

2 SIMPLE JIGS MAKE CUTTING AND ROUTING SMALL PARTS EASY
6 STRATEGIES FOR SMOOTH-FITTING, WICKED-TIGHT SLIDING DOVETAILS

DECEMBER 2004
ISSUE #145

Popular Woodworking

6 SUPERIOR TOOLBOX SOLUTIONS

**Smart Storage
For Small Shops**

**Shaker Bench
An Easy Heirloom**

**Best New Tools
of the Year**

Special Turning Issue

- We Pick the Best Mini-Lathes
- Dale Nish's Holiday Project



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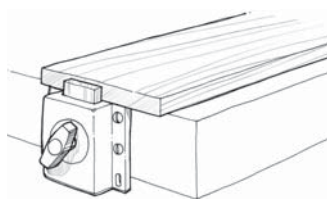


DISPLAY UNTIL 12-13-2004

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ON THE COVER

This Arts & Crafts tool cabinet stores an astonishing number of tools in a compact space. The trick? Sliding trays that hold the tools designed for specific operations, such as dovetailing or sharpening.

Cover photo by Al Parrish

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by Dale L. Nish

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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!

Reduce the Scrap Pile; Increase the Joy

Regardless of your woodworking skill level, you ought to be planning now what projects you'll be making to present as holiday gifts this season. And if you aren't in the habit of making at least a few items for gift giving, I strongly urge you to consider it. The rewards are plenty for you, and a handcrafted project from your shop will bring certain pleasure to the lucky recipient.

The projects don't need to be large or time-consuming. I'd consider making a "production run" of five to 10 of the same item and look at the project as a change of pace from your typical work in the shop. You might even find a way to reduce the size of that pile of scrap wood you've been squirreling away. The kind of scrap you have may suggest ideas of how best to use it.

Offcuts of maple, birch or cherry could become handcrafted cutting boards (use different species for accents). Leftover dowels could be converted to paper towel holders. Small pieces of leftover figured wood make gorgeous small boxes. Let the size of the piece determine the size of the box.

If you think ahead, you may want to consider making handcrafted gifts along a theme, thereby making a "collection" over the years for those on your gift list. A couple examples to consider are in this issue.

Turn to page 88 and look at the turned decorative birdhouse by Dale Nish. Dale is a master turner and is largely credited for the resurgence in the craft of woodturning in the United States during the past three decades. For a number of years, Dale has created a different decorative birdhouse then made a number of copies to present to family and friends.

Another "collection" gift concept is spindle ornaments like those presented by Judy

Ditmer on page 35. These ornaments need not be used exclusively as holiday decorations, but can be displayed on hangers year round. While these examples are both from the lathe, the collectible concept can be applied to "flat" woodworking, too.

The handcrafted gift concept can even be contagious. At our house last year, we decided to remove a lot of the commercialism from our gift giving. So each family member exchanged gifts that came from their own hands. Even the kids got involved, and it was a terrific experience for everyone.

Personally, the idea of making gifts appeals to me. I'd much rather spend my spare time in the shop than in the shopping mall. Logging some hours in the shop making gifts puts me more in the holiday spirit than slogging through the crowds, wandering from store to store to find just the right gift for every individual on my list.

And for those on the receiving end of your shop time, you can be sure your handmade gift will be appreciated and remembered far longer than just about any "store bought" gift. I'm always pleasantly surprised and more than a little flattered when years after giving a gift, when I have long forgotten even making it, I "rediscover" the project in the home of the friend or relative.

So this year, while there's time enough left to get the job done, get busy in your shop and make some holiday gifts that truly are the kind that keep on giving. You'll be glad you did, and so will your loved ones. **PW**

Steve Shanesy

Steve Shanesy
Editor & Publisher



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DALE L. NISH

Dale Nish's list of achievements, which includes a lifetime achievement award from the American Association of Woodturners, is long. A professional turner, instructor and



author of three landmark turning books, Dale has traveled the world to promote the craft. Much of his time is spent working with fellow turners and rarely does he leave a turner's

shop without purchasing a piece of their work. And Dale still turns regularly himself. Each year, as part of a much-loved tradition, he gives an ornament to family and friends. With the holidays quickly approaching, Dale is working on his next birdhouse-ornament design. For detailed plans of a previous year's design, turn to page 88.

JUDY DITMER

In 1985, furniture maker Judy Ditmer attended a turning conference at Arrowmont School of Arts and Crafts in Gatlinburg, Tenn. It was, she says, like a religious



conversion. When she returned home, she fired up her Shopsmith, quit the furniture making business and hasn't looked back. Although she took a few courses at Arrowmont, Judy

is almost entirely self-taught. "I just took to turning like a duck to water," she says. "The nonlinear aspect of it is perfect for me." Sculptural wall pieces, jewelry and bowls are her favorite items to turn. But her tops, ornaments and boxes pay the bills. Recently, Judy helped us test mini lathes. Find out her favorites on page 76.

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Random-orbit Tools Reduce Sanding

Do I Need to Upgrade My Quarter-sheet Sander?

In the article on the \$1,500 Workshop (October 2004), the Porter-Cable model 333 random-orbit sander is recommended for value. I am considering this purchase, but I would like some advice. First, does the random-orbit sander really offer an advantage compared to the traditional quarter-sheet sander? I currently have the Porter-Cable model 340K. If there is an advantage, should I buy the variable-speed model?

I am thinking that the only advantage is faster wood removal rate, and that the variable speed will allow finish sanding as well. If I already own the finish sander, perhaps the single-speed 333 is more than adequate.

Bill Brown
Omaha, Nebraska

Random-orbit sanders are a generation ahead of quarter-sheet sanders for a couple reasons: They are more aggressive and they are far less inclined to leave troublesome swirls or "pig-tails," a problem created by the single direction orbit of quarter-sheet sanders. You can still have this problem with random-orbit sanders, but to a far less degree. I switched to the random-orbit sanders years ago and would never turn back. As for variable speed, I'm not a fan. Slowing the sander down means sanding longer. If you are concerned about sanding through plywood veneer, you can be more careful or move up to a finer grit to mitigate the problem.

— Steve Shanesy, editor & publisher

Where Do I Get a Toolrest for My Lathe That's Like Judy Ditmer's?

I'd like to know what type of tool rest Judy is using on her 1018 Oneway lathe (as seen in the bottom right photo on page 77 of the August 2004 issue). I have the same lathe, and I'd like to get one.

Tim Albers
via the Internet

I am a huge fan of my Oneway lathes, but the 1018 toolrest is one of the very few things that doesn't fit my personal turning style. So I tried a toolrest from another manufacturer.

The toolrest I use is made by Shopsmith (call 800-543-7586, or visit shopsmith.com. Ask for item #503749, \$14.15). As you can see, the profile is far superior in function to the one that comes with the lathe. Shopsmith also makes a handy L-shaped rest, of which I have several, with the left arm cut off to different lengths for different purposes. As it happens, these have the same diameter post as the original from Oneway, and they are reasonably priced.

Now for the bad news. The configuration of the rest is such that it won't go quite low enough in the base of the 1018 for some operations. It's fine for most spindle work; but it's problematic for boxes and small bowls where you need the tool to hit exactly at center on the end. I resolved this by having a machinist mill away enough metal at the top of the post to allow it to go a bit lower in the base. Unfortunately, it's not always easy to find someone to do this kind of work. Mine were done by a machinist/engineer I know at Shopsmith, in exchange for some advice I offered on the design of the company's new lathe toolrest base; so alas I have nowhere to send folks to get this done. That's

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WRITE TO US

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LETTERS

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the only reason I don't suggest these rests publicly, because they will prove problematic without the "fix." I surely wish I could be of more help to you on this. It's a frustration to me not to be able to offer an easier solution.

If you do decide to pursue this, and you find a machinist who will do the work, I know you'll be pleased with this rest.

— Judy Ditmer

Why do You Tell Us to Order Far More Wood than We Really Need?

First let me say that I think your publication and projects are top-notch in content and writing style. I especially like the way you include the use of hand tools to complement machine setups, and your passion for solid-wood projects and their accompanying joinery. I just completed the #72 Magazine Cabinet (April 2003) and am contemplating the Limbert bookcase for my next kill.

Having made several pieces from your published projects I have noticed that you generally include the estimated board feet you should purchase for the project. If you compare the calculated board feet in the cut list to what you recommend purchasing, there is a proportional difference of about 60 percent.

I realize that there are losses due to knots, checks, rough rips and crosscuts, etc. but why do you suggest only a 60 percent yield in lumber (with 40 percent waste)? Wouldn't a 70 percent to 80 percent yield be more reasonable? I get the feeling that your lumber stock grows with the completion of each project.

Terry Harris
Rochester, New York

Sharp eye! I've been inching up slowly in the amount of wood I allow for waste for two reasons. I'm buying my lumber from nontraditional sources (farmers with sawmills, etc.), so it's ungraded. And I get pickier every day about wood selection for my projects. In fact, I can hardly bear to look at the grain matching I did on pieces when I started in the craft.

I've probably settled in to a comfortable level now. I wish I could give you a better reason than those above, but that's the truth.

If you buy graded wood from the lumberyard I think you can safely count on about an 80-percent yield on your order. PW

— Christopher Schwarz, executive editor

4 Ways to Make Dovetailing Easier

What are the Best Tricks To Improving Hand-cut Dovetails?

Hand-cut dovetails – I have a heckuva time with these. Frank Klausz, Rob Cosman, Ian Kirby ... I have seen all the books and videos. I have practiced for hours, and I continue to struggle with them. It has become somewhat of a nagging obsession at this point, and I am looking for help.

I just received your new issue (October 2004) and enjoyed it thoroughly. Your hand-cut dovetails were beautiful. Can you give me any tips on cutting these?

How about Western- vs. Japanese-style saws? I seem to recall an article on this question, but I'm really looking for your opinion. I debated biting the bullet and purchasing a Lie-Nielsen dovetail saw, but then I see numerous articles pointing me to the dozuki for dovetails. If I go with a Western-style saw, do I try to get one with rip cut or crosscut teeth?

Kevin Bradley
via the Internet

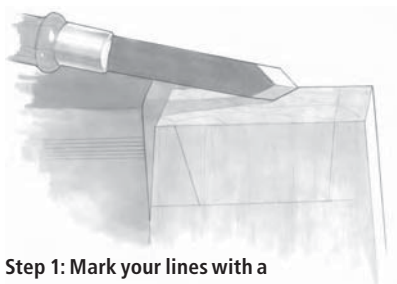
Hand-cut dovetails are one of the toughest things for me to do. They require all of my attention.

My best advice on getting good is actually something I plan to write about this year. For three months I cut a set of through-dovetails every evening after work. I dated each set. The next night as I began the new set, I studied the previous night's work to see what I was doing wrong. I was surprised to find that I was making the same mistakes over and over. Once I saw the pattern, I knew what I needed to work on.

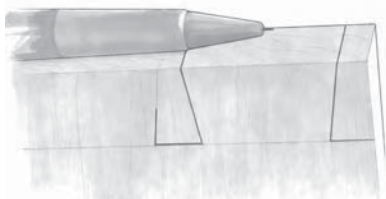
That said, here are the four "small breakthroughs" that have helped over the years.

1. **Rip teeth:** I used to use a crosscut dozuki to cut dovetails. It worked fine, but rip teeth track better. Saw teeth on Western saws are more robust (I have ruined several Japanese crosscut saws during what I would consider normal use). I'd purchase either a rip Western saw or a rip dozuki. Rip teeth do make a difference.

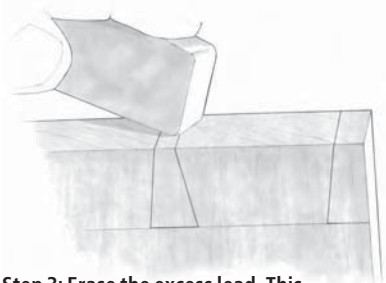
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Step 1: Mark your lines with a spear-point marking knife.



Step 2: Darken the knife lines with a mechanical pencil.



Step 3: Erase the excess lead. This leaves very sharp and dark lines.

Illustrations by Hayes Shaneshy

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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2. **Corner clamps:** One of my biggest mistakes was not correctly transferring my tail layout to my pin board. The corner clamps shown in the article on dovetailing drawers (October 2004, page 93) fixed that problem immediately. It was an excellent \$20 fix.

3. **Switch to a marking knife:** I was using a pencil to lay out everything. My joints got better when I started using a spear-point marking knife. Fine lines make a difference.

4. **Learn to darken the lines:** Knife lines are hard to see in some woods. Here's how I fixed that: After knifing my lines, I run over them with a mechanical pencil (the version with a .5 mm lead). Its mark is pretty coarse compared to a knife line, so I quickly and lightly run a quality eraser over the line. A fine knife line that's filled perfectly with dark lead is left. It's easy to see and track. I know it sounds like an elaborate procedure, but it takes just a moment.

—Christopher Schwarz, executive editor

Is Static Electricity In a Dust Collector a Problem?

I am creating a dust-collection system using thin-walled PVC pipe and heard that static electricity is formed when it is in operation. I've heard this is dangerous and I want to know if it's true. If so, what can be done about it?

Bruce D. Johnson
Newarkvalley, New York

There have been no definitive studies on the actual dangers of explosions or fires due to static build-up in a dust-collection system. I've spoken with experts in the field, and because of the lack of studies they're unwilling to say one way or the other whether it's a proven danger. Though the concern has been around for years, I've yet to hear or read of any accident that has occurred because of static discharge in a dust-collection system. Bottom line: Until someone proves it one way or another, it's probably best to err on the side of caution and ground your system. Purchase a good book to show you how it's done.

—David Thiel, senior editor

What's the Best Way To Flatten Dished Oilstones?

I have an India oilstone that is $\frac{7}{8}$ " x 2" x 7". It has fine grit on one side and coarse grit on the other. It is no longer flat due to years of service. I have read there is a method in which some material can be placed on glass and the

stone can be ground flat again. Are you aware of anything such as this? And if so, can you give me the materials and instructions needed to accomplish it?

Billy R. Nichols
Anchorage, Alaska

You can indeed flatten an oilstone, but it can be hours of hard work if the stone is severely dished. One of the nice things about oilstones is they wear slowly. But that toughness works against you when it's time to true the stone.

I've used diamond stones (the coarser the better), and I've used #90-grit silicon carbide lapping powder on a cast-iron plate with a lubricant—a little kerosene, mineral oil or mineral spirits. (The powder is available from Lee Valley Tools, 800-871-8158 or leevalley.com). Merely create a thick slurry of the grit and your lubricant, and then rub the stone on the plate. I use circular motions. Check your progress with a straightedge. It's messy and time-consuming work.

After you do it once, you'll probably want to switch to waterstones, which are inexpensive, cut quickly and true easily. I did.

—Christopher Schwarz, executive editor

Is Pressure-treated Lumber a Good Material for a Bird Feeder?

My neighbor has asked if I could make a bird feeder for him, and I am pretty sure I'm going to make it out of Western red cedar or possibly treated lumber. I have several questions: Is treated lumber safe for the birds? And can I use ordinary exterior glue and small brads to hold it together? I don't have a brad nailer, so it'll have to be by hand. Should I use polyurethane glue, Titebond II or ordinary carpenters' glue? Does polyurethane glue even hold on woods such as redwood or cedar?

Ed Williams
Elkhorn, Wisconsin

Treated lumber isn't safe for birds so you should pick something else such as cedar. As far as glue is concerned, Titebond II or III exterior yellow glue, or a polyurethane glue, will work just fine.

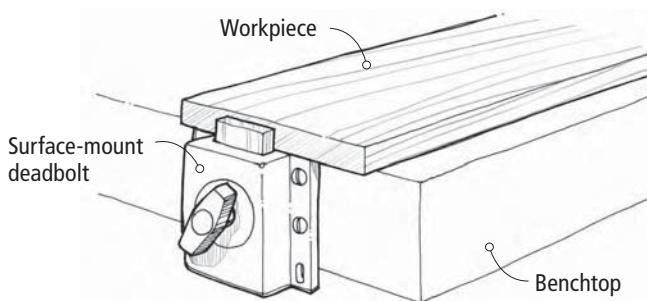
Same goes for those nails. Make sure they're rated for exterior use—usually this means that they're hot-dipped galvanized or stainless steel. Basically, everything you use to join your parts should be a product that is able to withstand all sorts of weather. **PW**

—Kara Gebhart, managing editor

Deadbolt Planing Stop

THE WINNER:

To hand plane a board on a bench, you often need only a single stop at one end of the workpiece to prevent it from sliding in the direction that you're pushing the plane. Various commercial bench stops are available that drop below the benchtop when not in use, or you can make and install your own wooden stops on the bench. However, one of the simplest alternatives is to remove an old surface-mount deadbolt from a door and install it on the end



of your bench. The bolt makes a good, solid stop that can be retracted below the surface of the bench when not in use.

Darryl Thomas
Thornhill, Tennessee

Sighting Right

Here's a simple but helpful tip, especially for those of us with "mature" eyes. When sighting along a board to check for bow or wind, get in the habit of sighting it against an appropriate background.

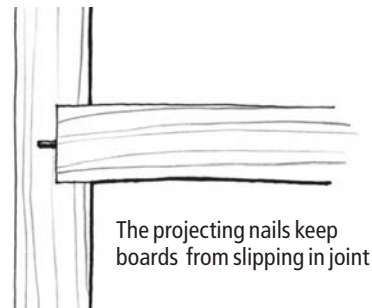
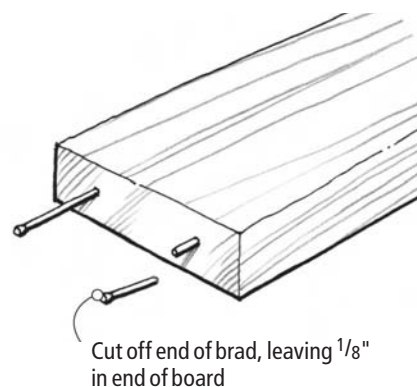
If it's a light colored board, sight it against something dark such as a black floor mat. If it's a dark colored board, sight it against something light colored. It sure makes reading the board a lot quicker and easier.

Frank Carbone
Hoboken, New Jersey

Non-slip Joints

Dado joints may slip as you glue and clamp them. When gluing up a case with multiple fixed shelves or horizontal dividers, it can be difficult keeping everything in line during assembly. I prevent this sliding by driving small brads into the end of the non-dadoed part, then snipping off the ends of the brads so only about 1/8" remains. When the joint is assembled, the projecting nails keep the parts from slipping out of alignment.

Cecil Brittman
Springfield, 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 a Freud PKG0026 Router Table Package including a FT2000E 3 hp router, router tabletop and variable-height stand, micro-adjustable SH-5 fence and router mounting plate. The package also includes two instructional videos on basic routing techniques and creating raised-panel doors.

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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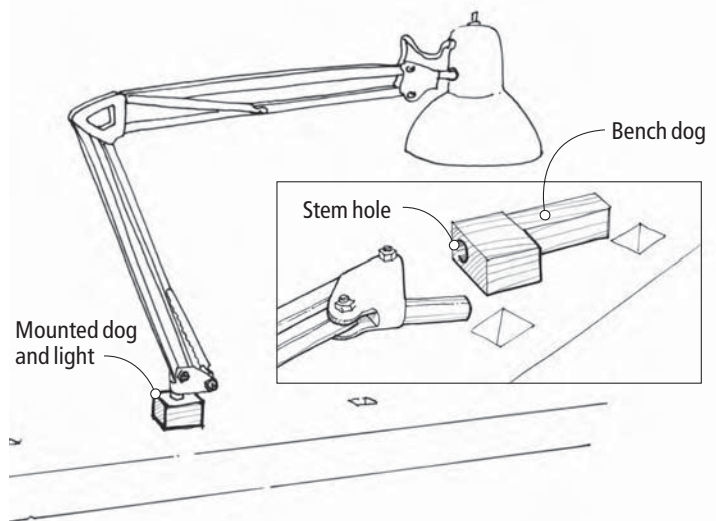
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A Dog's Light Illuminates Your Work

Certain chores at the bench require well-directed task lighting. When cutting dovetails, for example, a strong raking light across your knife lines can contribute to better cutting. Good light when sharpening generally results in keener edges. And light glancing at a low angle across any surface will highlight any defects that need to be corrected prior to finishing.

