iron of the plane be ground to a straight edge and be set ever so little ranker on one end of the edge than the other, the ranker end would (bearing as then upon a point) in working, dig Gutters on the Surface of the Stuff.”

The lengths of leveling planes vary in accordance with each tool’s specific use. Smoothers are shortest. Their principal duty is to leave a smooth surface regardless of its flatness. Try planes are the longest of the group. Their length leaves a flat surface. Fore planes are the roughing planes. The fore plane’s traditional 16" length is a convenient size for rough use.



Stanley listed its 14"-long No. 5 plane (shown at left) as a jack plane and called the 18"-long No. 6 a fore plane (not shown). The manufacturer of the 14" low-angle jack plane (center) says the plane is “technically a block plane.” The No. 40 scrub plane (shown at right) is a metal version of a European jack plane.

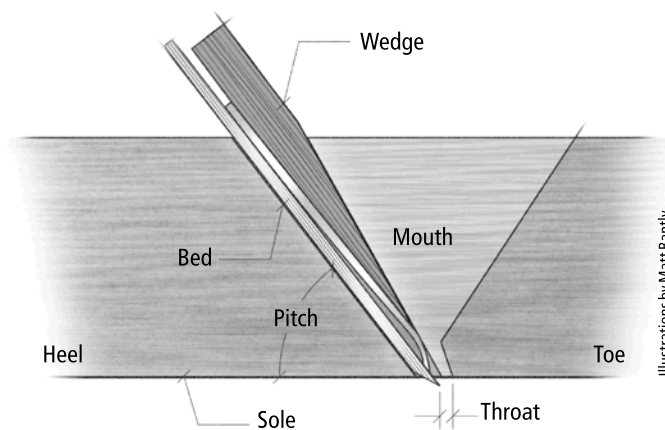
Smoothers’ mouths must be tight; as tight as possible to leave a truly smooth surface. Similarly, smoothers benefit from higher blade pitches. Fore planes may have wide-



Which one is the jointer again? Obviously the longest plane has the advantage when straightening an edge, but of the three, the widest may be the best choice, for it has advantages when edge planing thick stock.



Stanley named the #78 (left) a duplex fillister (whatever that means). It has many of the features of the wooden fillister at right except the one feature that makes it effective for creating fillisters. Can you tell what that is?



Illustrations by Matt Bantly

Anatomy of a wooden plane



The degree of blade curvature varies: smoothers (left) have the least, fore planes (center) the most. As a side benefit, the curved blades eliminate the necessity for lateral-adjustment mechanisms. At right is a try plane.

open mouths. Tear-out is limited by working at some angle across the grain. Try planes need a moderately tight mouth to work with the grain when needed. If a try plane's mouth was as tight as a smoother's it would work much too slowly.

Fitting Planes

The fitting planes are specifically designed to prepare square features for joints. The fitting plane category includes the dado, rabbet, "match" planes (which make tongue-and-groove joints), fillester, plow, router and the "glewing" jointer, which is often mistakenly placed with the leveling planes.

One needn't have all of these planes initially, though such a set would have been fairly typical in a professional cabinetshop in the 18th century. A common wide skew rabbet can be used with a batten or applied fence to

produce both rabbets and fillets of different sizes. Only buy a jointer if you need to glue up panels, otherwise a try plane can work your edges straight. Plows, dados and match planes work quickly and efficiently, and should be on the top of your tool wish list. Once sharpened and tuned correctly, you'll find little use for your electric router.

The blades of all fitting planes are always ground to form a perfectly straight edge. The "gutters" Moxon spoke of are not a problem with these tools because fitting planes are never called upon to work a surface broader than the width of their blades. In every case, except the jointer, a fitting plane benefits from a wide mouth. This allows the user to waste away wood fast. A flawless surface finish is never important because, by definition, the surface created is a joint that will be covered up. The "glewing" jointer is an exception to

this last rule. Its fine mouth facilitates the creation of lightly sprung match joints and very straight edges. Also, an edge with tear-out may blemish the face after the joint is glued.