Some of the best task lighting comes from swing-arm lamps. They're cheap and can be positioned as needed to best direct the light. The problem is that the small mounting brackets that typically come with the lamps don't open wide enough to clamp onto thick benchtops. No problem. If you have a bench with dog holes, just make a wooden dog-shaped peg that can be drilled out to accept the post on the light fixture. It doesn't have to be fancy. Sitting in a nearby dog hole, the lamp should be able to reach easily to any point on the bench that you're working.

Linda Shavitz
Milwaukee, Wisconsin



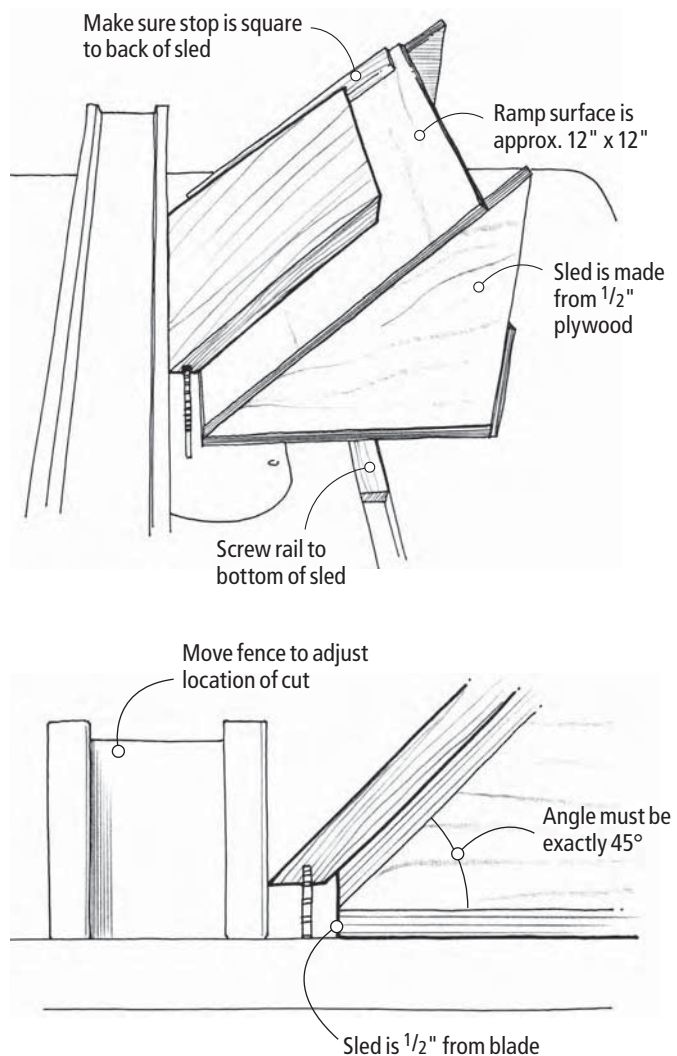
Miter Slotting Sled

In my work, I often use splines to reinforce miter joints. The first table saw I owned required tilting the table rather than the blade to make angled cuts such as the slot cut in the face of a miter to accept a spline. I found this awkward, so I instead developed a miter sled to carry the workpiece at an angle over the blade. Even after replacing my saw with a tilting arbor model, I found that using the sled to cut spline miter slots was still easier and more accurate than tilting the blade.

The jig is simple to make from 1/2"-thick plywood. It consists of two triangular end panels, a bottom panel, a narrow back panel, and a ramp panel. The fence and runner are made from a hard wood such as maple. The ramp on my jig is about 12" square, but the size isn't critical. However, for it to work correctly, the pieces must be cut out and assembled accurately, so work carefully. The end panels need to be cut at exactly 45°, while all other angles on the jig need to be square. Glue and screw the unit together, making sure the fence is carefully aligned to the rear edge of the top. To locate the runner, place the jig about 1/2" away from the blade and mark the location of the miter gauge slot on the leading and trailing ends of the jig. Then carefully attach the runner with screws, aligning it to these marks.

To use the jig, first mark out a spline slot on the leading edge of the mitered workpiece, then place it on the ramp against the fence. Slide it up or down the ramp as necessary to align the blade with the slot. Then lock the rip fence in position against the tip of the miter and raise the blade as necessary to cut the slot to the proper depth. Hold the workpiece firmly against the fence as you feed the jig past the blade.

Barry Black
Red Deer, Alberta, Canada



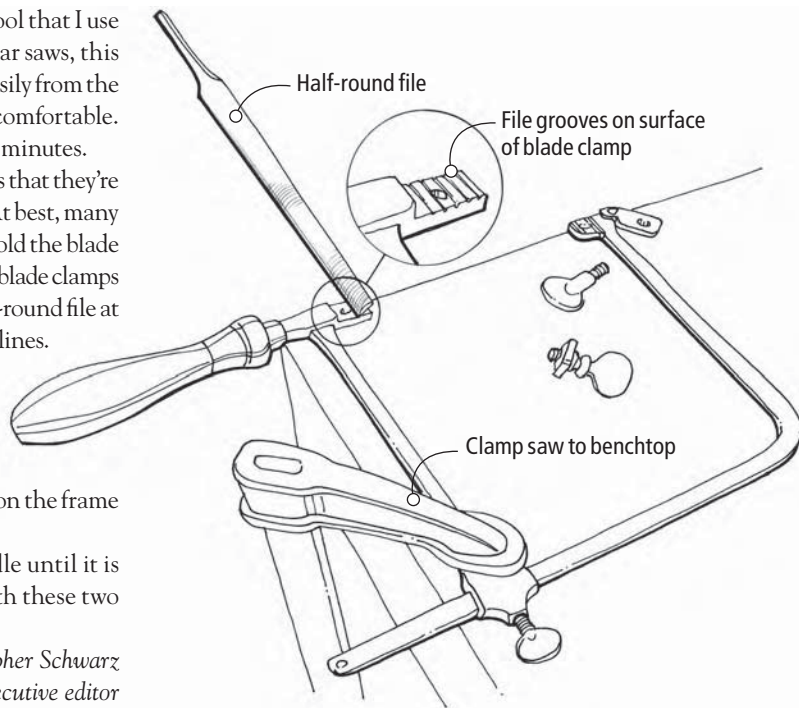
15-minute Fretsaw Tune-up

For years I struggled with my fretsaw, a German-made tool that I use for removing waste between dovetails. Like many similar saws, this one has been a disappointment because blades slip out easily from the blade clamps during a tough cut. Plus, the handle is uncomfortable. Fortunately, both of these problems can be solved in 15 minutes.

First, the blade clamps: The reason these so often fail is that they're supposed to have toothed surfaces, but they seldom do. At best, many of them have shallow lines stamped on them that don't hold the blade well. So, to greatly improve their grip, first disassemble the blade clamps and secure the saw's frame to your bench. Holding a half-round file at a steep angle, use one edge to deepen each of the stamped lines. (If your blade clamps lack lines, simply file the notches from scratch). About four strokes in each notch should do it. After reassembling the blade clamps, you'll be amazed at how much better your saw works. Not only will it hold the blades better, but you will be able to tension the frame much higher, allowing for more accurate cuts.

While you're at it, sand the ugly paint off the handle until it is comfortable to hold and no longer looks offensive. With these two improvements, your saw will work a lot better. **PW**

Christopher Schwarz
executive editor



Smooth, Quiet Cuts from New Grizzly 8" Jointer

If you've been considering buying an 8" jointer we strongly encourage you to first consider the new G0543 spiral cutterhead machine from Grizzly Industrial.

While this is actually a rework of the G1018 jointer (one that we've recommended in past issues for quality and value), Grizzly has answered many woodworkers' dreams by offering a spiral cutterhead in an 8" machine.

First, let me explain why a spiral cutterhead is a desirable feature. These traditionally industrial heads have the knives arranged to cut on a skew rather than straight, reducing the strain on the motor and providing a cleaner, quieter cut.

A better cut is a good thing in its own right. But even better, the knives are four-sided carbide inserts that are simply screwed in place. There is no adjusting height, no screws and no springs. Because they're carbide you'll already go longer before noticing any dulling, but because each knife is four-sided, it's simple to loosen and rotate an insert a quarter-turn to a fresh edge to adjust for a nick. Very cool.

You're now asking yourself how much this convenience is going to cost you. Well, yes it is a more expensive feature. The G1018 sells for \$695, which is a great price. Adding the spiral head almost doubles the price (the G0543 costs \$1,195). But before you walk away, compare the price of other 8" jointers. You'll find they range from \$1,100 to \$1,600, and that's with a standard cutterhead.

While we were very pleased with the G0543 we tested, this still may be beyond your tool allotment. So Grizzly also has a 6" version (G0526, \$850) that may better fit your budget.

—David Thiel

For more information, circle #171 on Free Information Card.



SPECIFICATIONS

Grizzly G0543 8" Jointer

Street price: \$1,195

Motor: 2 HP, 24/12 amp, 110/220V, TEFC, 3,450 rpm

Table: 8" x 75"

Cutter: Spiral cutterhead with 40 carbide inserts. 22,000 cpm

Performance: ●●●●●

Price range: \$\$\$

Grizzly: 800-523-4777 or grizzly.com

Festool's Plunge Router Loaded with Power, Precision

As a class, 3+ horsepower plunge routers are more tool than the average woodworker needs. Unless you rout a lot of big mortises, or cut solid surface material on a regular basis, a smaller plunge router is usually a better choice.

But if you need a big plunge router, the Festool OF 2000 E deserves a close look. Like a Mercedes or a BMW, this router is thoughtfully engineered and flawlessly manufactured. The motor is powerful, relatively quiet and vibration free. The controls are all within easy reach, operate sensibly and the plunge mechanism is smooth and precise. To carry the German automobile analogy a little further, when you use this router there is a sense of quality and the expectation that it will be reliable for a very long time.

In operation, this is the nicest plunge router I have ever had my hands on. The 1/2" collet was deep and nicely machined, and the spindle lock and one-wrench bit changing set-up were easy to use. I routed some deep mortises in cherry without any complaints from

the motor. The vacuum attachment snapped in and out easily, and cleared chips well.

This router has a couple quirks that you should be aware of. The depth scale reads in millimeters only, and I would expect a tool made for the U.S. market to read in inches. The bigger problem in my mind was the fact that this router accepts only template guide collars made specifically for it, and there are only four metric sizes available.

One other concern: This is the most expensive router in its class. The inclusion of a decent edge guide and a well functioning vacuum port ease the sting a little. Further to its benefit, this router works with the Festool straightedge guide system, so routing flutes or dados on a regular basis offers other applications that may justify owning this machine. If you need this kind of power and precision, and can live with the idiosyncrasies, this might be the router for you.

—Robert W. Lang

For more information, circle #172 on Free Information Card.



SPECIFICATIONS

Festool OF 2000 E

Street price: \$450

Motor: 2,000 watts, 15 amp, variable speed 12,000-22,000 rpm

Includes: Edge guide and vacuum attachment

Performance: ●●●●○

Price range: \$\$\$\$\$

Festool: 888-337-8600 or festool-usa.com

Veritas Shoulder Plane

It's time to get acquainted with the big brother of the first Veritas shoulder plane, which was introduced in 2003. This new version is wider (1 1/4"), heavier (3 3/4 pounds) and has two adjustable wooden knobs for different grips.

I prefer wider shoulder planes more than narrower ones because the extra mass helps in a cross-grain cut. Plus the width allows you to accurately plane tenon cheeks—as well as shoulders. If you build furniture (as opposed to smaller-scale boxes), then this is the right tool for your workshop.

Other nice features include four set-screws on the body that allow you to tweak the iron into perfect position. And the front knob can be moved to one of three positions (or removed). The tool we tested had zero defects. The sole was perfect. And the sides were ground perfectly square according to our thinnest feeler gauge. The plane is an excellent value at \$169.

—Christopher Schwarz

For more information, circle #173 on Free Information Card.



SPECIFICATIONS

Veritas Large Shoulder Plane

Street price: \$169

Sole dimensions: 1 1/4" x 8 3/16"

Iron: A2 steel

Body: Unbreakable ductile iron

Adjuster: Norris-style

Performance: ●●●●●

Price range: \$\$\$\$

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

'Rough To Ready' Video

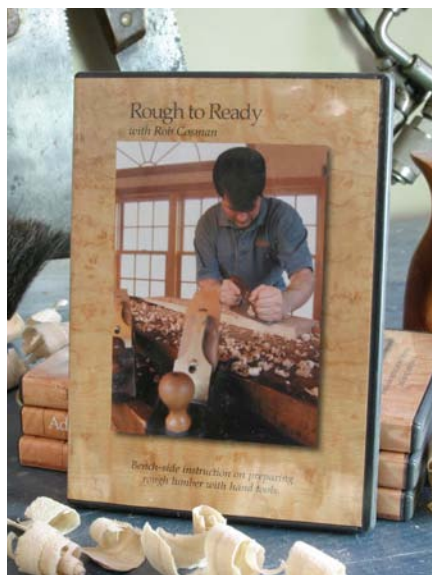
Learning to take a rough piece of lumber to a perfectly finished state is more than an academic exercise. The basic hand skills necessary for this task will make you a more accurate and meticulous woodworker, too. Plus you'll be able to do things that your power tools cannot, such as surfacing lumber that is too wide for your jointer or thickness planer.

The best way to learn these skills is to have someone show you. And Rob Cosman's video "Rough to Ready" is a complete education. Cosman shows how to simply use a scrub, jointer and smoothing plane to true up a single mahogany board. The video is loaded with tricks (some that I've never seen before) on how to easily get the lumber flat, and how to use even the tools themselves as measuring devices.

Video is the ideal medium for teaching these skills because you can easily show body motion, and the sound your tools make is critical feedback. Cosman is an excellent craftsman and teacher, and this video belongs in the library of every hand-tool enthusiast.

—CS

For more information, circle #174 on Free Information Card.



SPECIFICATIONS

'Rough to Ready' Video

Street price: \$20

Format: DVD and VHS

Length: 47 minutes

Performance: ●●●●●

Price range: \$

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



MILWAUKEE ELECTRIC BOUGHT BY TTI. WHO?

Consolidation is the buzz word in the tool industry these days, with many well-known tool brands being gathered under larger corporate umbrellas.

You might have heard that Milwaukee Electric was purchased by Techtronic Industries (TTI) for \$626.6 million. This sale comes right on the heels of the sale of Delta and Porter-Cable to Black & Decker. You almost certainly know who Black & Decker is, but you may not know about TTI.

TTI was founded in 1985 and is a manufacturer and supplier of home-improvement and floor-care products, employing more than 16,000 people worldwide (1,800 in North America).

You've probably been using products from TTI for years without knowing it. The TTI brand portfolio includes Ryobi, Homelite, Royal and Dirt Devil. TTI makes power tools for Ridgid and also works with Craftsman, Zircon, Toro, Bissel, Hoover, Fein, Senco, Bosch and Husky.

In August, TTI reported a net profit of \$38 million for the first six months of 2004, posting 41.8 percent growth compared to the previous year.

As the face of the tool companies that provide your tools continues to change it may not be your primary worry of who owns who. But it's good to know you may be comparing two brands from the same owner or manufacturer.

—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

Revolutionary No-kickback Saw

Two things to know about the Twin Cutter: One, this is a truly amazing saw. Two, you don't need one in your woodworking shop.

Let's start with the amazing. The concept of the Twin Cutter saw is that there are two 5/64"-wide blades that spin in opposite directions to create a 5/32"-wide (approximately) kerf. So what? Good question. How about the no-kickback effect created by the counter-rotating blades. No kidding.

The action of the blades actually makes it feel like there is little-to-no kickback (or pull in any direction for that matter) as you're making a cut. Not only is this a nice safety feature, but it makes it easier to handle the tool for more accurate cuts.

Part two: This is not a saw designed for making precision cuts. It's essentially a demolition or rough carpentry tool. At that, it excels, but the 6 1/8"-diameter blades limit the cut depth to 1 7/8", while the guard makes even that an exercise in dexterity. One deficit to the counter-rotating blades is that trying to make a

turn in a cut can cause the tool to pull or lift. This isn't dangerous, but the smooth operation is interrupted. Stick to the straight and narrow.

We found it a handy tool for rough cutting in a variety of materials (plastic, steel and more), and even for a little light carving. While priced reasonably at \$180, be aware that a pair of replacement blades will cost another \$50.

So why are we wasting ink and paper to tell you about this tool? Because we like to think ahead – as does Craftsman. This tool is already being adapted for a next generation more in line with a standard circular saw. As woodworkers, we can see further down the road to when the technology is possible for use on a radial arm, miter or a table saw. No kickback? Bring it on!

—DT

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



SPECIFICATIONS

Craftsman Twin Cutter

Street price: \$180

Motor: 7.8 amp

Blades: 2-6 1/8", 36-tooth carbide

Speed: 4,600 rpm

Performance: ●●●○○

Price range: \$\$\$\$

Craftsman: 800-549-4505 or craftsman.com

Starrett ProSite Protractor

While most woodworkers will go out of their way to avoid having to do accurate miter work, we all have to do it at some time. Whether it's adding a bonnet to a highboy or simply fitting an entertainment unit into a corner, accurate miters are a fact of woodworking life.

And when it comes to accurate dimensions, Starrett is always a name we trust. So we were happy to take a look at the Starrett ProSite Protractor.

This is a very simple tool that will take some of the difficulty out of miters. Two 12" x 1/4"-thick aluminum plates are hinged at an easy-to-read, flush-set dial. "Easy to read" is the critical phrase here.

To use the tool you simply spread the two legs and place them flat against the two adjoining surfaces. If working on crown moulding in a corner, read the red arrow and red dial to find the required miter saw setting for each piece. If you're working with only one piece to fit in the angle, use the black arrow and black dial – it's quite simple.

The hinge on the ProSite Protractor is factory-set to a certain tension. It's tight enough to hold a dimension (even if bumped), but still

move with reasonable pressure.

If you're not excited about cutting miters, this tool will also function as a layout tool, transferring angles from one piece to another. You can also use it for setting up machinery – well, some machinery.

And that leads to a couple of things we weren't totally pleased with. The size of the protractor is a little large for machinery set-up (especially on a table saw), and it's actually a little small for gauging larger corners.

Another thing we questioned is a lack of 1/2° markings on the scale, especially for the more often used 22 1/2°.

Then there's the price of the tool. Expect to pay around \$40 for this accuracy assistant. If miters are an important part of your work, then it's a valuable tool. But you'll have to make that call. **PW**

—DT

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



SPECIFICATIONS

Starrett ProSite Protractor

Street price: \$40

Material: Aluminum

Legs: 1/4" x 12"

Performance: ●●●●○

Price range: \$\$\$\$

Starrett: 978-249-3551 or starrett.com

Sliding Dovetails

Strong and versatile, this joint is simple to make with a router.

For the woodworker who builds furniture and cabinets, the sliding dovetail is a joint well worth mastering. It's strong and versatile, with myriad applications, from case construction to leg-and-rail joinery.

I'm sure you've seen drawings of the joint. It's a hybrid of the dado and the dovetail, with a groove in one part and a tongue on the other. Naturally, the tongue fits the groove. But because both the groove walls and the tongue sides are angled like a dovetail, the joint has to be assembled by sliding the tongue into the groove from one end. There are several advantages here:

Assembling a chest with several drawer dividers is simple when the parts lock together. You don't need five hands and a bunch of



Router-cut sliding dovetails link parts together, with or without glue, and they have a multitude of uses.

clamps. And once the chest is assembled, the joint mechanically resists tension, meaning that the sides can't bulge outward, separating from the dividers.

If left unglued, the sliding dovetail allows wood movement. The obvious example here is a breadboard end, attached across the end of a wide, solid-wood panel such as a chest lid or a tabletop, as shown below. The end is intended to keep the panel flat, while allowing it to expand and contract. These are just two of the many suitable applications.

Each sliding dovetail joint requires two operations – cutting the groove and cutting the tail. Both operations are done with the router, and to get a good fit, it's imperative to use the same bit for both.

Grooves can be cut with a hand-held or table-mounted router. The location of the cut and the size of the cut itself usually will dictate which approach is optimum.

The tails likewise can be cut either way. The portable router generally requires jiggging to steady it on the narrow edge being worked. As a consequence, most woodworkers cut the tails on the router table. There you need nothing beyond all-purpose accessories such as a push block and a featherboard or two.

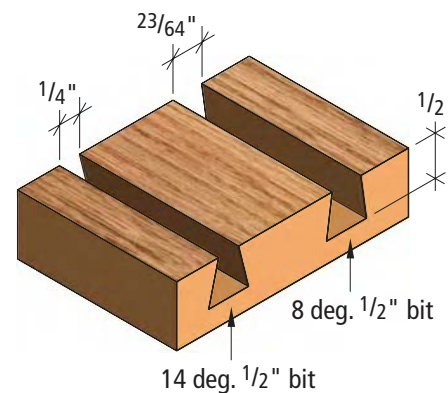
by Bill Hylton

Bill is the author of several books about furniture construction and router operations. When he isn't writing about woodworking, he's doing it in his home shop in Kempton, Pennsylvania.

Choosing a bit: Dovetail bits are made in a variety of diameters and angles. Most half-blind dovetail jigs require a $\frac{1}{2}$ "-diameter, 14° bit on a $\frac{1}{4}$ " shank, so I'd say that's the most common bit. But thanks to the prevalence of through-dovetail jigs, you can buy bits with 7° tapers, as well as with $7\frac{1}{2}^\circ$, 8° , and 9° tapers. These angles yield more of a hand-cut look.

A benefit of these bits – one that's pertinent here – is that they allow deeper cuts and stronger tails. Check out the comparison drawing below. A $\frac{1}{2}$ "-diameter, 14° bit can't cut more than $\frac{1}{2}$ " deep because, at that point, the bit has tapered to a $\frac{1}{4}$ " diameter. At the same spot on an 8° bit, the girth is about $\frac{11}{32}$ ". With this bit you can go $\frac{13}{16}$ " deep and still have a $\frac{1}{4}$ " width.

Scaling the joint: For casework, a shallow sliding dovetail – say $\frac{1}{8}$ " deep – is all you need. Even in a dado joint, that depth is sufficient to withstand the shear stresses applied



The sliding dovetail is an excellent joint for mounting a breadboard end on a chest lid. The joint is glued only at the front, so seasonal expansion and contraction of the lid panel is visible only at the back. Flush with the end of the breadboard when assembled in mid-winter, this lid panel has expanded markedly during a humid summer.

Photos by the author

to a cabinet and its parts. Add the dovetail angle and you reap the mechanical blessings it confers. Plus that cut depth is easy for any router to cut in a single pass.

The dovetail groove in a breadboard end, on the other hand, should be as deep as you can make it without compromising the groove-wall thickness or the thickness at the base of the tail.

Slotting a Face

Both portable and table-mounted routers can cut the slots. For casework, I use a portable router, guiding it along a clamped-on straight-edge. A shopmade T-square is perfect.

If you're cutting a $\frac{1}{8}$ "-deep slot, as I suggested, and using an 8° bit, then cut away. If your cut is deeper, say $\frac{3}{8}$ ", and your bit is a 14° taper with a very narrow waist, it's a good idea to "stage" the cut. The way to do this is to first rout a groove with a straight bit that matches the dovetail's waist diameter, cutting about $\frac{1}{16}$ " shy of the final depth.

In the example situation, you'd use a $\frac{1}{4}$ " straight bit, cutting – perhaps in two passes – about $\frac{5}{16}$ " deep. This is most convenient to do if you have two routers of the same base diameter, so you can set one up with the straight bit, the other with the dovetail bit. The fence position for both cuts then ends up being the same.

Stopped slots: Because of the dovetail profile, a stopped slot requires you to back the bit out of the cut. There's a slight risk of it grabbing as you back it out of the cut, because that is a climb cut. That could pull the router off the fence, and it could ruin the cut.

For a stopped slot, I prefer to trap the router, either between a pair of fences or with a template. If the router's trapped, it can't wander, regardless of the feed direction.

Cobbling together a twin-fence guide takes 10 minutes, 20 at most. You need four strips of plywood or MDF, and a few drywall screws. Attach a stop to one or both fences to limit the length of the cut. Position the jig, cut with the straight bit and then cut with the dovetail bit. Bang! Your slot is done.

If you want to use a template instead, it can be made from a piece of $\frac{1}{4}$ " hardboard. Simply rout a slot in from one edge. Make the slot the width of the template guide you'll use. Extend it no longer than necessary to get the length of slot you want.

Because of the dovetail profile, you can't simply lift the bit out of a stopped cut; you have to back it out. To avoid having the router drift away from your fence as you do this, use a twin-fence jig for such cuts. The jig traps the router, and with a stop attached, the router can produce only the dovetail slot you want.



If you have two routers with the same base diameter, you can use one for the "wasting" cut with a straight bit (as shown at top), and the other with the dovetail bit (above left and right).

The template approach has several advantages. You can use any two routers because the template guide, not the router base, is the registration device, but you do need two identical template guides.

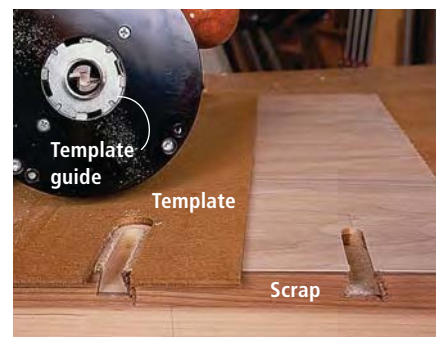
When you set up any of these jigs, be sure you clamp a strip of scrap tight to the edge of the work. This will prevent splintering on the edge, which is almost guaranteed to occur.

To aid you in sizing the tails that will fit into the slots you cut, use your setup to cut a slot in a scrap of the working stock. You avoid having to fit the test-cut tails to a slot in a case side itself, if you have this piece available.

Grooving an Edge

Doing an edge groove with a portable router is precarious. If you must do the cut this way, try using a laminate trimmer; it's smaller and easier to perch on an edge. Or equip your router with two edge guides – if that's possible – to trap the workpiece. Failing that, try the operation with one edge guide that has a wide facing attached to the tips of the guide.

In contrast, the setup and cuts are simple



Make the template with some overhang along the front edge, so the template guide is caught in the guide slot while the bit is still clear of the work. A waste strip clamped to the front edge of the work prevents tear-out or chipping. The fuzzies on the work's surface are common, but are easily removed with sandpaper.

on the router table. There are two operations. First, you plow a groove with a straight bit. Then you finish the groove with a dovetail bit. The work is guided along the router table's fence during both cuts.

The setup is straightforward. The fence is positioned to center the cut on the edge. It's

the same for both the roughing-out cut and the final dovetail cut. The workpiece is set on edge, pressed tight against the fence and fed across the cutter, right to left.

Naturally, you should make at least one test cut to ensure that you're content with the result before cutting the real workpieces. Save the test cut for fitting the tail (or make a separate piece for the purpose).

Cutting a Tail

Tails are most commonly done on the router table. There are some alternatives, of course, but it is fast and easy on the router table, so let's focus on that approach.

Use the same router bit for the tails as you used for the slots. This guarantees the geometry of the mating pieces will match.

Close down the bit openings in the tabletop and fence as much as possible. For the tabletop opening, use the appropriate reducer in your router mounting plate, or a 1/8" hardboard auxiliary tabletop. For the fence, either close the split fence facings in against the bit, or apply a one-piece auxiliary facing and cut a zero-clearance opening with the bit.

Set the bit height to match the slot's depth. If you cut the slots on the router table, move directly from that to the tail cut without changing the bit setting. If you cut the slots with a portable router, use your cut sample as an aid in setting the bit height.

Bring the fence into position, housing



Edge grooves are best done on the router table. Set the fence to center the bit on the edge, and make the cut. Reduce stress on the dovetail bit by preplowing the groove with a straight bit. Minimize the tabletop opening – here with a hardboard overlay held in place by the fence – to prevent the work from catching on the opening as you start the cut.

all but the very edge of the bit in the fence. Depending upon the size and proportions of the workpiece, you may want to add a tall facing to the fence. This may be worthwhile if you're working something like a tabletop or chest lid, although I've found a well-placed featherboard (and my regular fence) is all I need for even these big pieces.

The drill is this: Make a test cut on a scrap of the working stock. The scrap must be exactly the same thickness as the real work.



Cut a tail on a narrow piece such as a drawer divider by standing it on end, backing it up with a scrap block, and advancing it along the fence. The backup block minimizes exit splintering and helps stabilize the work, reducing its tendency to "walk" along the fence. Make a cut, spin the work 180° and cut again to form the tail.



For a stopped slot, trim one edge of the tail. Simply turn the piece to register its edge against the fence. Use a backup block, and cut.

I think it's most effective to creep up on the fit. That is, start with a "fat" tail and check it against the grooved sample. Make a fence position adjustment, recut (on both sides of the tail), and recheck the fit. I keep trimming the initial sample until I get the right fit. My final assessment is based on a fresh sample.

Assessing the fit: How tight you make the fit depends on the application. A short joint, such as one that joins a drawer divider to a case side, should close at least halfway with hand pressure and require only a tap or two to seat. You'll be able to assemble it with glue, and the glue line will look nice and tight.

If you have to pound the tail into the slot, it's too tight for gluing. If it slides home with firm hand pressure, the fit isn't ideal, but the joint will hold well when glued. Finally, if the tail piece sides into the slot easily, and especially if it wiggles from side to side, you need to start over. The tail is too small.

With the right fit, the sliding dovetail will provide years of strength and beauty. **PW**



One well-placed featherboard will stabilize even a large panel on end, so you can rout a tail across it. The featherboard is aligned just ahead of the bit, and it is elevated so it's pressing above the cut. The fence is my regular one.

Spindle Ornaments

A painted finish is easy to apply when using a lathe.

In spring, a young man's fancy may turn to thoughts of love, but in autumn, a wood-turner's fancy turns to thoughts of gifts that can be made on the lathe. These little ornaments make very nice gifts and are fun to make. You can play around with the shapes and proportions, and the paint adds another dimension. You don't need to use fancy, expensive wood for these; the colors punch up the wood, and the wood seems to make the colors look richer, too. It's a nice combination.

I use acrylic paint, which comes in small bottles and can be found at craft stores of all kinds; I get it at a local fabric store. There are several brands and they all offer a large variety of colors. This paint is usually the right consistency right out of the bottle. The somewhat thicker paint that comes in tubes would probably have to be thinned a little with tap water.

The right brush is key. A good artist's brush will hold plenty of paint, will release it evenly and won't leave stray bristles behind. You don't need the most expensive brush available, but the cheapest ones are sure to disappoint. I use good-quality (about \$6 to \$8) synthetic-bristle angled shaders ($\frac{1}{4}$ " or $\frac{1}{2}$ ", depending on the size of the area to be covered). A brush that is too small won't hold enough paint to go all the way around the piece; a brush that is too large will be hard to control for fine detail. The shape is important as well; a round brush, for example, won't allow you to control the flow of the paint to get clean edges.

Make Your Shapes

Prepare the blanks by drilling a $\frac{1}{2}$ "-diameter hole through the end grain of a piece of wood about 2" x 2" x $1\frac{1}{2}$ " long. Glue into the hole a $\frac{1}{2}$ "-diameter x 6"- to 7"-long dowel using yellow woodworker's glue. About 1" should protrude from the end; this part will be held in a Jacobs-style chuck for turning.



Photos by Al Parrish

Painted spindle ornaments make nice gifts and are an opportunity for you to experiment.

Mount the blank on the lathe, making sure it's snug in the chuck and supported by the tailstock at the other end. Before you start turning, make sure everything is snug and that the workpiece isn't going to hit any part of the lathe when you turn the machine on.

Turn a shape you like. A few (such as a bead or fillet on the bulb part of the ornament) provide a logical place for colors. Burn-

ing lines will help form clean edges for the painted areas, and it makes them look crisp. (Use steel wire attached at both ends to a piece of dowel and hold the wire with the dowels. Don't hold the wire itself; the workpiece may grab and pull it, injuring you.) The painting will be done with the piece still on the lathe, so part off the right end (the bottom of the spindle), but not the end in the chuck. Sand the piece. Now you're ready to paint.

Painting on the Fly

It's easiest to do the painting on the top of the workpiece as it turns away from you. This way you can see what you're doing and can better

by Judy Ditmer

Judy, author of two turning books and many articles, has been turning since 1985. She teaches and demonstrates her skills throughout the United States and Canada.

control the brush. If your lathe doesn't reverse, you can move to the far side of the lathe so you can work on top. Swing the toolrest around too, so you can steady your hands on it.

You also need to slow down the lathe pretty drastically compared with turning speeds. If it's going too fast, the paint will fly off. If it's going too slow, the paint won't go on evenly. If your lathe has infinitely variable speed, 50 to 100 rpm is best. If it doesn't have variable speed, you may find that even the slowest speed is too fast. Because it takes only a few seconds to apply the paint, try painting as the lathe is slowing down just after you turn it off. You'll need to have the brush loaded and ready as you hit the off switch. This will take

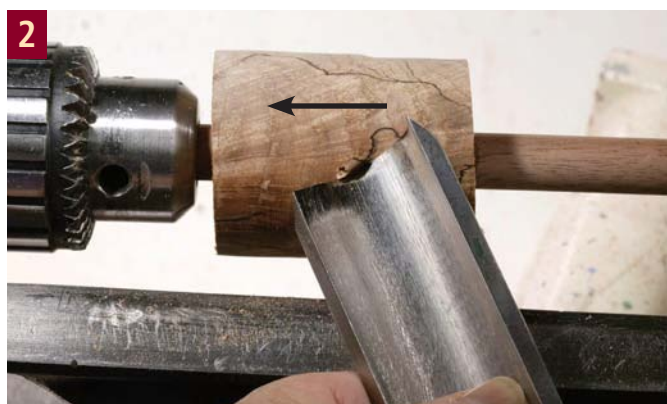
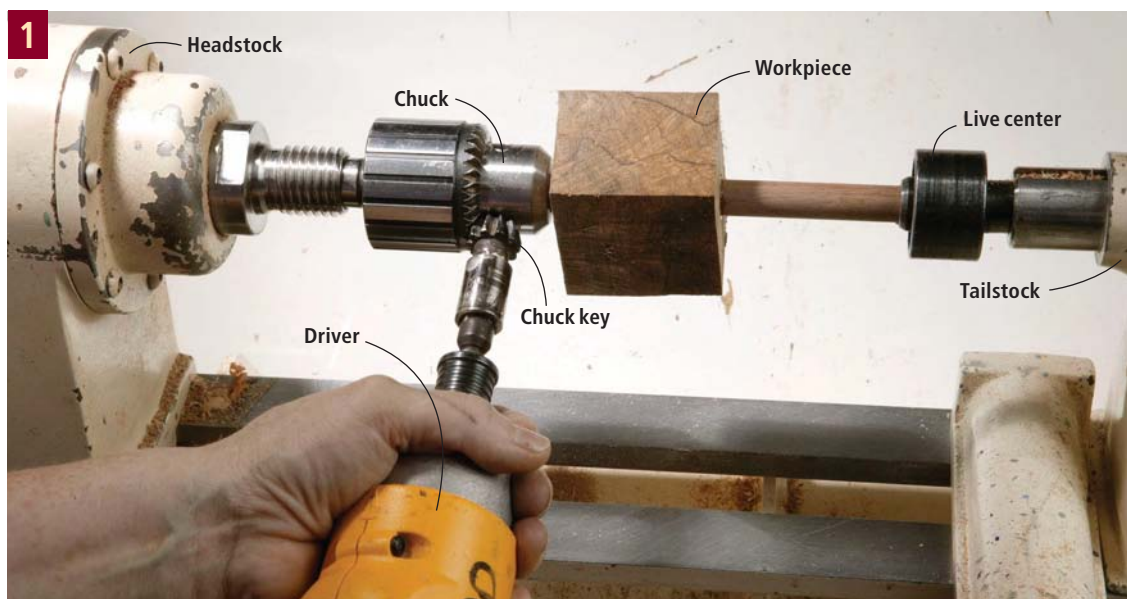
some coordination and practice, but what doesn't? (And it will effectively illustrate why you're going to want to upgrade to a lathe with reverse and infinitely variable speed.)

The paint has to be applied quickly and accurately. You can't really fix it if it slops over onto adjacent areas, or if it doesn't go on relatively evenly. Don't waste time fussing over it; take it off and start over. You'll never get it to look right, and in the time you'll spend trying, you could practice applying it properly in the first place. The key to getting the paint cleanly onto the workpiece is to load and handle the brush properly. Dip the brush in clean water and squeeze out the excess before loading it with the paint. You must have enough paint

to coat the entire circumference of the piece, but too much paint and you won't be able to control it as it goes onto the piece. Getting clean edges can be difficult. The trick is to lay down a small bead of paint and then push it to the edge. This will all take practice.

When you're happy with the colors you have applied, allow the paint to dry for at least a few minutes. The easiest way to finish the ornament is to apply a soft wax and gently buff it while the piece is still on the lathe. But be careful of the painted parts; the paint is soft for awhile, even when dry to the touch. You may find it works better to take the piece out of the chuck and let it dry overnight, then put it back in to finish it and part it off.

Put the prepared blank into the chuck and tighten the jaws. I have modified this live center by knocking out the point; this allows the dowel to slip into the recess so I don't have to find the center of the dowel every time I put a blank in. This also prevents the point from splitting the dowel under pressure. If the configuration of your live center doesn't lend itself to doing this, just be careful not to tighten the tailstock too much.



Using a large roughing gouge, turn the blank round. Remember to move the tool in the direction the flute is pointing, and to cut on the low side of the tool. Keep the tool firmly on the toolrest. Keep the bevel of the tool rubbing the wood as you cut.



Begin shaping the piece. Note I have switched to a fingernail-grind spindle gouge. I can do all the detail work with this tool.



Finish the details with a fingernail-grind spindle gouge. Burn any lines using steel wire. Sand the ornament up to #320 grit.



Begin applying the paint to the areas you wish to color. Steady your hands on each other (as shown here) and on the toolrest. Find a way to hold the brush that feels comfortable for you.



To make a crisp edge, lay down a tidy little bead of paint and carefully push it to the edge, as shown here.



This brush is a 1/4" angled shader; it's the one I use the most. The angle helps to allow a controlled release of the paint. It's easy to lay down a pencil-thin line with this brush. A square brush would tend to spread out and make it hard to get sharp detail.



After the paint is dry enough, apply a soft wax finish. Be gentle; you can damage the paint if you aren't careful. You might want to set the ornament aside overnight and finish it later.



When the piece is completed, use the fingernail gouge to part it off the lathe. Glue a tiny screw eye in the top and add a colorful ribbon. **PW**

Shaker-inspired Bench

Some simple adaptations turn this
19th-century bench into a modern
mudroom necessity.

There is an old Shaker hymn called “Simple Gifts” that begins with this line: “Tis the gift to be simple.” This bench carries many of the qualities that the Shakers valued. The design is straightforward and driven by function, yet it’s also graceful and elegant. The construction is obvious and building it doesn’t require anything beyond simple tools and techniques.

The antique Shaker bench that inspired this piece actually led two lives. It was originally made without a back at the Hancock Shaker village. As it got older (and presumably the brothers or sisters using it also got older) wood was scabbed onto the back of the ends, and the backrest was added, making it more comfortable.

Made of pine, the original was longer – 94” – and likely was used with a dining table. I liked the look and simplicity of this piece, but I decided to make a shorter version for use in an entry hall or mudroom.