Fitting planes designed to work perpendicular to the grain typically have skewed blades. This is a distinct advantage for this type of work. When working with the grain, the skewed blade pushes the plane sideways. This can be advantageous when guiding the plane along a batten, or banking the tool against a pre-established fillet. But it's a distinct disadvantage when establishing a feature freehand.

Ornamentation Planes

Ornamentation planes produce mouldings. A seemingly infinite variety of ornamentation planes exist.

Simple moulders are often called hollows and rounds, each named for the shape of the plane's sole, not the moulding it produces.

When making a moulding, one often needs to remove a great deal of material from a long length of stock. Naturally we prefer to do this



Shown from left are a set of four dado planes, three skew rabbets, a pair of side rabbets, two pairs of match planes for different size stock, moving fillester, specialty drawer bottom plow, wedged arm plow, old widow's tooth router (uses plow plane irons) and a 30" jointer plane behind them all.



A skew rabbet plane (top) can work across the grain or with it. The square rabbet plane (bottom) is easier to freehand.



Complex moulders produce shapes with complex curves or multiple features; simple moulders produce a single, fillet-less, convex or concave arc.



Here is a half set of round planes.



Here is a half set of hollow planes.



Technically, beads and sash planes (as shown here) are complex moulding planes, but they are rarely categorized as such.

quickly, and that means a sharp iron and an open mouth. But the decorative nature of the moulding requires a tight mouth for a smooth finished surface. So should a moulding plane have an open mouth for fast work, or a tight mouth for a smooth finish? We can't have both. Unfortunately, I don't know the answer.

In Michael Dunbar's excellent book, "Restoring, Tuning, and Using Classic Woodworking Tools" he recommends purchasing hollow and round planes in matched pairs. I've never come across a technical reason for this practice. It suggests some functional requirement (like making a joint) that should theoretically never exist within the category of ornamentation planes. Maybe Dunbar was thinking of using hollows and rounds for rule joints? Until we figure this out, I recommend sticking with Mercer and buying or making any

shape you think will be helpful and forgetting about looking only for matching sets. It's also a lesson to beware of arbitrary requirements.

Back Where We Began

Mercer's categories are the starting place I promised. Mercer saw the arts and mysteries in the commonality of design and function. That enabled him to solve the problems he faced in identifying unusual planes.

But it helps us precisely the same way: One needn't consult an expert to learn how to tune or use an unfamiliar plane. Use the design (including length and other physical characteristics) to help you place the plane into its proper functional category and name. Once properly identified, you will instantly know how the iron should be sharpened and how tight the mouth should be.

Likewise, by determining what function you require, (such as surface leveling, making rabbets, dados, grooves, mouldings etc.) you can select the design of the plane you need, regardless of what the manufacturer calls it. This way, you can determine if a skewed iron or tight mouth really is a benefit for your work. Unfortunately, you can't trust the manufacturer to always know such things.

Mercer's categories are a starting place, but also an inevitable destination. See, there's much more to Mercer's categories than just cataloging the tools in a collection, or tuning and using planes. Implied but never discussed is the notion that each plane fits into only a single category and has but a single name. So naming each plane correctly is an important first step. Recognizing that a plane can only have one true name is the next. **PW**

Fixing Finished Surfaces

Remove common surface problems with minimal damage to the finish.

Cleaning the finish on furniture can involve more than just wiping now and then with a damp cloth or furniture polish. Foreign matter can become stuck to the surface and require a more complex cleaning procedure. Here are several common examples and how to deal with each.

Stickers and Tape

Many retail stores and moving companies put labeling stickers with prices and other information on furniture. If these stickers aren't removed within a few months they can become so stuck to the surface that you can't peel them off. Because the glues that are used on these stickers vary, it's not possible to identify one solvent that will dissolve every one. In many cases the solvent that works best, in fact, also dissolves the finish.

Usually, the safest way to remove these stickers is to soften the paper with water (as you do to remove paper labels from jars), then peel off the paper and either rub off the glue with your finger or soften it with a petroleum-distillate solvent and then rub it off.