I used cherry, and happened upon a single board that was wide enough, and long enough, for the seat and the end pieces. If you’re not as fortunate, you’ll need to glue up stock for width, which is what I was planning to do on the way to the lumberyard.

by Robert W. Lang

Comments or questions? Contact Bob at 513-531-2690 ext. 1327
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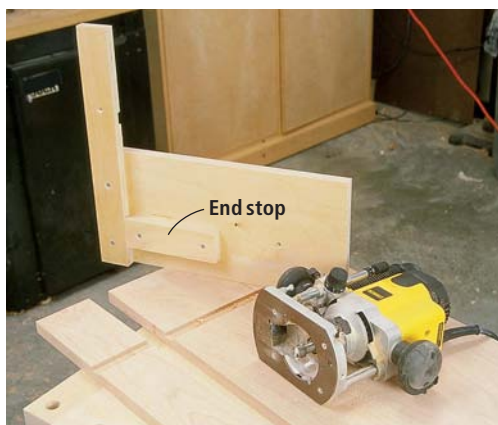


Adapting the Design

The original seat was 1" thick, and the corbel supports were short pieces at each end. Because I would be using $\frac{3}{4}$ "-thick materials, I extended the seat supports to run all the way between the ends to brace the seat and strengthen the overall structure.

The second design change was to the ends – on the original the arched cutout that creates the legs of the bench wasn't centered on the end. Because the back was added, the cutout was pushed forward. I put the cutout at the mid-point of the ends and made it taller and elliptical.

This T-square jig locates the exact position of the router bit. The addition of an end stop on the bottom of the jig puts the cuts the same distance from the ends of both the seat and the back rail.



Easy Layout, Strong Joinery

I stayed with the simple joinery of my example; a dado in the bottom of the seat to capture the ends and two more in the back rail to capture the back supports. Lap joints where the seat supports meet the ends complete the joinery.

After all the parts were cut to size, I routed the $\frac{3}{4}$ "-wide x $\frac{1}{4}$ "-deep dados in the bottom of the seat, and the back of the back rail. I made the T-square jig as shown at left to guide the router, and to locate all of the joints the same distance in from the ends.

With the dados cut, I made a test assembly of the two ends and the seat. When I prepared the stock, I planed everything to just more than $\frac{3}{4}$ ". I made some final adjustments to the thickness of the ends with a hand plane to get a nice snug fit in the dados.

With these three pieces fit together, I turned them upside down on my bench. After making sure that the ends were square to the seat, I marked the seat supports' locations working from the ends, as shown below left.

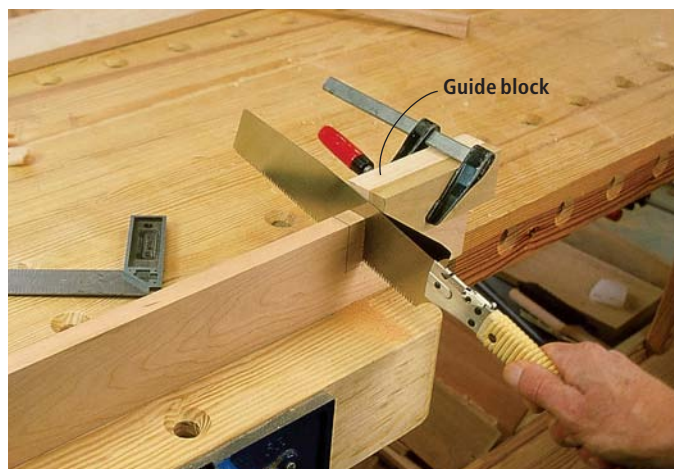
While I managed to avoid having to measure for the locations of the lap joints on the stretcher, I did need to measure for the depth of the cuts. Because the ends recess into the $\frac{1}{4}$ " dado in the seat, the lap joint cuts need to be $\frac{1}{8}$ " deeper than half the width of the support rails. The cuts in the rails and ends were marked at $1\frac{7}{8}$ " using the end of my adjustable square.

Guiding Hand Tools

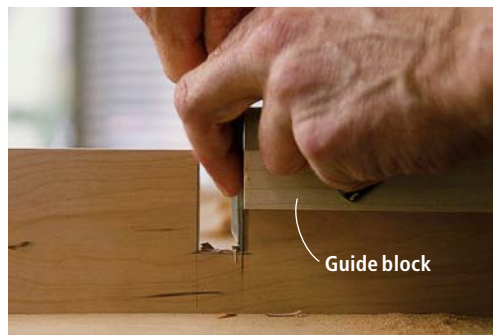
Like the dados in the seat, there are numerous ways to cut the lap joints. The seat supports are rather long, so I decided not to risk using



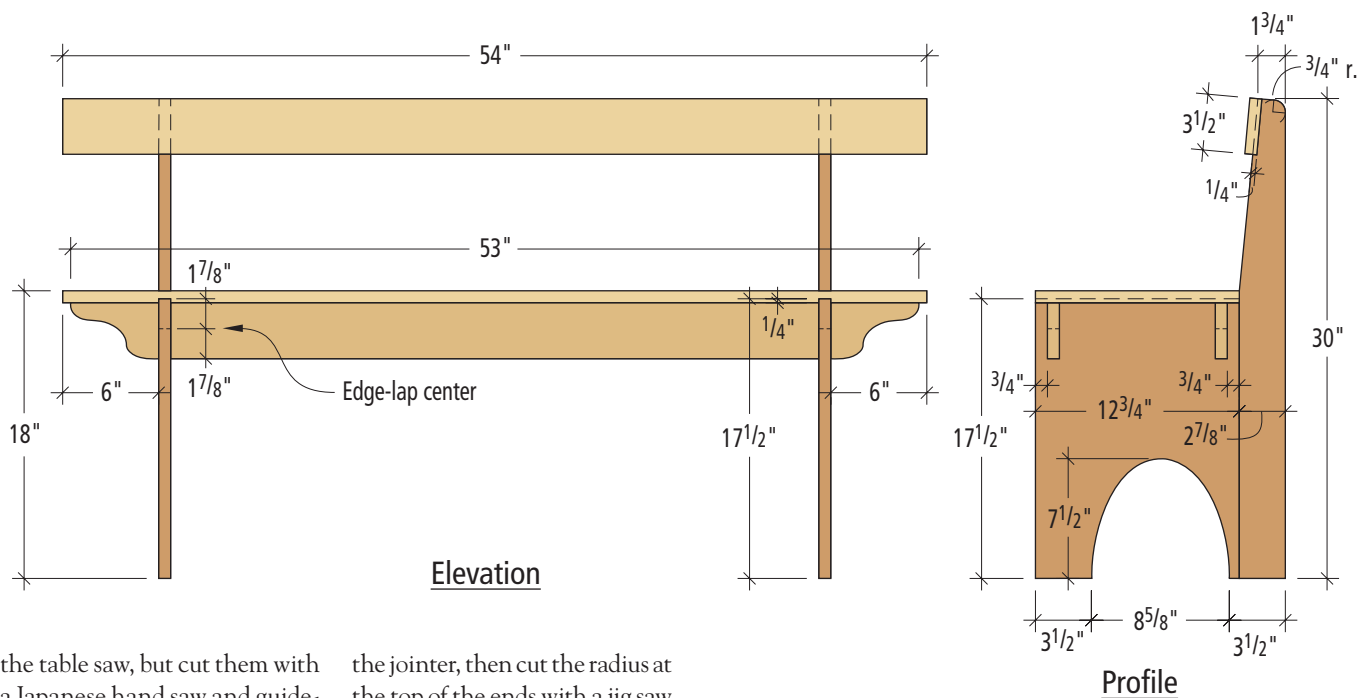
With the ends placed in the dados in the bottom of the seat, you can mark the location of the lap-joint cuts in the seat rail without measuring.



Clamp the guide block for the saw to just cover the pencil lines. By pressing the saw to the block as the cut is started, you establish a straight kerf.



After the bottom of the joint has been cut, use the same guide block to guide the chisel to pare the sides of the joint.



the table saw, but cut them with a Japanese hand saw and guide-block as shown at left. With the guide block clamped on the edge of my layout lines, it was easy to keep the saw straight, and I had the long cuts made quickly.

I used a jigsaw to make the bottom cuts, but I could just as easily have used a coping saw. I used the same guide block to pare the sides of the joints with a chisel, as shown at left. I also used a rasp to fine-tune the fit. These joints are relatively easy to make, but you need to be careful – if you try to force them together, there is a good chance that the pieces could split, especially with cherry.

I like to sneak up on a good fit by testing the slots next to the adjacent slot rather than in them. If the wood should split, don't despair. You can usually glue the split pieces back together without losing any strength, or the repair ever being visible.

With the lap joints complete, I turned to the back supports. By making them as separate pieces, cutting the back taper is very simple. I used my band saw and started the taper 1/4" above the intersection with the seat, tapering to 1 3/4" at the top of the support. After making the cuts, remove the saw marks by running the pieces over

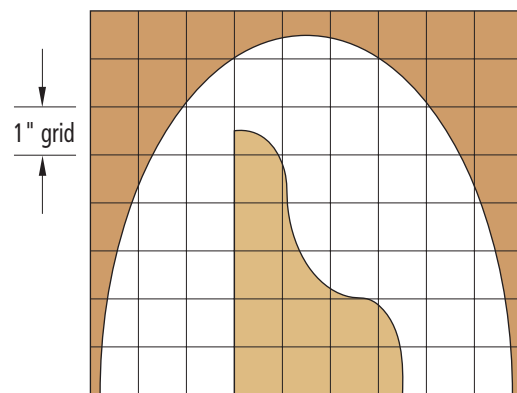
the jointer, then cut the radius at the top of the ends with a jig saw or coping saw.

To make the ends a single piece, I simply glued the back supports to the ends. I used a butt joint, and had to be careful while clamping this up to keep everything aligned. You might want to add some biscuits to help keep the pieces in the same plane. Once the glue was dry, I cleaned up the joints with a card scraper, and I was then ready to cut the decorative curves.

I made a full-size pattern of the cutout in the ends, and the corbel at the end of the seat supports. I transferred the patterns to the pieces and then made the cuts with a jigsaw. I cleaned-up the cuts by sanding the curves with an oscillating spindle sander. Again, there are many ways to make these cuts and smooth the surfaces. A band saw or coping saw could have made the cuts, and the curves could be smoothed with a spokeshave, a card scraper or a sanding block.

Edges with Character

I prefer to ease the sharp edges on a piece like this by hand with a block plane, and I did most of this before assembling the bench, being careful to avoid the areas



Quarter-size patterns



After the joints are cut and the back extension is glued on, position the paper pattern and mark the arched cutout.

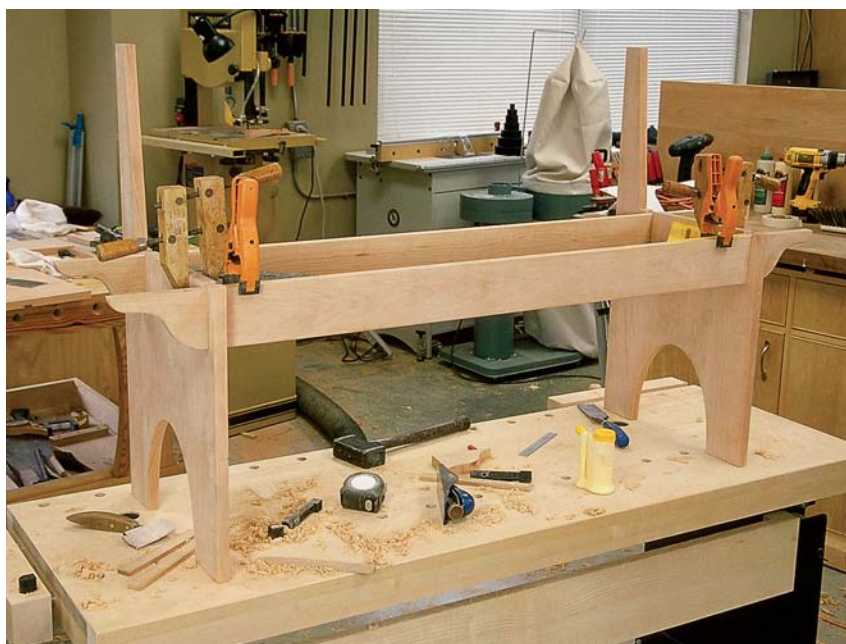


The oscillating spindle sander is ideal for cleaning up the saw marks and sanding to the inside of the pencil line.



A spokeshave eases the edges the block plane couldn't reach.

The lap joints should slide together with hand pressure and don't need to be clamped together. Speed squares clamped in the corners keep the assembly from racking while the glue dries.



in the vicinity of the joints. I could have used a router with a roundover or chamfer bit, but I enjoy the process of doing it by hand, and I like to vary the radius in different areas, adding character to the piece. With a router, I would have ended up with a sterile sameness on every edge.

The edges on the inside curves of the end cutouts were shaped with a spokeshave as shown in the photo below. After everything was put together, the edges near the joints were eased with a knife, a skew chisel and a rasp.

I did most of the sanding before assembly, sanding to #150 grit by hand with a sanding block. I avoided sanding in the areas of the joints to keep the joints from becoming sloppy. While hand sanding can be tedious, it leaves a much better surface, particularly on narrow edges, than using a random-orbit or palm sander.

Because the lap joints have a good deal of mechanical strength, I didn't need to clamp them together. I did clamp a "speed square" in the corners to keep things from racking while the

glue dried. After an hour, I put glue on the top of the end pieces, and the top of the support rails. Then I clamped the seat and back, and left the assembly overnight for the glue to dry.

A Bit of Insurance

In the photo of the original Shaker bench, the ends of the dowels or plugs are visible on the face of the back rail and on the front edges of the joints for the seat supports. I decided to reinforce these joints, as well as the dado in the seat, with #8 x 1 3/4" screws, covering the screw heads with contrasting plugs of black walnut.

Years ago I did repair work on wooden boats, and plugged screws were the way we held nearly everything together. Here are a couple of tricks from those days that speed the process considerably.

Most people cut plugs in a random pattern in a piece of scrap and then pry them out with a chisel. If you rip the scrap to roughly the outside diameter of the plug cutter, and use a fence on the drill press as shown on page 43, the plug cutter won't need to remove so much material, and it won't tend to wander.

The second benefit is that the plugs don't need to be pried loose with a chisel. Set the blade height on the table saw to 1/8" less than the strip of plugs, and set the fence so that the plugs are on the outside of the blade. Use a push stick to carefully make the cut, and you have a strip with the plugs still attached. You can easily break them off when you're ready to use them, as shown on page 43.

Flush-cutting handsaws can be used for trimming the plugs, but I prefer to use a chisel. Pay attention to which way the grain is running on the side of the plug, and make the cut with the edge of the chisel on the "downhill" side. I hold the chisel slightly above the surface,

and one smack with a mallet removes most of the plug. A paring cut, pushed by hand, leaves the plug flush with the surface.

If I'm not sure which way the plug will break, I'll make the first cut higher up, so that the plug is entirely above the surface, and then make the final cut in the direction that the first cut broke, as shown below. This technique is faster than sawing, and a minimal amount of work with a scraper leaves the plug smooth and flush with the surface, as there are no saw marks to be sanded out.

A Fitting Finish

With the entire piece assembled, it was time to finish the work on the edges of the bench and to give everything a final sanding. I sanded all of the edges with #120-grit sandpaper, followed by #150. With the majority of the flat sur-

faces sanded to #150 grit before assembly, only some minor sanding was needed before the entire piece was hand sanded with #240-grit sandpaper.

Cherry is truly a beautiful wood, and it's my opinion that an oil finish brings out the best of its character and figure. I used a Danish oil finish, and wiped it on, working in the oil with a nylon abrasive pad, and keeping the surface wet for about 45 minutes.

After wiping the surface dry with a rag, I set the bench in the sun for a few hours, turning it every half hour and wiping off any oil that bled out. This exposure to the sun darkened the wood, giving a jump start to the patina that cherry develops as it ages.

The next morning I applied a second coat of oil, keeping the surface wet for 20 minutes before wiping it dry. I let the oil dry during a long weekend, and applied two coats of paste wax, worked in with

a nylon pad and then buffed.

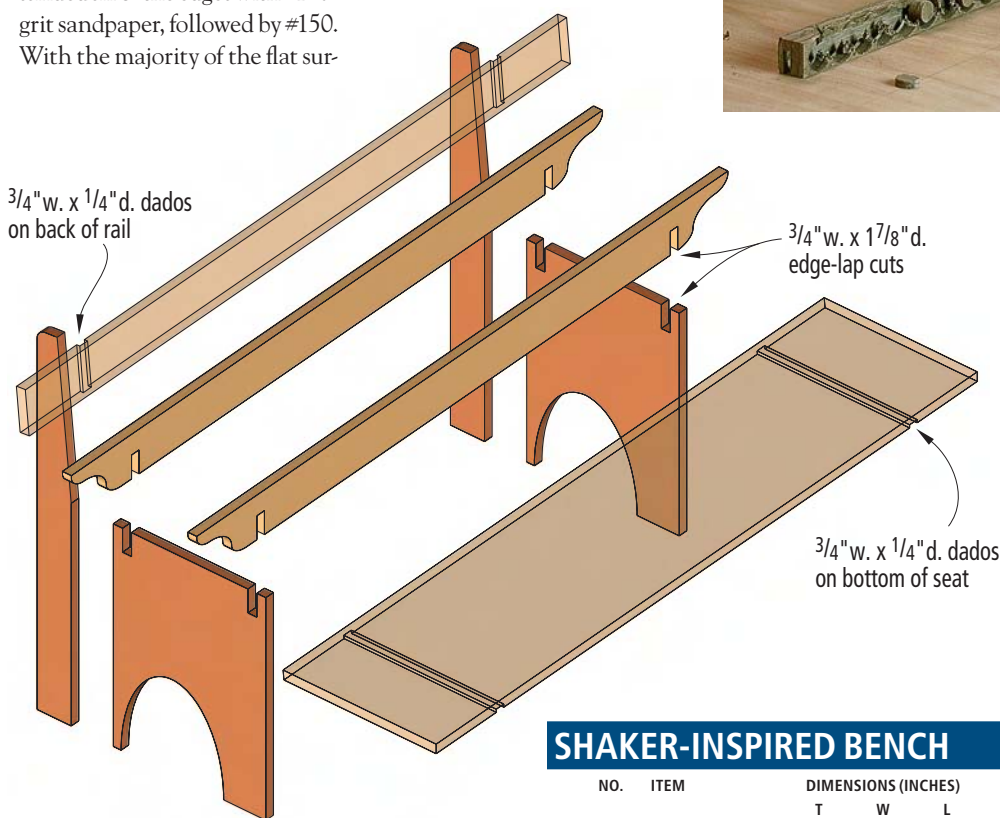
We tend to think that the furniture we sit on needs to be intricate in design and complicated to build. This Shaker bench proves otherwise. **PW**



Spend a little time preparing stock for plugs, and they will be easier to cut. The rabbet in the fence keeps chips from building up.



Keeping the plugs barely attached to the strip keeps them manageable. Break them off from the strip by hand.



Exploded view



It's faster to trim the plugs with a chisel than with a saw, and if you keep an eye on the grain direction they will be flush with the surface.

SHAKER-INSPIRED BENCH

	NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
			T	W	L		
<input type="checkbox"/>	2	Ends	3/4	12 3/4	17 1/2	Cherry	
<input type="checkbox"/>	2	Back supports	3/4	2 7/8	30	Cherry	Glue to ends after joints are cut
<input type="checkbox"/>	1	Back rail	3/4	3 1/2	54	Cherry	
<input type="checkbox"/>	2	Seat supports	3/4	3 1/2	53	Cherry	
<input type="checkbox"/>	1	Seat	3/4	12 3/4	54	Cherry	

WOODWORKING ESSENTIALS

BY NICK ENGLER

CHAPTER

3

Basic Joinery

There are three basic saw cuts: crosscuts, rips and miters. Crosscuts are made perpendicular to the wood grain, rips are cut parallel to the grain and miters are made at angles diagonally across the grain. None of these requires elaborate jigs or complex techniques, but they are the building blocks to basic joinery on the table saw.