Petroleum-distillate solvents include mineral spirits (paint thinner), which is the weakest, naphtha, xylene (xylol) and toluene



Sometimes stickers become so stuck to a surface that they can't be peeled off. Usually water or solvent can be used to remove them.



Felt-tip pen marks can be removed without damaging any coating (except shellac) by wiping lightly with denatured alcohol.

(toluol), which is the strongest solvent. All are available at paint stores and home centers, as is turpentine, a pine-sap distillate, which has a solvent strength similar to naphtha.

None of these solvents causes damage to any finish except wax and water base unless they remain in contact for a considerable time. They all remove wax; and xylene and toluene will damage a water-based finish.

Masking and Scotch tape are more difficult to remove because you can't use water to separate the tape from the glue. You will have to work a solvent under the tape. Toluene and xylene are best (except on water-based finishes) because of their strength. Other solvents such as alcohol and lacquer thinner may damage the finish.

In extreme cases, you may have to scrape or abrade off the tape and then repair the damage to the finish. Sometimes there's a

color difference in the wood or finish under the sticker or tape because this area was shielded from light.

Candle Wax

You can remove candle wax from a finish a little at a time by rubbing with a petroleum-distillate dampened cloth. But it is much faster to use ice to crystallize the wax and then pick it off the surface.

Hold an ice cube against the wax for five or 10 seconds to freeze it. Then pick the wax off the surface with your fingernail and remove



Candle wax can usually be removed by picking it off after freezing with an ice cube. Any remaining wax can then be dissolved and wiped off with mineral spirits.

by Bob Flexner

Bob is author of "Understanding Wood Finishing," now in its second, fully revised, edition. To purchase, visit amazon.com, your local bookstore or a woodworking supply store.

any that remains with a petroleum-distillate solvent.

If you don't have any ice handy, you can cut or scrape off the majority of the wax with a chisel, knife or plastic credit card. Then remove the rest with a petroleum distillate.

Crayon Marks

Because crayons are wax, you should be able to remove crayon marks by wiping with any petroleum-distillate solvent, turpentine or even furniture polish. But if the finish is so thin that the crayon has gotten into the wood, you may have difficulty removing all the color. Try washing the surface several times with the petroleum distillate. It may help to scrub the affected area lightly with a toothbrush.

Paint Spatter

When you roll latex paint onto walls and ceilings, the roller throws off tiny droplets of paint that land on you and everything else in the room. If you don't cover your furniture well, you may find these droplets stuck to the finish.

For a few days you may be able to remove the droplets by rubbing with a cloth dampened with water, or soap and water. But once the droplets have hardened, you will need to rub them with a solvent.

The solvent to use is toluene or xylene, which is the active solvent in commercial products such as Goof Off and Oops!. Be very careful using one of these solvents on water-based finish or latex paint.

Unlike latex paint, oil paint cannot be removed easily from another paint or finish without also damaging it. Only a very strong solvent such as lacquer thinner or paint stripper will soften oil paint, and these solvents will dissolve or soften every other paint or finish on the piece, too. To remove oil paint with the least damage to the underlying paint or finish, you usually have to scrape or abrade the paint off the surface.

Felt-tip Pen Marks

The binder used in felt-tip pens and Magic Markers is similar to shellac in that it is usually soluble in alcohol, so the obvious cleaner is alcohol. Of course, you won't be able to avoid damaging a shellac surface, and you will need to be very careful on lacquer and water-based finish.



Crayons are wax, so crayon markings can be removed by wiping with mineral spirits.

Mold and Mildew

Mold and mildew are bacteria that thrive in damp conditions common in cellars. It doesn't do much good to remove the mold or mildew from the surface if you don't kill the spores. To do this, mix equal parts of household bleach and water, and wipe the surface using a cotton cloth or sponge. The bleach won't damage any finish, but the water will if it gets under the finish and into the wood. So don't soak the cloth.