Rips and crosscuts are used to form many joints, including the basic edge and butt joints, which can be used to

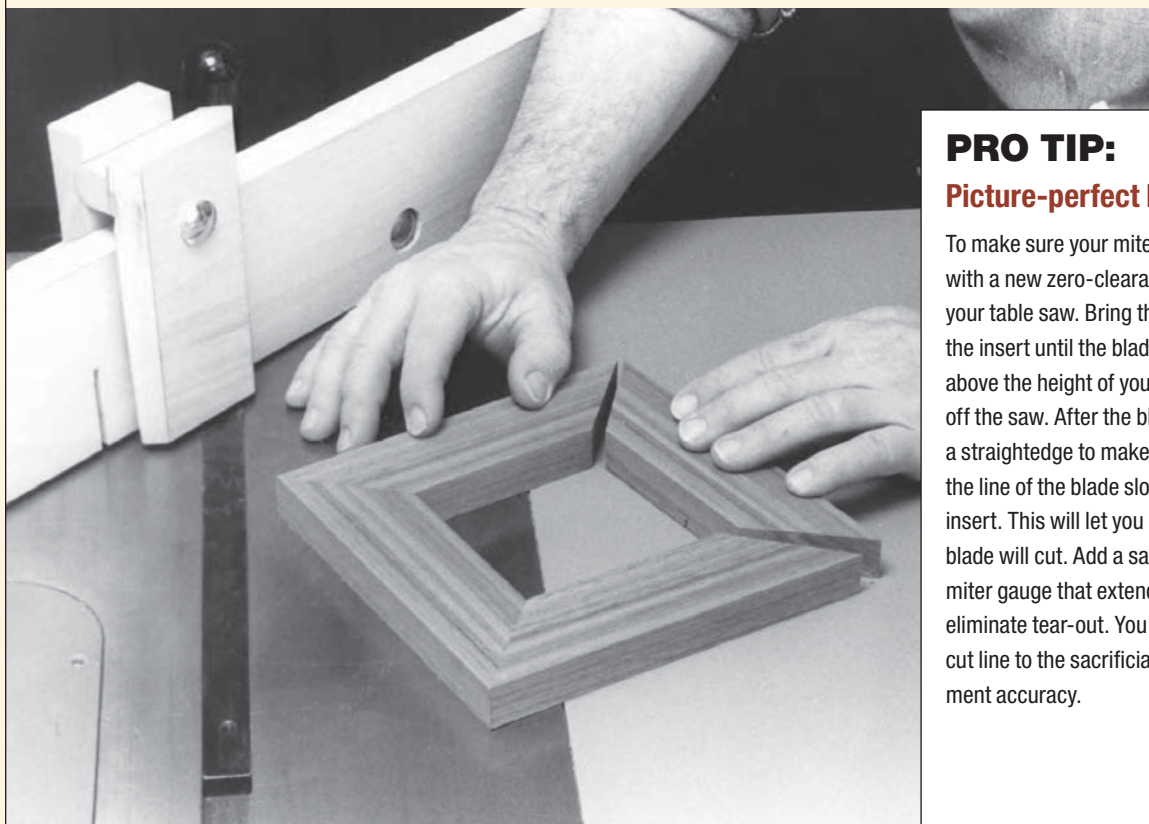
glue up a tabletop or door frame. These two cuts are also used to cut rabbets, grooves and dados. And a variation of these cuts will create a miter joint. In Chapter 2 we discussed crosscuts and rips. Now it's time to learn about miters.

Miters

Miters can be the most frustrating cuts to make. Angled cuts are harder to measure and lay out than crosscuts. To make a mitered frame perfect, both the inside

and outside dimension of the piece must match on each component. You should start with accurate measuring tools and some basic math, and then you will need to test and retest your setup to ensure its precision.

When you make a miter cut on a table saw, you run into a problem associated with crosscuts – the factory-supplied miter gauge is too small to offer adequate support for guiding most boards. To properly support the work, you must



PRO TIP:

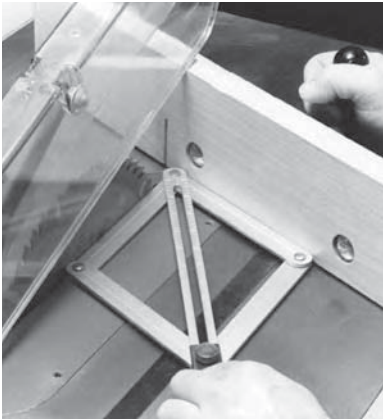
Picture-perfect Miters

To make sure your miters are perfect, start with a new zero-clearance throat insert on your table saw. Bring the blade up through the insert until the blade height is about $\frac{1}{4}$ " above the height of your frame material. Turn off the saw. After the blade has stopped, use a straightedge to make a mark, extending the line of the blade slot the full length of the insert. This will let you see exactly where the blade will cut. Add a sacrificial fence to your miter gauge that extends past the blade to eliminate tear-out. You can also extend the cut line to the sacrificial fence for extra alignment accuracy.

TIPS & TRICKS

GREAT TIP:

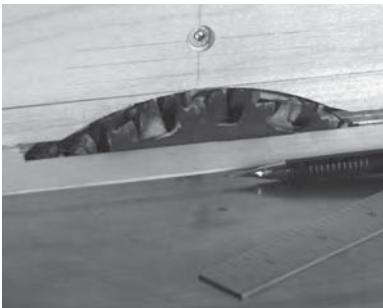
Setting Between the Lines



Use an angle divider to help set oddball miter angles that you can't measure with a set of drafting triangles or a square. This device, which is available from most wood-working suppliers, looks like an adjustable metal parallelogram.

PRO TIP:

Right Height, Every Time



When using a dado set and sacrificial rip fence to make rabbets, setting the height of the dado set in the fence is tricky. Make it simple by attaching a new sacrificial fence, then measure and mark the height of the blade (for the perfect rabbet depth) right on the fence face, measuring from the table saw's top. Lower the dado set, move the fence into place, then bring the running blade up into the fence, stopping when you reach your line.

Work creeps downhill as it's cut

A simple stop clamped to your miter fence will keep your piece from slipping during the cut.

Clamp stop here to prevent creep

fit the gauge with an extension fence or replace it with a sliding table.

Even when using an adequately sized miter gauge, boards are inclined to creep during a miter cut because of the rotation of the blade into the cut. One way to compensate for this is to add a stop to your miter gauge fence as shown above. Your stop will also help you make repeatable, accurate miter cuts every time.

Accurate angles are another problem on table saws. The stock miter gauge and

blade-tilt scale on most table saws – even the best ones – are notoriously imprecise. And you can't use a drafting triangle to set every possible angle you might want to cut. You must use the scales to estimate the degree setting, then thoroughly test the setup until you have it right.

Once the miter gauge angle is properly set, make the miter cuts. If the boards are to be joined by miter joints (such as the members of a frame), you must make mirror-image miters. Note:

To create accurate, matching miters (or butt joints) for frame work, flip the work piece end-for-end keeping the same long edge against your miter gauge, as shown here.

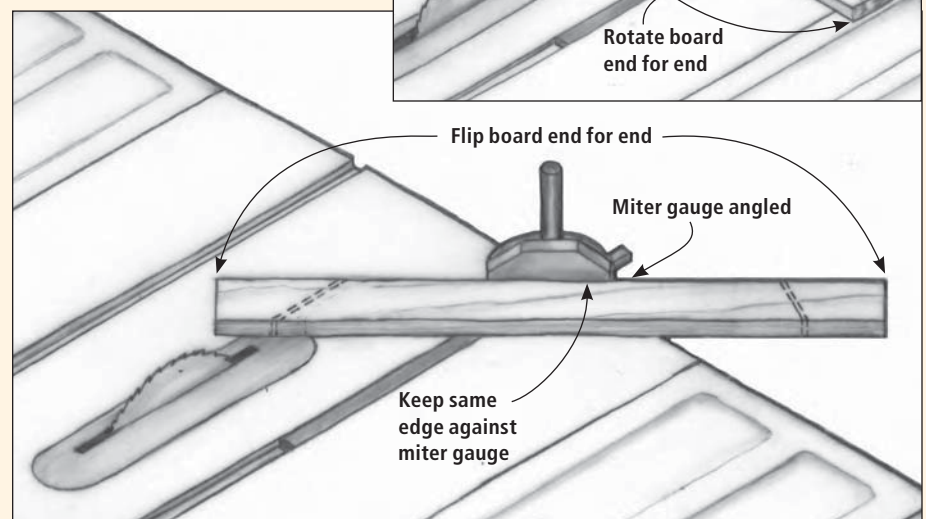


Illustration by Mary Jane Favorite

Illustration by Mary Jane Favorite

A single miter joint is comprised of one left miter and one right miter. To do this, flip each board end-for-end, keeping the same edge against the gauge as you cut the ends. Only in rare instances when you can't flip the board should you have to readjust the angle of the miter gauge to cut left and right miters.

You also can cut a miter by tilting the blade rather than angling the miter gauge. This procedure is similar, but there is an important difference when cutting left and right miters. As you rotate the board end for end, the same face must rest against the table. Note: You can switch faces if you first switch the miter gauge to the other slot.

Bevels

The procedure to make a bevel is similar to the way you make a miter, but you must set the blade at the proper angle, rather than the miter gauge. Measure the angle between the blade and the table with a triangle or a protractor.

If you rip a bevel or chamfer, make sure the blade tilts away from the rip fence. This gives you more room to safely maneuver the board and reduces the risk of kickback. On right-tilt saws, you will have to move the rip fence to the left side of the blade (as you face the infeed side of the table saw).

Rabbets, Dados and Grooves

Although the final results and applications for dados, rabbets and grooves are different, the way to make each is very similar. And all are easily made on the table saw. But first let's take a look at the joints themselves.

- A rabbet is an L-shaped cut of varying widths and depths, cut on the end (cross grain) or side (long grain) of a board. The width and depth of the rabbet can be adjusted to match the piece fitting in the rabbet, such as on a cabinet or drawer side. The joint created is better than a butt joint, but it is stronger when reinforced with more than glue.

- Grooves and dados have the same shape, but they're called different names depending on the direction they're cut



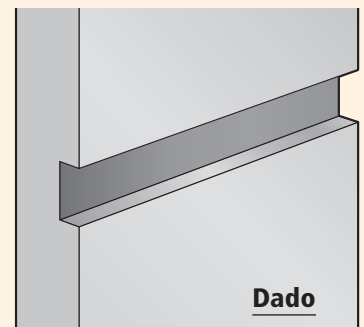
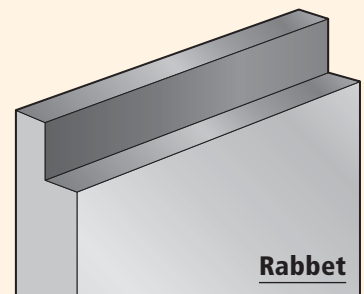
When ripping an angle other than 0° – cutting a bevel or a chamfer – be sure the blade tilts away from the rip fence. If the blade tilts toward the fence, there is a chance that the blade will pinch the board and fling it backward. Also, you may not have the space needed to feed the board safely. And on narrow cuts, there is the added danger that the blade may bite into the fence.

on the board. Both a groove and a dado are U-shaped trenches. The depth and width are variable according to the use. This joint is referred to as a groove when it's made parallel to the grain direction of the board. When made across the grain, it's referred to as a dado. This is a stronger joint than a rabbet because the mating piece is captured on three sides, rather than two.

Using a Dado Set

Rabbets, dados and grooves can all be created by making multiple cuts with a single saw blade, or one cut with a dado set. The different types of dado sets were discussed in detail in Chapter One of this series, as were the different saw blades to best use for this application.

When changing from a single blade to a dado set, always remember to unplug the saw and carefully handle the sharp blades. Because a dado stack cuts a much wider kerf than the ordinary saw blade, you must replace the saw's throat insert with a special dadoing insert. You can either make your own insert or purchase an aftermarket accessory to fit your saw. It's wise to make or purchase more than one. After you cut the insert to accommodate your widest dado arrangement, it shouldn't be used with a smaller-width setup that will leave gaps between the opening and the blades.



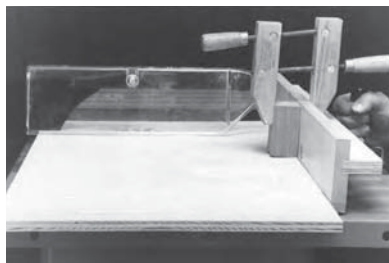
A rabbet (top) is an L-shaped cut on the end or side of a board. The depth and width can be varied to match a mating piece, or to create a particular type of joint. While the rabbet can be viewed as the female part of a joint, it can also be the male part, as it forms a tongue that can be used in tongue-and-groove joinery. A dado (bottom) is U-shaped and cut across the width of a piece. It can also be adjusted in depth and width. A groove is cut parallel to the board's grain direction. It's always the female part of a joint. Rabbets, grooves and dados can be "through" (run entirely across the board as shown), or stopped at either of both ends, depending on the requirement of the joint.

Illustration by Len Churchill

TIPS & TRICKS

PRO TIP:

Controlling Large Panels



When using a miter gauge extension to cut off large, wide panels, clamp a block of wood to the extension to serve as a hold-down. This will keep the panels from tipping over the back edge of the table saw as you finish the cut.

GREAT TIP:

Burn an Inch

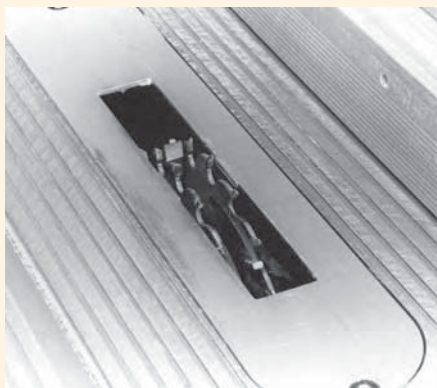
When making a sacrificial fence for your rip fence (for cutting rabbets), make it 1" thick. This will make it easier to use the fence scale when setting the position of the fence – simply subtract 1" from the indicated measurement.

PRO TIP:

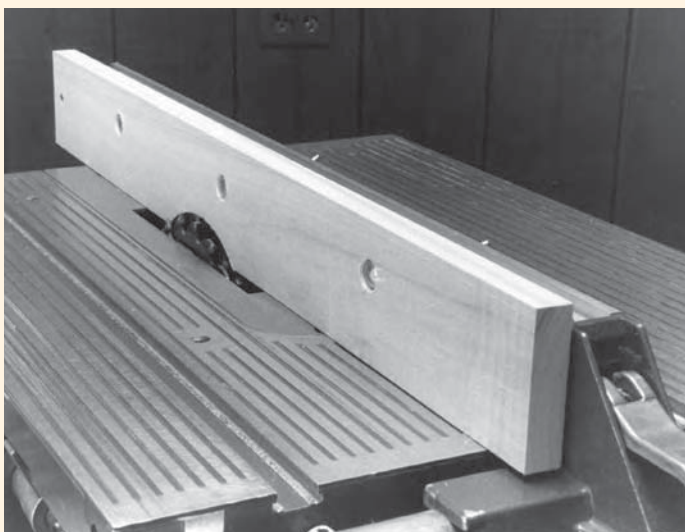
Clean in the Corners



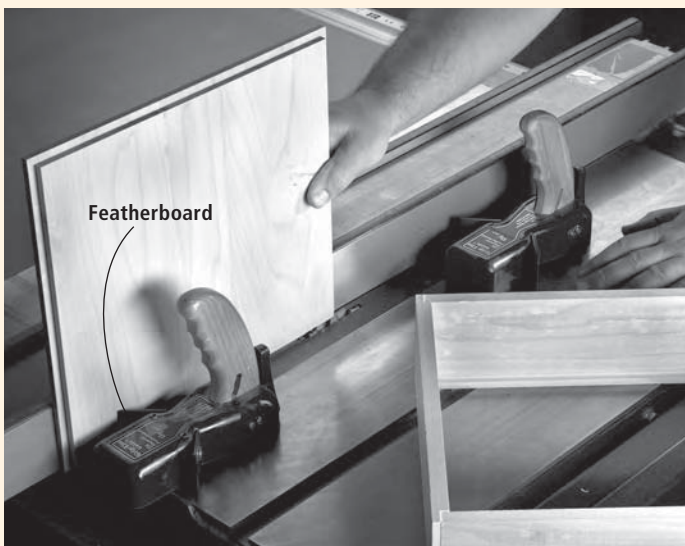
After cutting a rabbet with a dado cutter or a saw blade, inspect the inside corner between the side and the bottom. These cutting tools sometimes leave a little waste, or "tang," in the corner. You can quickly remove this with a scraper, chisel, bullnose plane or rabbeting plane.



Because the dado stack makes a wider kerf than the saw blade, you must replace the normal throat insert with one that has a wider opening.



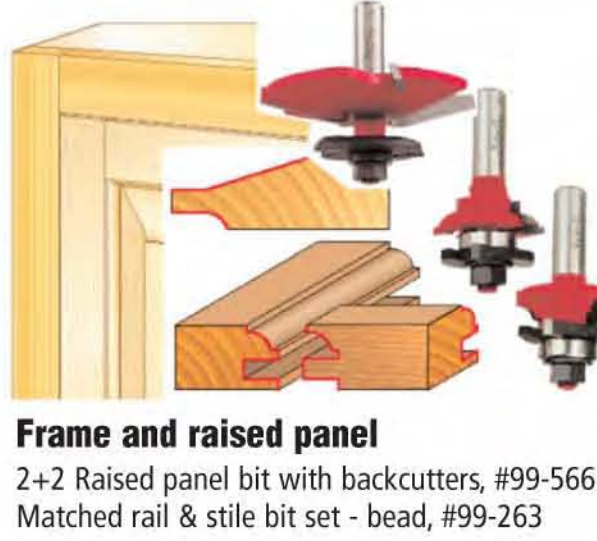
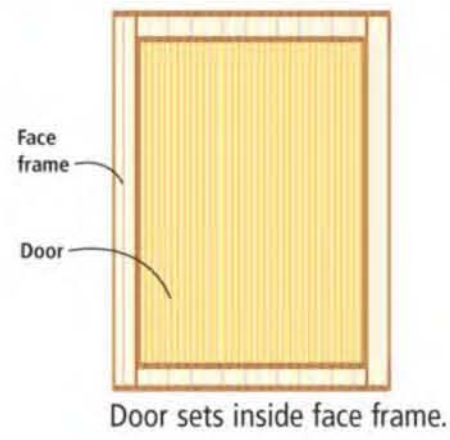
A sacrificial fence attached to your rip fence allows you to accurately use part of a dado set for rabbeting without harming your rip fence. The blade should be run up into the fence while it's securely locked in place to the tabletop. Make sure the blade clears your rip fence.



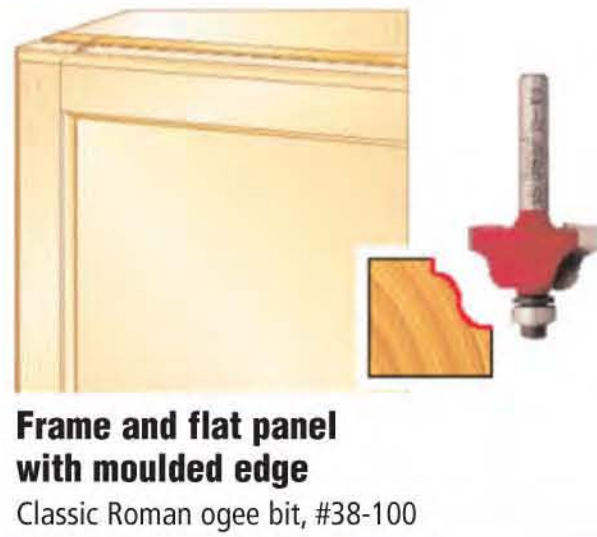
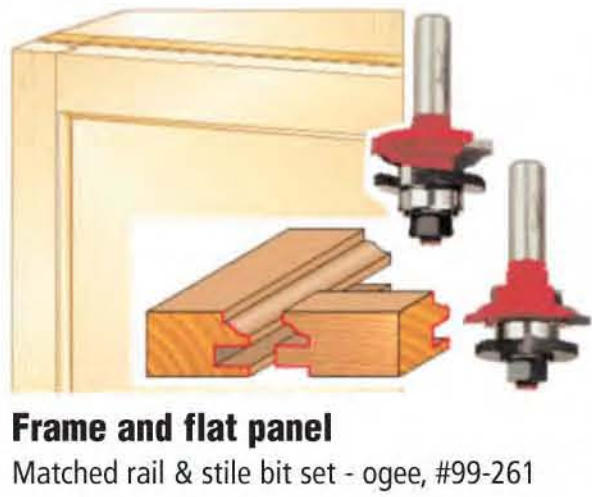
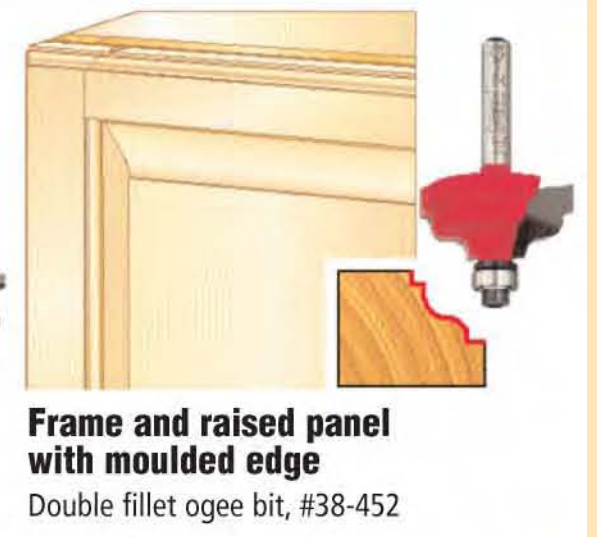
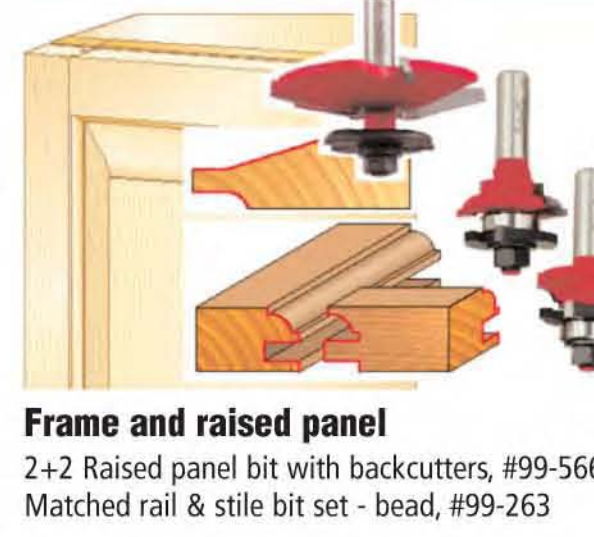
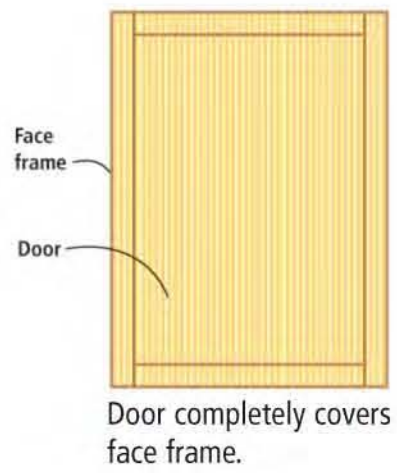
Featherboards, to hold material snug against the fence (and to avoid kick-back), can either be shop-made or purchased. The featherboards shown here have magnetic bases to hold them tightly against the tabletop. They should be positioned before and after the blade, but not at the blades' location or the waste will bind against the blade.

Illustrated Guide to Door Styles

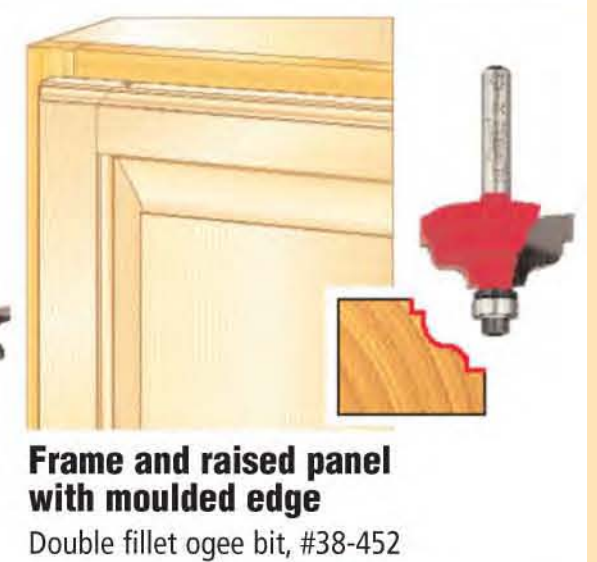
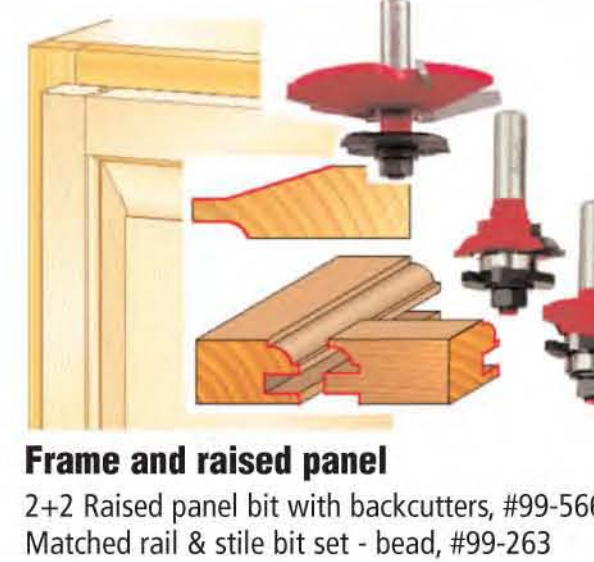
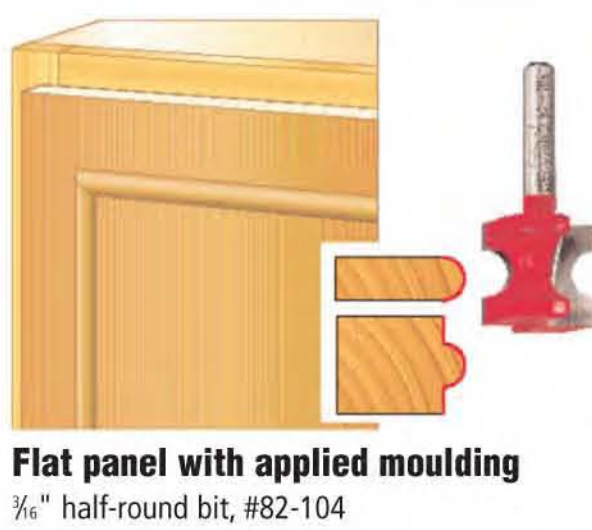
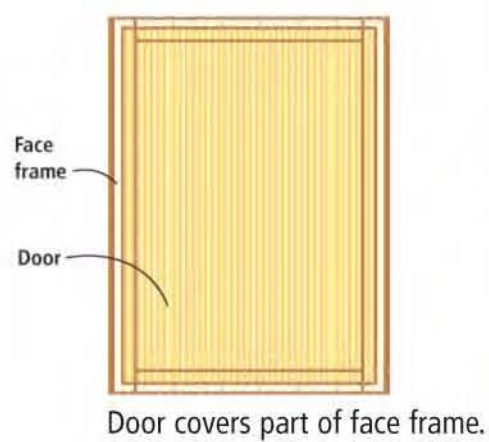
INSET



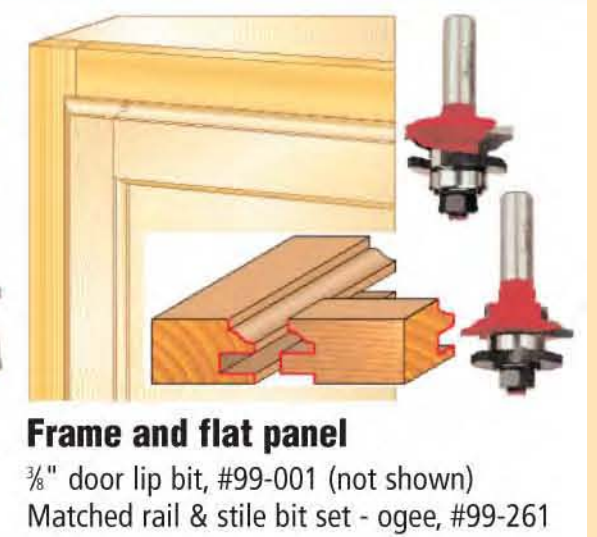
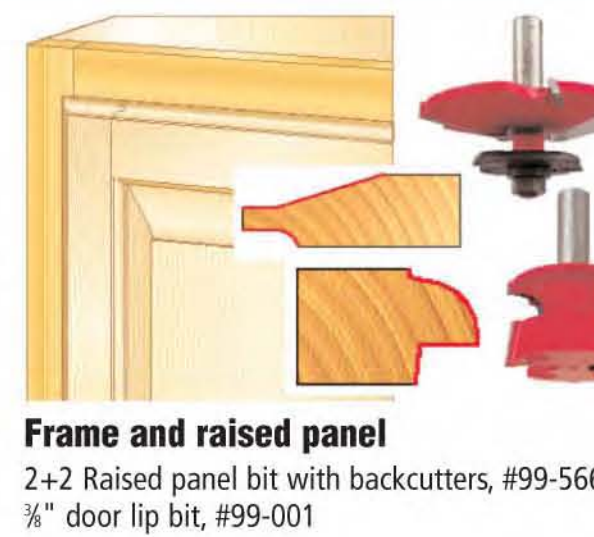
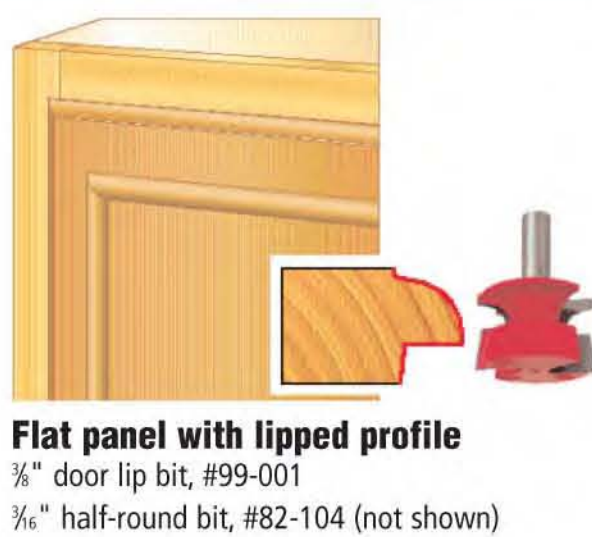
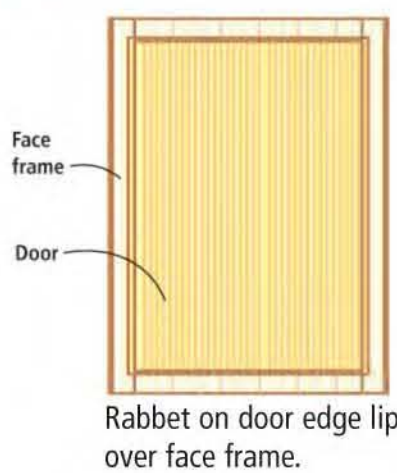
FULL OVERLAY



PARTIAL OVERLAY



LIPPED



in your way. Unfortunately, without the splitter and anti-kickback fingers, there is nothing to stop kickback, so be careful. Also, because the dado cutter removes more stock than a standard saw blade, kickback is more likely. To guard against this, use a featherboard.

When making the rabbet cut, the board is most safely run flat on the table saw's top. By virtue of this position, the height of the dado stack should be set to the required depth of the rabbet. The distance from the sacrificial face to the left side of the dado stack (the amount of blade exposed) will be the width.

To make a groove (or dado, but only on wide boards for safety) the rip fence is adjusted to re-locate the groove where needed, and the dado stack height is set for the required depth of the groove.

Making Rabbet and Dado Joints with a Single Blade

As mentioned, rabbets and grooves can also be made with a single saw blade if you don't have a dado stack.

Rabbets can most easily be made in a two-pass method. The blade height is set for the depth of the rabbet and the rip fence is set for the width of the rabbet (including the blade width in the setup). The board is then run flat on the table surface for the first cut.

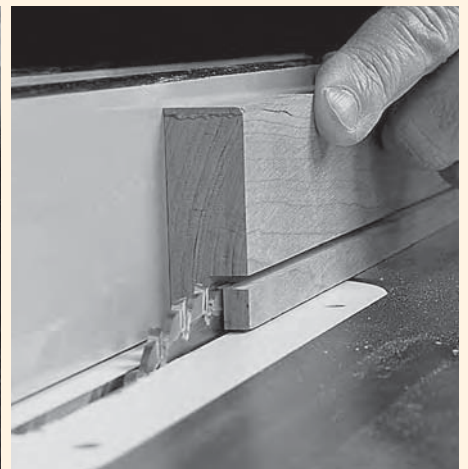
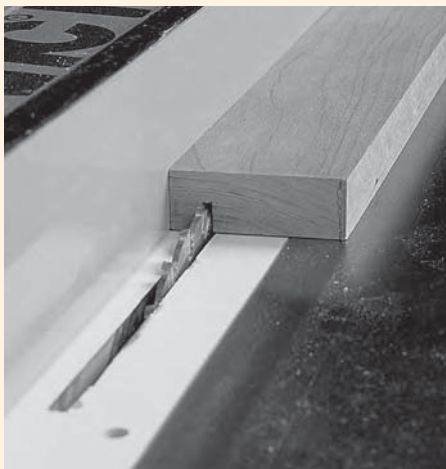
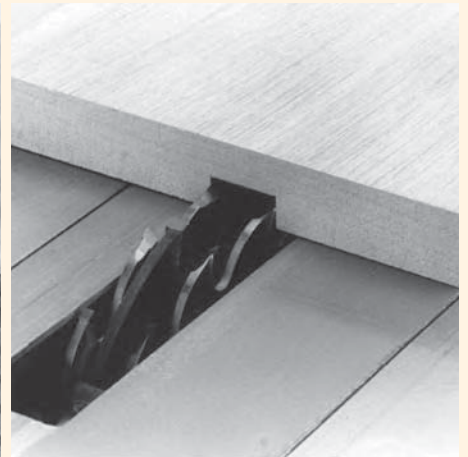
To complete the rabbet, the blade height is reset to just shy of the width of the rabbet, while the fence is set to cut away the depth of the rabbet. It's a good idea to have the rabbet size marked on the end of the board to double-check your setup. The board is then run on edge against the rip fence.

The order of these cuts is important. If the board were run on edge first, then on its face, the waste piece could be trapped between the blade and fence, and be kicked back at you at a very high speed. As shown above, the waste piece falls safely to the outside of the blade after the second cut.

To make a groove or dado with a single blade is more a nibbling away process until the groove is complete. It's easiest to start with the two outside passes



A sacrificial fence attached to your rip fence allows you to accurately use part of a dado set for rabbeting without harming your rip fence. The blade should be run up into the fence while it's securely locked in place to the tabletop. Make sure the blade clears your rip fence.



It's possible to create a rabbet on a board with a single blade using only two cuts. The order of the cuts is important for safety, though. The first cut (left) must be made with the face of the board against the saw table. The second cut (right) must be made on edge, with the waste piece oriented away from the fence to allow the waste to fall harmlessly away from the blade.

that will define the groove's shoulder, then make overlapping cuts between those kerfs to remove the waste material. While this process works, it won't take too many single-blade dados to convince you that the investment in a dado set is a smart one.

Expanded Techniques

In addition to cutting basic dados, grooves and rabbets, there are many other useful ways these joints can be used. Here are just a few of the most common variations:

■ Stopped Cuts

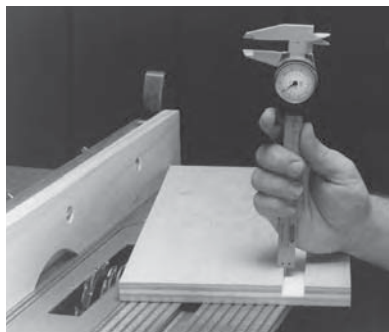
Sometimes you must halt a cut before it exits the end or edge of a board. To make a stopped rabbet, dado or groove, you must first know where the dado cutter starts to cut as the wood passes across the table saw.

To find out, first adjust the cutter to the desired height and position the rip fence. Affix a piece of tape to the fence beside the cutter. Select a scrap with at least one square corner and place it on the infeed side of the table with the square corner against the fence and fac-

TIPS & TRICKS

PRO TIP:

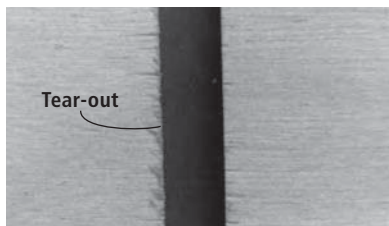
Tested for Accuracy



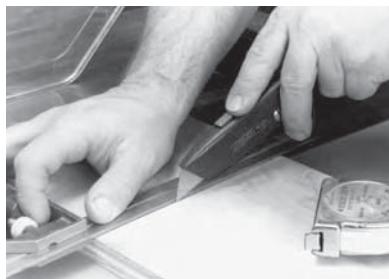
Whenever you're setting up the saw for a rabbet or groove cut, it's always a good idea to make a test cut in a scrap piece before cutting good stock. Measure the position of the cut on the board with a ruler or tape measure. For even more accuracy, a dial caliper can measure the width and depth very easily.

PRO TIP:

Dados with no Splintering



Whenever using a dado stack to make a dado (across the grain), there's a very good chance of tearing out the fibers on the face of the wood, whether solid wood, or plywood (see above). To avoid this, score or precut both sides of the dado with a sharp utility knife before making the cut. This cleanly separates the fibers before the dado teeth get a chance to tear them.

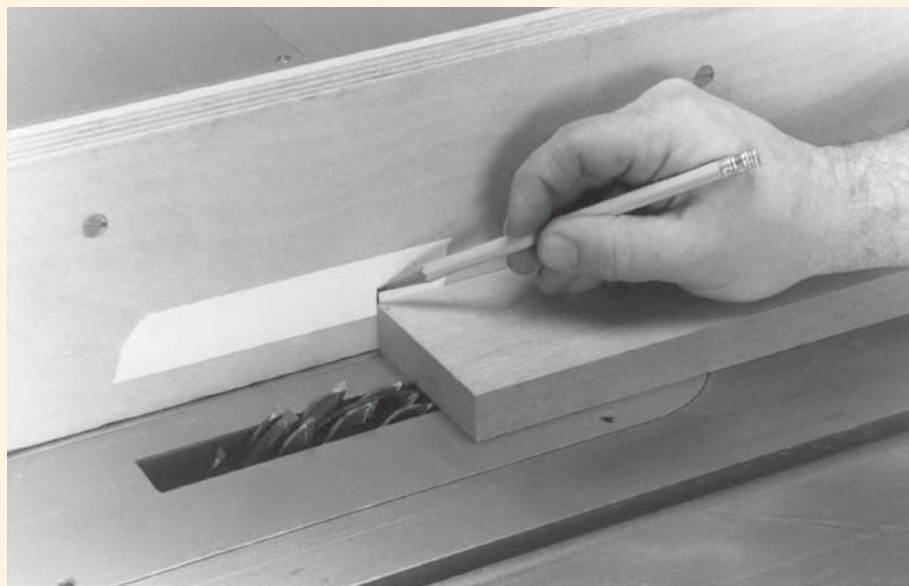


ing the cutter. Slide the scrap toward the dado accessory as you spin the cutter by hand (with the saw unplugged). When the teeth brush the scrap, mark the position of the corner on the tape.