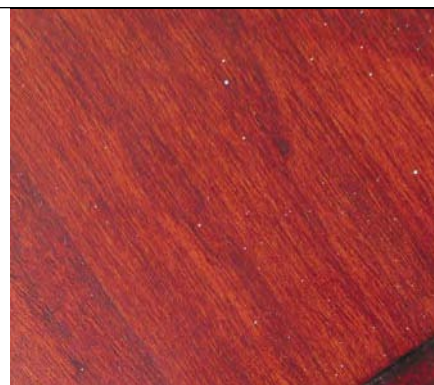
To aid in the cleaning you can add a pH-neutral soap such as dishwashing liquid. Then wipe the surface with a clean, damp cloth to remove any residue that might be left from the bleach or soap. Carefully dry off the surface with a dry cloth. To keep the mold and mildew from returning, place the furniture in drier conditions.

Wrinkled Finishes

A dirty, wrinkled and often sticky finish on chair arms and backs, edges of tables, and



Mildew spores can be killed (to stop further growth) by washing the surface with half-and-half household bleach and water. Dry the surface quickly so the water doesn't damage the finish.



Latex paint spatter can be removed without damaging any coating except water-base or latex paint by scrubbing lightly with xylene or a proprietary product containing xylene.

around knobs and pulls is usually the result of the finish having been broken down by repeated contact with mild acids or alkalis. The most common culprit is acidic body oil or sweat from peoples' hands, arms and backs. Repeated washings with an alkali soap can also cause this problem.

You can try washing the finish with a mild soap such as dishwashing liquid. If this doesn't correct the problem, you can try rubbing with steel wool to abrade off the surface of the finish and expose good finish underneath. Usually the finish is destroyed all the way through, however, so it has to be removed and replaced to fix the problem.

The Ultimate Fix

With the possible exception of the wrinkled finish, all of these problems can be corrected by abrading – in effect, rubbing out the finish, or at least a part of it. But this may cause sheen differences, so try the methods I suggest above first. **PW**



Finishes that have softened and become wrinkled (and also dirty) because of extended contact with acids contained in body oils and sweat (as shown above) usually have to be stripped and replaced with a new finish.

Solid Roots for Good Design

The first step to a pleasing form is knowing your possibilities and limitations.

Whether or not you know it, every time you make something you are designing. What does that mean, exactly? This definition (from “The Random House Dictionary of the English Language”) sums it up well: “... to plan and fashion the form and structure of an object.” You may do this as you go without consciously thinking, using your experience (or possibly lack thereof) to determine the structure, procedure and form of your work. In other words, you do a certain step a certain way because that is the one way you know best or you don’t know any other way to do it. Or you may carefully plan out every step in advance, specifying materials, drawing the finished object before you even begin, etc. Either way, you are a designer.

To design work for the lathe, you need to have a general idea of what you plan to make and what kind or kinds of materials will be suitable for the project. For this article we will use a wooden bowl as our example. You will decide how to treat the wood based on its condition. For example, you could use it as is, rough-turn and dry it, turn it green, etc. You also will decide how to attach it to the lathe, and what tools and procedures, in what sequence, you will use to produce the work. And eventually, even if by default, you will decide what form the object will take; what it will end up looking like. I’ll discuss form and proportion in our October 2005 issue.

The process of designing anything is something like starting at the root of a tree, with the tip of each and every twig on the tree a possible destination. You travel up the trunk, taking one branch, and then another, and so on, until you reach a final design. Each choice,



If you’re turning green wood, designing a bowl begins when you rough it out. Leave the bowl thick enough for the shape and detail you want. Remember, you will lose a fair amount of the thickness just getting it round again after it dries and distorts. Pay special attention to the foot; a common problem is too little material left to comfortably re-attach the piece to the lathe and create a pleasing shape that harmonizes with the rest of the piece.



Photos by Al Parrish

each decision you make, will automatically eliminate a great many possibilities that lie along other branches, but will also bring you closer to your goal – the finished piece. So an important tool in designing anything is an understanding of how each decision will both place limits on, and enable possibilities for, what comes next.

For example, if you decide you’re going to use clear hard maple, you need no longer

consider any issues about the appearance or other characteristics of other species of wood, and how those characteristics might affect your design or its execution. But you can now take into account what will be possible with the maple. Maple is hard and strong, and has a close and even grain; you can make a very thin bowl, or one with very tight, crisp detail, though you aren’t limited to doing so.