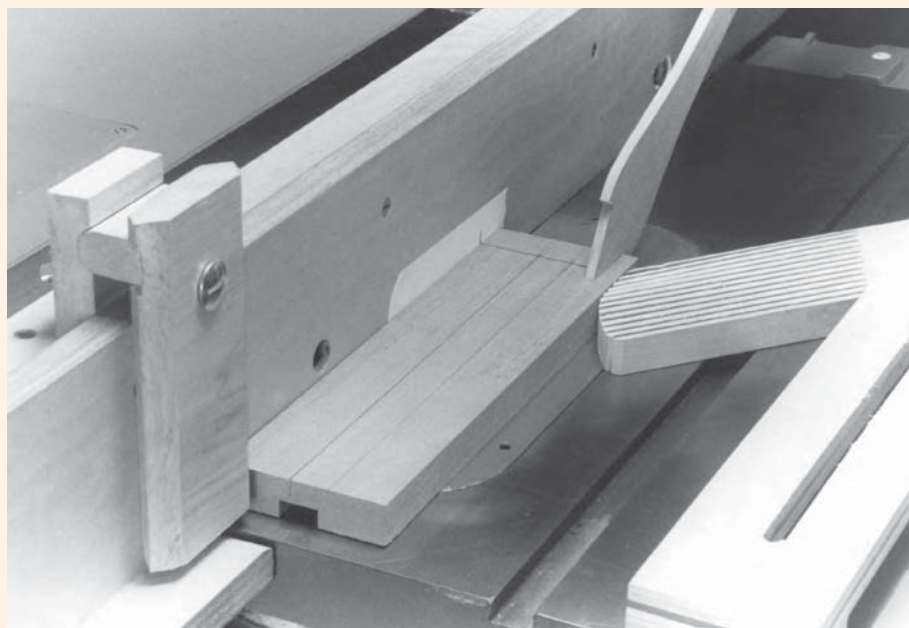
To find where the dado cutter stops cutting, simply place the scrap on the

outfeed side of the table.

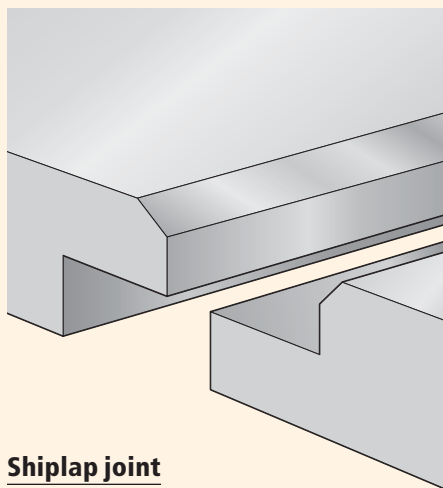
Now that you know where the blade stops its cut, you can clamp a stop to the end of the rip fence to halt the cut. Determine the length of the cut required and set the stop block that distance from your *infeed* blade mark on the fence.



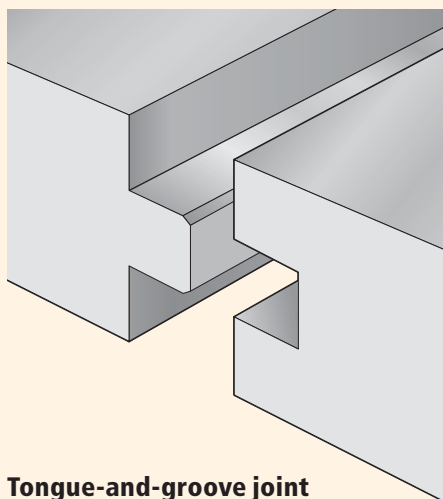
With the dado set to the desired height (and with the saw unplugged) the board is pushed forward until the leading edge touches the dado teeth. Mark the board location on the tape. This is the "start" position of the cut.



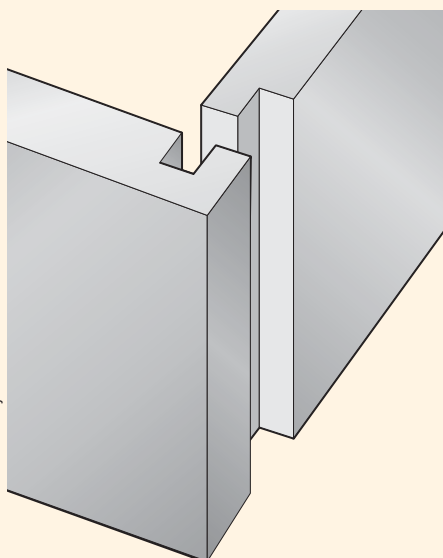
The tape mark on the fence also indicates where the dado cut ends in the piece. For a more accurate dado, a block attached to the fence (located using the tape mark) provides a positive stop.



Shiplap joint



Tongue-and-groove joint



Rabbet-and-dado joint

Illustrations by Len Churchill

■ Shiplap Joint

A useful combination of two of our joints in this chapter is shiplapped boards, which are often used as decorative (and sturdy) backs in cabinetry.

The shiplap joint uses two interlocking rabbets (created on the long edges of the boards). The interlocking rabbets form a solid back that still has the ability to expand and contract with changes in humidity, without stressing the cabinet, or opening a gap between the boards. To add a decorative element, bevel the shiplapped boards at the mating edges.

■ Tongue-and-groove Joint

A mating of a two-sided rabbet (forming a tongue) and a groove run in the long edge of a board forms the tongue-and-groove joint. Offering the same benefit against wood expansion and contraction as the shiplap joint, the tongue and groove also offers great strength as a mating joint. It allows long boards to stay parallel over long lengths. That's why it's most common application is in flooring to lock the board lengths tight against one another. This joint also plays an important role in frame-and-panel doors, but we'll cover that in more detail in Chapter Six.

■ Rabbet-and-dado Joint

With a rabbet on one side and a dado on the other, this joint makes a strong, but simple drawer joint. While a simple rabbet joint can be used as a drawer joint, the addition of a dado allows the rabbet to be firmly captured on three sides. This adds strength and stability to the joint. And this joint isn't only for drawer sides. Many drawer bottoms are slipped into grooves cut in the drawer sides to form an even simpler rabbet and dado. But wait – that makes it a tongue (the entire bottom is a tongue) and groove joint. **PW**

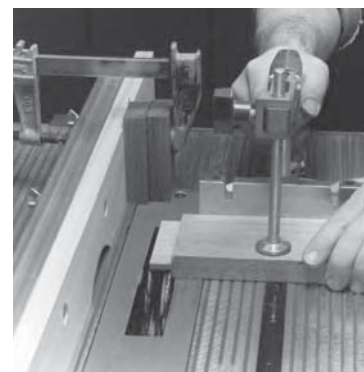
Add Basic Joints to Make Complex Ones

A rabbet is a fairly simply (and not all that sturdy) joint. How it's used can make it much stronger. If the tongue of the rabbet fits into a groove or dado, greater strength can be achieved.

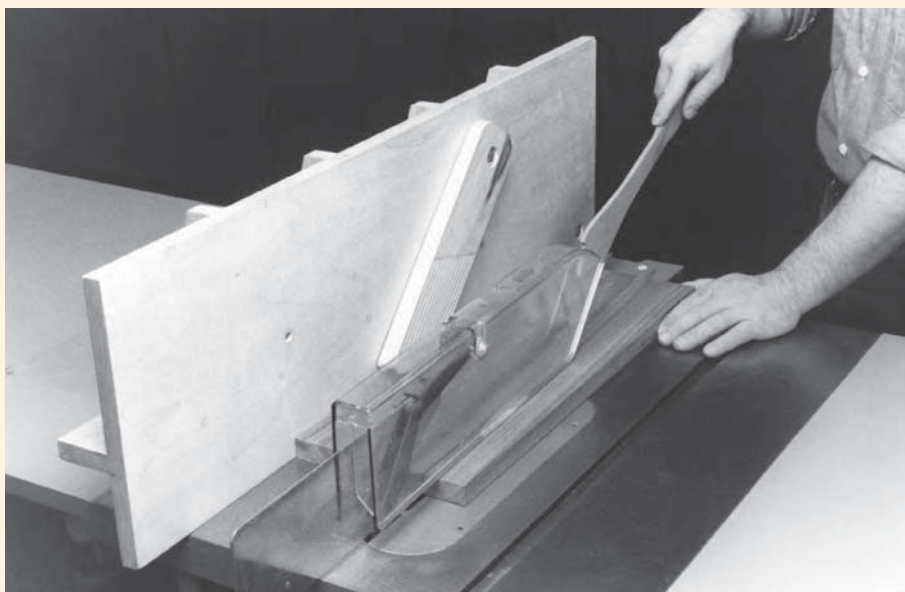
In fact, one of the strongest joints in woodworking is the mortise-and-tenon joint. And a mortise is nothing more than a groove with closed ends, while a tenon is a double rabbet!

To turn a rabbet into a tenon, you're simply cutting a shallow rabbet on both sides of a board with a dado stack that's wider than the dado cutter itself. Do this by making two or more passes.

This seems simple enough if you have to make only one joint – make the first pass, move the rip fence or reposition the board on the miter gauge, make the next pass. But if you must make several precise copies of the same joint, use spacers to help position the boards, removing them one at a time as you make each pass.



Tall Fence Extension



The tall fence extension increases the height of the face of your rip fence and attaches directly to the rip fence. This is a useful accessory for stabilizing boards during cuts when running boards on edge. One good example is cutting rabbets with a single blade. While one of the cuts is with the board flat against the saw table, the second cut is made with the board vertical and held tight against the fence. With 10" of bearing surface instead of the standard 3" or 4", the cut is much more accurate and safer.

Cut all the jig's parts from cabinet-grade plywood, taking care to make the faces and braces straight and flat. Rout the joinery, drill the mounting holes, then assemble the parts with glue and screws. Countersink and counterbore the screws so the heads are well below the surface of the wood.

If you wish, cover the heads with wooden plugs and sand them flush.

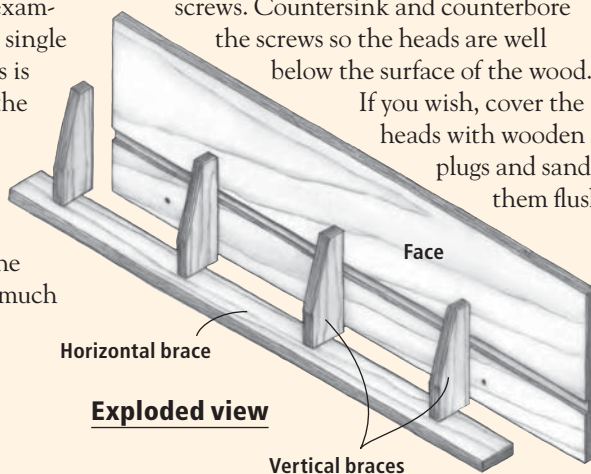
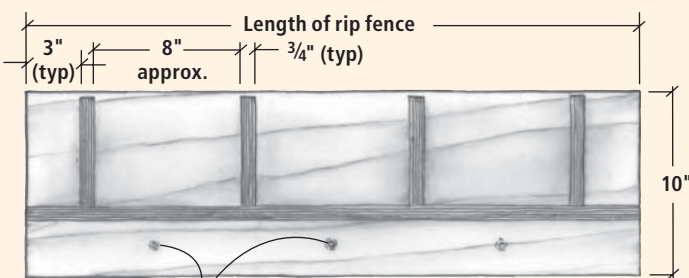
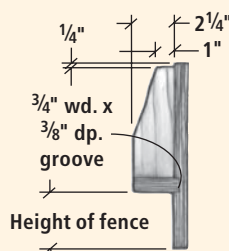


Illustration by Mary Jane Favorite



Countersunk mounting holes, sized and spaced to fit fence

Elevation – from behind



Profile

Everything you need to know about the table saw in our special series!

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 3 Basic Joinery

The saw is great for making some simple joints.



IN PAST ISSUES

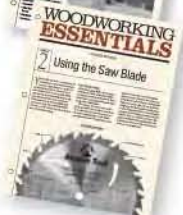
Chapter 1 Intro to the Table Saw

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



Chapter 2 Using the Saw Blade

The most important part of the saw is the blade.



IN FUTURE ISSUES

Chapter 4 Customize Your Table Saw

Simple additions can greatly improve your time in the shop.



Chapter 5 Advanced Joinery

A closer look at some of the more intricate joints to make.



Chapter 6 Special Techniques

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



Chapter 7 Advanced Techniques

Do things you never even imagined with your saw.



BEST NEW TOOLS OF 2004

Every year, the Best New Tools article is the one that everyone on the staff looks forward to. Each editor picks his or her favorite tools introduced during the calendar year and makes a list that's passed around.

Then we have to defend our recommendations to the other staff members. Frustrations rise, tempers flare and then (inevitably) a fistfight breaks out. Luckily we're all pretty fairly matched so you still get a balanced presentation of our favorite tools.

This year was no exception. And while there are other tools and machinery that were in hot contention that didn't make the cut (someone who shall go unnamed started biting) we're proud of this year's list.

There's something for everyone, including machinery from Grizzly and Jet, some fine precision power hand tools from Bosch, some value-added tooling from Infinity and some excellent hand tools from Lee Valley/Veritas, Lie-Nielsen and a French company new to our pages – Auriou.

We also call out a couple hot items that will improve the tools you already own, including a slick new router lift from Jointech and a simple splitter for your table saw from Micro Jig.

And each year there are a number of tools that are just too new

to fully evaluate but that seem likely to prove worthy of recognition next year. So we give you a sneak peak of some of these upcoming developments at the end of the article.

We hope you approve of this year's selection and I know a couple editors that will be training all year to get ready for next year's Best New Tools selections.



THE WINNERS

AURIOU

BOSCH

GRIZZLY

INFINITY

JET

JOINTECH

LEE VALLEY

LIE-NIELSEN

MICRO JIG

VERITAS

by the Popular Woodworking Staff

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



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

AURIU Rasp

It's not really fair to label the Auriou rasps as a "new" tool. After all, these rasps have been handmade in France one at a time since 1856. But they are new to the United States for 2004.

Simply put, these rasps will change your thinking about both what a rasp is capable of and how well it can do the task. Auriou (pronounced "Are-you") rasps cut sweetly thanks to the hand-stitched teeth of the tool, which are arranged randomly on the steel stock. The tools are available in a wide variety of "grains" (which is a measure of how coarse or fine the tool is), from rasps that will shape stone all the way up to the finest cut you can imagine from a rasp.

Most woodworkers stick with rasps on the finer side, from 10 grain to 15 grain.

Another enormous plus of the tools is the sharp "Swiss pattern" point at the tip. Most rasps sold in this country have a blunt point. The pointy Auriou allow you to shape wood in places you never thought possible. And with a set of Auriou rifflers, your reach is increased even more.

You know what we're going to say next: Quality has a price. These are the most expensive rasps on the market today. The 9"-long cabinetmaker's rasp with a rated 10 grain is \$81.95 – a bit less than twice the price of a Nicholson #50 rasp. But rest assured this is the last rasp you are likely to buy. Well, that is until you start lusting after the dozens of other Auriou now available.

–Christopher Schwarz

BOSCH 4410 10" Miter Saw

The Bosch 4410 came into our shop as part of a category review this year, and right out of the box we were impressed with what the saw had to offer, not least of which was the micro adjustment knob that tweaks the cutting angle available at any of the preset miter stops – a unique and useful feature.

Other features include a four-position handle with an ambidextrous safety switch, up-front bevel and miter locks, and extension tables to either side of the main table that are integral, nicely designed, easy to operate and include a built-in stop that works on the left or right side of the saw.

The miter capacity on this saw is an impressive 52° to the left and 60° to the right, and it's also a dual-bevel machine, allowing the head to tilt to

either side. The mechanism controlling the depth of cut is simple to adjust and offers a quick bypass for faster adjustments.

The powerful 15-amp motor, combined with the supplied 72-tooth ATB blade, provided quality cuts.

Another nice feature is the saw's large footprint, which offers stability not found in many other sliding compound saws.

Priced at the top of the category at \$530, it is a pricey saw, but a good one that offers the unique micro adjust.

–David Thiel



Bosch
877-267-2499 or
boschtools.com

BOSCH 1590EVS & 1591EVS Jigsaws

Bosch has always held a leading position in the jigsaw market, and when the 1590EVS top-handle jigsaw hit the market very late last year (too late to make the 2003 list), it re-established Bosch as the leader in that category. This year Bosch added the 1591EVS barrel-grip jigsaw to its line with the same features, just a different way to grab it – one that the *Popular Woodworking* editors prefer in our shop.

The feature high points are the same for both saws and include a 6.4-amp motor (the most powerful motor available in the category), variable speed (500-2,800 strokes per minute), four-position orbital

blade action and a built-in blower. Add to that a completely tool-less blade changing system that actually ejects the blade to keep your fingers away from hot, sharp metal. Plus, Bosch has added a precision control guide that adds extra support at the sides of the blade to hold it even more accurately to eliminate deflection.

Both models are very nice jigsaws, but as I mentioned, we like a barrel grip. It's our opinion that this design offers a lower center of gravity, making the saw easier to control in both straight and curved cuts.

The top-handle 1590EVS is priced around \$170 and the barrel-grip 1591EVS will run you \$190.

–DT



Bosch
877-267-2499 or
boschtools.com



Grizzly
800-523-4777 or grizzly.com

GRIZZLY Spiral-head Jointers

Every shop should have a jointer and planer to prepare rough lumber. But even with the best planers and jointers you still end up working the finished surface (whether sanding, planing or scraping) to remove machining marks.

Industrial shops have been using spiral cutterheads in their planers and jointers for years to reduce this tedious task. Spiral cutterheads have individual carbide inserts that are arranged to cut on a skew, reducing the strain on the motor, cut quieter, and more importantly, provide a cleaner cut that requires considerably less sanding.

As if that's not significant enough, the inserts require no set-up jigs and are four-sided so they can be quickly rotated 90° to remove nicks. The carbide

ensures they will outlast any high-speed steel knives many times over.

Grizzly did the home woodworker a favor this year and decided to add spiral cutterhead technology to both a 6" (G0526, \$850) and 8" (G0543, \$1,195) jointer. Both of these machines are proven designs in the line offering a good value to begin with—Grizzly simply added the upgraded cutterhead.

These two jointers are a step up in price from the base Grizzly models, but if you start to compare other 6" and 8" jointers from other manufacturers the math quickly starts to even out. And that's not counting the money (and time) you'll save between sharpenings. Oh yeah, then there's the sanding.

—DT

INFINITY Dadonator Dado Set

Testing tooling is tough to do. The premium and mid-price tools usually come out of the box and work very similarly. It's only after months of cutting that you start to see the differences between the really good stuff and the OK stuff.

After six months of testing the new Dadonator stack dado set from Infinity Cutting Tools I've concluded this tooling acts like a premium set with a slightly less-than-premium price (\$180).

The Dadonator makes smooth cuts with bottoms that are flat and clean. And even after a couple hundred cuts, the teeth were sharp enough to crosscut birch plywood with little or no splintering—just like the higher-priced tools.

One interesting feature of the Dadonator is that the chippers have six teeth instead of the four found on other premium sets. These extra teeth, the tooth geometry and the precise grinding make for very smooth cuts in both plywood and solid wood.

A couple of things to note: This 8" set isn't exactly 8" in diameter, more like 7⁷/₈". And the joints produced by the Dadonator (without shims) were between .008" to .01" undersized on our saw, something that is readily remedied with the included shims (and is common among other stack dado sets, too).

Here's the bottom line: This dado stack has earned the right to remain on my table saw.

—CS



Infinity

877-872-2487 or infinitytools.com

JET Variable-speed Mini Lathe



Jet
800-274-6848 or jettools.com

Months ago at a turning class I overheard one student say that Jet was coming out with a variable-speed mini lathe. The student was ecstatic. Well, Jet did indeed come out with a variable-speed mini lathe, and it's fantastic.

Professional and hobby turners have been impressed with Jet's JML 1014 mini lathe. The variable-speed version (JML 1014VS) is the same lathe with the added electronic bonus. The machine features three speed ranges that work like gears on a bike. The variable speeds are controlled by a knob and the position of the belt on the pulleys. Moving the belt is simple work.

It's quite difficult to bog this lathe down in use. When turning larger pieces, you will want to use a lower gear in order to have enough torque. But this minor trade-off is well worth the convenience of the electronic variable speed.

On top of all that, the lathe is top notch. The levers are made using high-quality metal and don't interfere with one another. Included is a beefy faceplate, a live center, spur center, safety goggles and a knockout bar. The handwheels' configuration is good and the tailstock and toolrest, once adjusted, tighten down well. Our only complaint is where the knockout bar is stored. Get a magnet and store your bar on the back of the machine, out of the way.

—Kara Gebhart

JOINTECH Digital Router Lift



Jointech
800-619-1288 or jointech.com

I was impressed with the Jointech SmartLift Digital Router lift even before putting a router in it. The digital readout allows you to set the height of the router bit to $\frac{1}{1000}$ " (or $\frac{1}{100}$ mm) simply by turning the handle and looking at the digital readout on the insert plate.