If, on the other hand, you will be using spalted maple that has gone somewhat soft, the nature of this material may preclude an extremely thin bowl because it would not be strong enough to hold together if too thin. Or you might have to avoid adding very tight detail because it would require too much sand-

by Judy Ditmer

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ing. In terms of aesthetics, such detail might be inappropriate anyway; the wood itself is visually dense, and too much detail could easily make the piece too busy.

Deciding how you will mount the work for each step in the turning process is a critical part of designing it. If you will use a faceplate, you need to ensure that the area containing the screw holes will be eliminated later. Usually this isn't an issue with the first mounting, because the holes are in what will become the interior of the bowl. But if a faceplate will be used on the foot to turn the inside of the bowl, then as you turn the exterior, be sure to leave enough wood on the bottom for the faceplate. So faceplate mounts are often a good choice for larger work; there is plenty of room for the screw holes, and it is a very secure way to hold a large, heavy piece of wood.

If you will be using a chuck, at some point you will need to prepare the workpiece for the chuck by turning the appropriate shape on one

or both sides. This might be done while the piece is between centers; it might mean cutting a recess on the bottom of the workpiece while it is initially mounted on a faceplate. Chuck mounts work well for medium-sized pieces, or pieces that will need to be removed and replaced several times.

For small bowls, a waste or glue block is often the best choice for mounting. A piece too small to be effectively or safely mounted on a chuck is easily turned on a waste block, and none of the workpiece is used up in the mounting. See "Mounting a Bowl" below for more information on the subject.

Again, each move outward on your decision tree both creates and limits possibilities. A very big part of design, whether technical or aesthetic, is understanding these limitations and possibilities and the complex ways in which they interact.

It's a good idea to learn to use as many different materials, mounting methods, pro-

cedures and tools as you can. This increases your "vocabulary" of solutions for a variety of problems or questions you will encounter in designing your work. And the larger your vocabulary is, the better able you will be to clearly express your ideas, or even to have them in the first place.

If you only know how to mount a bowl using a chuck, you may tend not even to think of designs that would work best, or would only work, if mounted on a waste block. At best, such designs could be difficult to execute if you only know one or two ways to mount a piece on the lathe.

There are many variables; experience will begin to open up the possibilities. In the meantime, choose a particular way to proceed with this bowl, whether or not you are certain it is the very best one possible. Then make the best piece you can. Pay attention to that dance between limits and possibilities. It describes and defines what design is. **PW**

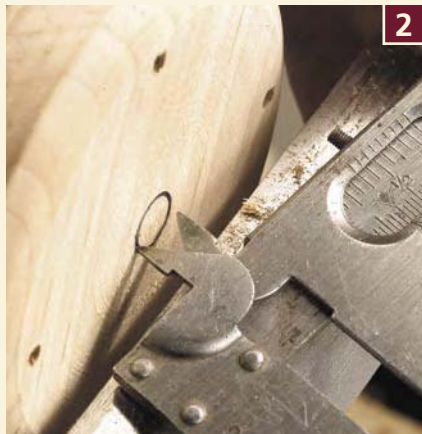
MOUNTING A BOWL

Mounting with a Faceplate and Waste Block

One of the most basic decisions in designing your bowl will be how you will attach it to the lathe. There are many ways to do this, and usually there will be at least two different mountings: one (or more) for turning the exterior and interior of the bowl, and one for finishing the foot. The method(s) you choose will be influenced by the kind and size of the piece of wood, the type of bowl you're making, whether or not you have a chuck, etc. Here is a simple sequence for mounting a small bowl using a faceplate and waste block.



A faceplate (not shown) is attached with screws to what will be the interior of the bowl; the screw holes are in the part that will be excavated later. The bottom is turned flat, leaving a small button in the center (this will be used to center the bowl on the glue block). The entire exterior of the bowl should be completed while on the faceplate, including sanding and finishing (unless finishing will be done off the lathe).



The workpiece has been removed; a glue block (shown left) has been screwed onto the faceplate, mounted on the lathe, turned round and faced off flat (I like to use hard maple for this but any hard close-grained wood is suitable). Measure the button on the bowl and transfer the size to the glue block. With the lathe on, touch only the left point of the caliper to the wood.



Cut a shallow recess to the diameter you have marked.

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Try the fit, and modify the recess as necessary. The button should fit snugly into the recess so the workpiece won't move off center, and the bowl shouldn't rock. You can test the fit with the lathe running, by gripping the bowl securely and pressing it onto the block; this will create burn or burnish marks and you will be able to see any high spots. If you are not comfortable doing this (the bowl could be twisted from your hands), just keep testing the fit with the lathe turned off until you have it right. It may take some trial and error. Glue the bowl onto the block with thick cyanoacrylate glue on the bowl and accelerator on the block. Rotate the bowl to spread the glue evenly and hold for a few seconds until it sets. Turn, sand and finish the interior of the bowl.



5

To remove the bowl, place a flat chisel or skew along the glue joint and strike the chisel with a quick, sharp blow with a mallet. The bowl should pop right off of the waste block. (If you can't manage to hold the chisel and the bowl with one hand, put a board covered with a towel or blanket across the lathe bed to cushion the bowl when it falls.)



6

Usually the glue joint breaks cleanly, and there will be only a little cleanup required.



7

A simple way to finish the foot (if it will not be too deep) is to place some padding over the glue block, put the bowl over that, and bring up the tailstock to hold it in place. Bring the live center forward slowly and gently; it is possible to split the bowl if you use too much pressure. With a fingernail-grind or detail gouge, cut a slight hollow in the foot almost to the center. Then remove the bowl from the lathe, nip off the remaining bit of waste with a hand chisel and sand smooth.



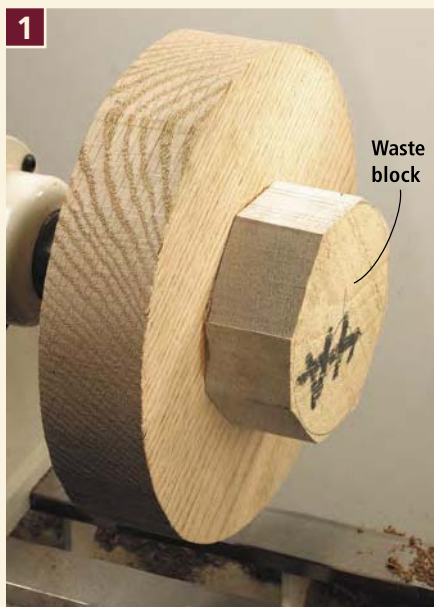
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Another way to remount the bowl to turn the foot is in a doughnut jig. This jig holds the bowl between a disc of plywood attached to a faceplate and another disc with a hole cut into it; the discs are held together with bolts and wing nuts (the nuts always go on the side toward the headstock). The bowl is cushioned with carpet foam. This mounting is a good choice if the foot will be deep or will have a lot of detail, as it allows better access to turn the foot.

Mounting with a Glue Block and Chuck

This is a good method if you own a chuck, but your workpiece is not very thick. If you mount the piece using a recess that is too shallow, the jaws of the chuck may break the piece when they are expanded to hold it, or the workpiece may simply be pulled off the chuck as you turn it. But a deeper recess would use up too much of the thickness of the wood; you don't want to lose any depth in the finished piece.

Here the waste block (or glue block) has been glued to what will be the bottom of the workpiece. I use thick cyanoacrylate glue. Apply glue to one surface, accelerator to the other and twist together.



The waste block and the bottom of the workpiece are then turned together. Cut a straight shoulder (or a slight dovetail, depending on the jaws of your chuck) on the waste piece for mounting in the chuck. (Here I have cut a recess to indicate that you could also mount the piece by expanding the jaws into it, if desired. You would be using one method or the other, not both; your glue block should have only a shoulder or a recess. Always remember: When mounting by expansion of the jaws, the recess must be as deep as possible and the collar of surrounding wood as wide as possible, so the wood will not split.) You should complete the bottom of the workpiece, including sanding and finishing; you won't want to work on that side later with the jaws of the chuck spinning so close.

Mounting with a Glue Block and Faceplate



Another way to turn using a glue block is to mount the waste piece on a faceplate, then glue the workpiece to the waste block.



Round the glue block, and turn the outside and inside on this one mounting. It can be more difficult to work on the back like this, but for smaller pieces it works well and eliminates the need for a second mounting.

Larger, flatter pieces are much more difficult to turn this way; they are best done as described above. (The extra time for the second mounting is made up for by easier access when turning the bottom.)

—JD

Woodshop Pest Control

One man's trick to keeping his lumberyard's small mammal population in check.

When customers visit my lumberyard with unruly children, I have a delicate job maintaining safety without offending the parent. Dr. David Randall, a psychologist, needed some curly maple for a Queen Anne lowboy. He brought his 6-year-old son, Webster. As David unrolled his plans, Webster sprung onto the oak pile.

"No, Webster. Don't climb on the lumber," he explained patiently. "You might fall and hurt yourself. Come help me show these plans to Mr. Sieling." Webster leaped off the oak, crashed on the concrete floor and began to howl. David knelt and comforted him. Webster pulled away, picked up a handful of sawdust and threw it into the air. David opened his plans. Webster found a piece of scrap wood and began to beat the table saw blade. He found the bell-like tone enchanting. "He is very musical," David explained. "He has an excellent sense of rhythm and tone." I cranked the blade below the table.

As I pulled out some boards, Webster disappeared upstairs. "David, why don't you see how these boards will fit your list. I'd like to show your son something educational."

"Oh, of course," David said.

I found Webster swinging a stick at the band saw switch. "Hey Webster, want to see the kiln snakes?" I pried the stick out of his hand and led him downstairs to the lumber kiln. We entered through the access door. A blast of hot humid air blew out, accompanied by the roaring of fans. "Feels kind of like a jungle, doesn't it?" I suggested.

Stretched out on the floor were half a dozen garter snakes and two large milk snakes. Like the buzzards of Hinckley, Ohio, or the swallows of San Juan Capistrano, Calif., the milk snakes return every spring



Illustration by Pat Lewis

to bask in the warmth of the kiln, grow bigger, shed a few skins, then disappear in late summer. I picked up the largest snake.

"This is Cuddles," I explained to Webster. "He is the largest snake. His wife's name is Snuggles. Do you know why I named them that?" Webster shook his head. His eyes showed white all around. "They are constrictors. That means they like to wrap themselves around their food and crush it before eating. That way they can swallow things that are larger than themselves. They lurk quietly around the lumber piles and catch things to eat. I like to have them around because they keep pests out of our warehouse. Do you know what snakes eat?"

Webster shook his head.

"They like frogs and toads, small mammals, stuff like that. Do you know what a small mammal is?"

"Mice and stuff."

"That's right; mice are small mammals, and rats and cats, too. Also the young of larger mammals: baby rabbits, kids—I mean baby goats. I suppose children might be

considered small mammals, too, although I don't know what snakes think of them. They might be too big. Just in case, I recommend that kids stick close to their parents."

Cuddles wrapped his body tightly around my arm and warily stared at Webster, his forked tongue flitting in and out. "He's smelling you. Ow, Cuddles, I'm not a small mammal!" I peeled him off my arm. "I guess he's hungry. They've pretty much cleaned the small mammals out of this place."

Webster seemed quiet as we returned to his father. He stuck close to me.

David and I finished the order and ran it through the planer. David gave Webster a board to carry out to the van. Webster dropped it across a mud puddle, and stomped on it. David turned pale. "Webster, no! That board is not for jumping on. It's for making furniture."

"... Good for paddling backsides, too," I said, looking at Webster, who slowly picked up the dripping board and set it in the van.

"Oh no, no," David sputtered. "Children need to be nurtured gently."

I waved at Webster as they pulled out. He glared back. "Goodbye, little mammal!" I called. He stuck out his tongue. We understood each other. **PW**

by Peter Sieling

Peter owns Garreson Lumber Co., a hardwood supplier in Bath, New York.