If you like, you can reset the zero point at any time, and accurately move the router up or down a specific amount. Want to cut a $\frac{1}{4}$ "-deep groove? Raise the cutter until it's flush with the tabletop, hit the zero button and turn the crank until the display reads .250. It's that quick, that easy and incredibly accurate. For quick adjustments, one complete turn of the handle moves the router $\frac{1}{16}$ ".

This electronic digital wizardry is housed in a

well-engineered, well-made package. The geared mechanism that provides the motion is completely enclosed to protect it from dust, and backlash has been virtually eliminated. I especially liked the aluminum insert plate – smooth and flat. One of my favorite things about the insert is that the leveling screws can be reached and adjusted with the insert in place, and that the three injection-molded ABS insert rings lock in place with a simple twist.

Mechanically, this lift is excellent, solid, precise and very user-friendly. Add in machine-shop digital measuring capabilities for a few dollars more (around \$375, check the company's web site for routers accepted), and you have the ultimate router lift.

—Robert W. Lang

LEE VALLEY Roller Stand

In my book, most roller stands would be more useful if they were melted down and cast into something that actually works. I've never found a stand that was durable, easy to adjust and versatile.

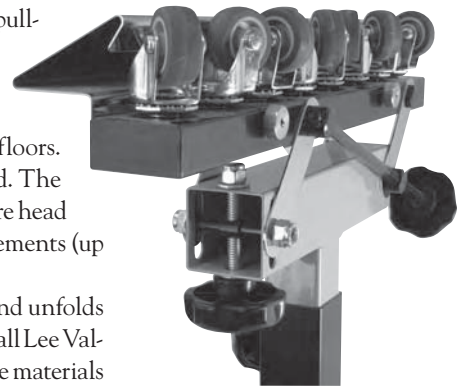
That long-held opinion, however, has just been changed. The Lee Valley outfeed roller stand is the first one of its kind that I would actually consider purchasing. And, I might add, it's an excellent value to boot. Let's look at some of my favorite features:

The head that catches your boards is well designed. An angled steel ramp catches any board that droops (up to $1\frac{1}{2}$ ") and guides it over eight independently swiveling casters. These casters work far better than rolling-pin stands or ones with transfer

balls. They support your boards without pulling them in odd directions.

Where the stand really shines is how you can adjust it in so many ways. A leveling foot fixes its stance on uneven floors. The steel ramp can be raised or lowered. The head can be tilted up to 4° . And the entire head can be raised and lowered in small increments (up to $1\frac{1}{2}$ ") simply by turning a knob.

The whole package folds up tidily and unfolds with an impressive $29" \times 22"$ stance. Like all Lee Valley products, this one is built from durable materials and is well-priced – just \$79.



Lee Valley
800-871-8158 or leevalley.com

—CS

LIE-NIELSEN Chisels

After month after month of using (and abusing) the heck out of these tools I can say that the Lie-Nielsen bevel-edge chisels are the most comfortable, balanced and durable chisels I've used.

Case-in-point: The most recent tool cabinet I built has more than 70 hand-cut dovetails. After chopping out those, I cut a few more dovetailed drawers for demonstrations, pared a bunch of tenons and squared up the rounded ends of several mortises. The chisels' edges were just starting to show some wear – so I honed them up one night just to

have something to do.

Based on the venerable Stanley 750 chisel, these

tools are lightweight enough to wield like a pencil while dovetailing, which lends you enormous precision. The perfectly finished American hornbeam handles take a tremendous beating without splitting and fit perfectly in my hands while paring.

The blades are durable thanks to the cryogenically treated A2 steel. And they have small side bevels (a rarity in new chisels these days), which allow you to clean out dovetails without bunting up the corners. The chisels unbeveled faces came perfectly flat and quickly polished up to a mirror shine.

If you have a nice set of chisels and are completely happy with them, stick with it. But if for any reason you are in the market for a set of lifetime tools, put the Lie-Nielsens (\$250 for a set of five) at the top of your short list.

—CS



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

MICRO JIG Table Saw Splitter

This year the price of safety has been lowered to just \$20. And the number of reasons for not having a splitter on your table saw has been reduced to zero.

The Micro Jig Splitter is the simple answer to a variety of problems with current table saw designs. Stock splitters are flimsy, hard to adjust and nigh impossible to remove and replace. Most aftermarket splitters are pricey (up to \$130). Many of us have vowed to make a homemade splitter, few ever do.

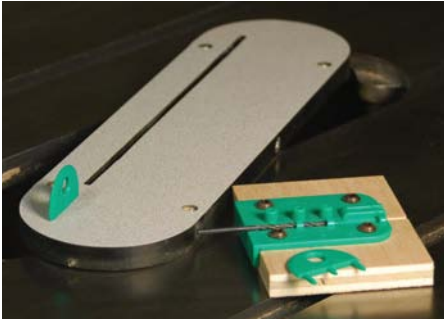
In just 30 minutes you can make your saw 30 times safer with the Micro Jig. The splitter is a small wafer of tough polycarbonate plastic, and it

fits snugly behind your blade to greatly reduce the chance of kickback. And – most importantly – it's easy to remove and replace when you need to make dado, bevel or through-cuts. And it costs only about \$20 (a thin-kerf version sells for \$25 to \$30).

Here's the not-so-good news: the Micro Jig Splitter works only with saws that have a zero-clearance insert. So if you're still using a stock throat insert, you'll have to upgrade to make this work.

The Micro Jig package includes everything you need to install the jig (even the drill bit), good instructions and a second splitter that's configured to work like a small featherboard. There are no more good excuses. Get safe. Get a Micro Jig Splitter.

—CS



Micro Jig
407-696-6695 or microjig.com

VERITAS Low Angle Jack Plane

Veritas planes get better with every new model the company introduces. The Veritas Low-angle Jack plane might just be the company's best tool yet (until next year, of course).

From a manufacturing standpoint, everything about this tool is spot-on. The sole was dead flat, the sides were ground perfectly square to the sole and everything moved smoothly and positively. Here's more proof that well-made tools are not a thing of the past. (If I could make one change, it would be to make the handles a bit smoother, but this is something you can do at home.)

Apart from the excellent manufacturing specs, there are two real standout features of this tool that will make you sit up and pay attention. The mouth of

the plane is 5" back from the toe. This novel arrangement allows you to accurately edge-joint longer pieces than you'd normally be able to do with a 15"-long plane. Also, there's a small knob behind the movable front shoe that you're gonna like. That knob acts as an adjustable stop for the shoe. You'll never bang the shoe against the blade again. And you'll be able to clear the mouth of shavings quickly and easily.

The plane is heavy (6 pounds), made of unbreakable ductile iron, equipped with a nice $\frac{3}{16}$ "-thick A2 steel blade and a precise Norris-style adjuster.

In a modern shop that uses both power and hand tools, this plane is ideal for truing edges and even final smoothing. And it's an excellent value at \$179.

—CS



Lee Valley
800-871-8158 or leevalley.com

NEXT YEAR'S BEST NEW TOOLS?

DeWalt Cordless Nailer Line

New from DeWalt is a line of four 16-gauge cordless nailers. The big news here is the ability to fire as fast as you want, with no pause for recycle time. We're waiting for a more woodworking-friendly 18-gauge nailer, but we like the speed! • **DeWalt:** 800-433-9258, or dewalt.com

Freud Avanti Router Bit Line

New from Freud is the Avanti 15-piece set (the most common profiles) of router bits offering Freud quality at an affordable price (\$200). These uncoated bits are manufactured with carbide designed for one or two sharpenings (rather than five or six) to keep the price affordable.

• **Freud:** 800-334-4107 or freudtools.com

Grizzly/General spray booths

Just out this year are a handful of easily stored finishing booths from Grizzly and General International. These are designed for the small

shop or serious hobbyist who wants to spray finish. Four models are in the pipe, starting at about \$1,000. We'll keep you informed.

• **Grizzly:** 800-523-4777 or grizzly.com; **General:** 514-326-1161 or general.ca

Hitachi Router kit

Hitachi is launching a 2 $\frac{1}{4}$ hp single- or variable-speed router with both a fixed and plunge base in a kit, priced about \$200. It's not a new concept, but we're anxious to see what Hitachi has done with the idea.

• **Hitachi:** 800-829-4752 or hitachi.com/hpt

Ryobi 18-volt One+ System

Ryobi recently announced a new cordless tool system that will offer all of its 18-volt tools without a battery or charger. This keeps the price of the tools low, and a pair of batteries will cost less than \$40, while a one-hour diagnostic charger runs \$20. Buy exactly the tools you need – not bad.

• **Ryobi:** 800-525-2579 or ryobitools.com PW



Photo by Al Parrish



Arts & Crafts

TOOL CABINET

The goal: The maximum tools in the minimum space.

Sometime while sawing the 60th dovetail for a drawer side, when my patience was as thin as the veneer facing on cheap plywood, a familiar feeling crept into my body. I began to experience an understandable lust for my biscuit joiner.

It sat patiently on a shelf, and I knew that its chattering, rattling teeth would make everything about this tool cabinet go much faster. But I resisted, because I had the words of a Victorian social reformer, art critic and part-time madman ringing in my head.

The writings of Englishman John Ruskin (1819-1900) were a cornerstone of the American Arts & Crafts movement. Ruskin decried the worst parts of 19th century industrialism. He promoted craft, pensions and public education when there was little of those things for the poor.

And in his book the “Seven Lamps of Architecture, The Lamp of Memory,” which was published in 1849, he wrote a passage that all woodworkers should read. It’s a bit long and a bit dramatic, but it has stuck with me just the same.

“When we build, let us think that we build forever. Let it not be for present delight nor for present use alone. Let it be such work as our descendants will thank us for; and let us think, as we lay stone on stone, that a time is to come when those stones will be held sacred because our hands have touched them, and that men will say, as they look upon the labor and wrought substance on them, ‘See! This our father did for us.’”

The biscuit joiner stayed on

the shelf. I continued to saw, chop, pare and fit for another four or five hours. Ruskin, I hoped, would have approved.

From the Book of Tolpin

While Ruskin kept me going through this long and difficult project, I really have a 20th century craftsman and author to thank (or blame) for my obsession with building a fine tool cabinet. Since it was first published in 1995, “The Toolbox Book” (Taunton Press) by Jim Tolpin has become the most-thumbed book in my library. I’ve studied every page, toolbox and drawing between its maroon cover boards (the dust jacket is long gone).

Years ago, I resolved to build

myself a cabinet that might rival some of the examples in “The Toolbox Book.” This year, I gave it my best shot. Since early 2004 I’ve spent many spare moments doodling on graph paper and on my computer to come up with a design that satisfied the three things I wanted from a cabinet: It had to hold a lot of tools, look good and be built to last. After studying my work habits, measuring all my tools and paging through thousands of examples of Arts & Crafts casework, this is what I came up with.

It’s small but spacious. Have you ever ridden in an old Volkswagen Beetle? They are surprisingly roomy, and especially generous with the headroom. Somehow, the Beetle violates the laws of space and physics, and it is roomy but can also be parked between two oversized Hummers. This cabinet

continued on page 70

by Christopher Schwarz

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

6 STORAGE SOLUTIONS

Tools need to be protected, organized and easily retrieved. That's a tall order.

Here are some of the problems I've run into over the years: Hanging tools on a wall keeps them organized and close at hand, but unprotected. Keeping them in a traditional sliding tool till in a chest keeps them protected and organized, but you dig around for them endlessly. Drawers under a bench keep them protected and close at hand, but most drawers end up a jumbled mess.

Here's my solution, and so far it works well. The cubbyholes are sized exactly to hold a full complement of hand planes. Finding the right plane and getting it down for use has never been easier.

The chisel rack puts my most-used sizes out where I can get them. And the rack is designed to hold the tools even when the door is accidentally slammed.

The saw till on the right door is the same way. These two saws do 80 percent of my work and they're always handy.

The real feature is the drawers. The smaller drawers hold tools for a specific operation. In the larger drawers, the interchangeable trays stack inside the drawers and also hold tools for a specific operation. Whenever I dovetail, I grab the top right drawer. No more making mounds of tools on the bench.

Chisel Rack

This simple L-shaped bracket holds the five chisels I use most, plus my drawbore pins. Don't use a magnetic strip; it will magnetize your tools, which makes them difficult to sharpen.



Tool Trays, Lower Drawer

The bottom of the drawer is for the tools I rarely need. The tray at left holds files and rasps (I'm going to subdivide this tray as soon as some more rasps arrive in the mail). The tray at right holds specialty chisels and screwdrivers.



Top Shelf Plane Cubby

This area isn't just what's left over from the remainder of the cabinet. It is carefully sized at $22\frac{1}{2}$ " wide x $5\frac{3}{4}$ " high to hold a No. 7 jointer plane (a constant companion in my shop), plus a jack plane, panel plane and scraper plane.



Small Plane Cubbies

The cubbyholes are a magic size: $6\frac{1}{4}$ " high, about $3\frac{5}{16}$ " wide and $10\frac{1}{2}$ " deep. This size holds all my joinery planes, my scrub plane, smoothing planes and miter plane.

Saw Till

My saw till holds the two most useful joinery saws – a dovetail saw and a carcass saw. My full-size saws reside on pegs below the cabinet.



Four Upper Drawers

Each of the four drawers holds all the tools for a common operation: one is for dovetailing, the second is for trimming and squaring assemblies, the third is for marking and measuring, and the fourth is for nailing and screwing.



Tool Tray, Middle Drawer

The lower section of the drawer holds waterstones and honing guides (make sure the stones are bone dry before putting them back in the drawer). The tray shown above holds my four spokeshaves and some specialty sharpening equipment.



continued from page 67

is designed to function the same way. The interior is a mere 11 $\frac{1}{4}$ "-deep, 22 $\frac{1}{2}$ " wide and 31 $\frac{1}{2}$ " tall. Yet, thanks to good planning, it holds every hand tool I need.

The cubbyholes and shelf for hand planes are carefully sized for all the planes needed in a modern shop. The drawers are loaded with trays of tools. Each tray contains all the tools for a routine function, such as dovetailing, sharpening or shaping curved surfaces.

The cabinet looks pretty good. I spent months thumbing through old Art & Crafts furniture catalogs and contemporary hardware catalogs for inspiration. This cabinet and its lines are a little bit

Gustav Stickley, a little Harvey Ellis and a little of myself.

The cabinet will endure. No compromises were made in selecting the joints. Every major component (with the exception of the changeable, nailed-together trays) are built to withstand heavy use. Of course, when you discuss durable joints, you are usually talking dovetails, which is where we'll begin construction.

A Case that Takes a Beating

When this cabinet is fully loaded, my best guess is that it weighs more than any single member of our staff at the magazine (modesty prevents me from revealing

what that upper limit might be). To ensure the bottom and top pieces can withstand this weight, I joined them to the side pieces with through-dovetails.

One interesting variation worth noting here is that instead of using one solid top piece, I substituted two 3"-wide rails and dovetailed them into the sides to save a little weight. Because I cut these dovetails by hand, it was simple to lay out this unusual arrangement. If you plan to use a dovetail jig, you will save yourself a headache by forgetting the rails and making your top one solid piece instead.

If you're cutting the dovetails by hand, it's faster and more

accurate to clamp your two sides together and saw the tails on the side pieces simultaneously. For years I resisted this technique because it seemed more difficult, but now I know better.

A second feature of the case to note is that the rabbet for the back is a hefty 1" wide. This allows room for the $\frac{1}{2}$ "-thick shiplapped back, plus a $\frac{1}{2}$ "-thick French cleat that will park the cabinet on the wall and keep it there.

And then there are the stopped dados. These $\frac{1}{4}$ "-deep joints in the side pieces hold all the dividers. Cutting these joints is simple work with three tools: a plunge router, a bearing-guided straight



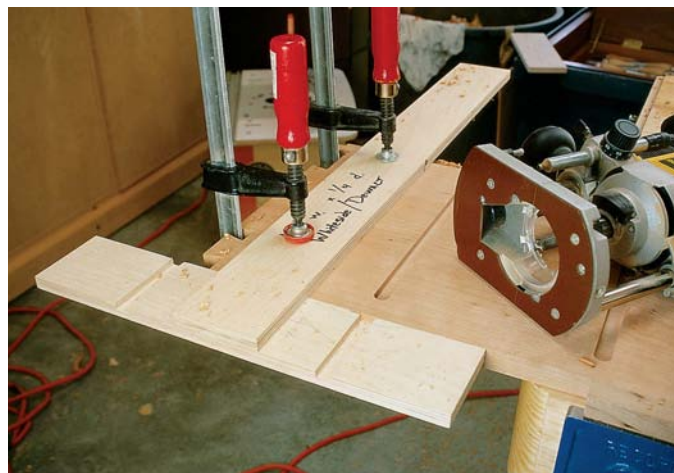
When sawing the tails, clamp the two sides together and cut them at the same time. This saves time and effort and prevents layout errors.



If your rabbets for the back are perfectly square, your case is much more likely to end up square, too. Clean up any imperfections with a rabbeting plane, such as this bullnose rabbet plane.



The shop-made T-square jig and a plunge router make quick work of the dados.



Here you can see how you use the dado cut into the jig to line up the jig with your layout lines. Using a router with a flat side on its base is more accurate than using a router with a round base.

bit and a shop-made T-square jig that guides the whole shebang. Lay out all the locations of your dados on the sides. Park the jig so it lines up with your layout lines. Cut the dados in two passes.

Fitting all the horizontal dividers to fit the dados is easy. The $\frac{1}{2}$ "-thick dividers simply need a small notch at the front to fit over the rounded end of the dado created by the round straight bit. A sharp backsaw is just the tool here.

The $\frac{3}{4}$ "-thick horizontal divider needs a bit more work to fit in the $\frac{1}{2}$ "-wide dado. A $\frac{1}{4}$ " x $\frac{1}{4}$ " end-rabbit is the answer.

The through-dados that hold the vertical dividers use the same

router jig, but with the plunge router set to make only an $\frac{1}{8}$ "-deep cut. Laying out the locations of these parts for the hand plane cubbyholes might seem daunting. If you want the openings evenly spaced, they should each be 3.333" wide. I don't have any infinite numbers on my ruler. But it's actually child's play to lay out the cubbyholes with a pair of dividers (they look like a school compass but with two pointy tips—no pencil). You can tweak these tools until they step off the cubbyholes as precisely as you please. Dividers are one of my secret weapons.

With all these parts cut and fit, make the back of the case. I used

ambrosia maple. It's cheap and looks a bit like the spalted maple I used in the doors and drawers. The back boards are joined by a $\frac{1}{4}$ "-deep x $\frac{3}{8}$ "-wide shiplap on each long edge.

The top cap is easy. Cut the wide chamfer on the underside using your table saw. Clean up the cut with a block plane. Attach the top to the rails with screws.

You are now at a critical juncture. You can go ahead and get some quick gratification and assemble the whole case. But good luck when you go to finish it. Getting those cubbyholes finished right will be murder. The better solution is to glue up only

the sides, bottom and top rails. Tape off the exposed joints and finish all the case parts (I used two coats of a satin spray lacquer). Then assemble the case. I know it sounds like a pain (it is). But the end result is worth it.

Finish the back pieces and top cap while you're at it. Now you can screw the back in place and the top cap. You are ready for the doors and drawers.

Easier than They Look

The doors aren't too bad. The mullions and muntins that form the four lights in each door appear difficult, but thanks to a little leg-dermain, it's no problem.



Fitting the dividers is easy with a hand plane. I merely make sure the dividers are surfaced a few thousandths of an inch thicker than where I want them to be. Then I thin them down with a smoothing plane until they slide in with just a little persuasion.



After gluing the sides to the bottom and top rails, trim the dovetails flush with a block plane. Soak the end grain with a little bit of mineral spirits to make it easier to cut. Here you can also see how I supported the case as I worked on it. The big slab holding up the side is an offcut from an old door that's clamped to my bench.



Cut the rabbet on the backside of the door using a rabbeting bit in your router table. With a large tabletop such as this, it's simple work.



Glue one backing strip into the rabbet in the door on edge. Then flip the door over and glue a mullion onto the backing strip. Then use spring clamps to hold everything while the glue dries.



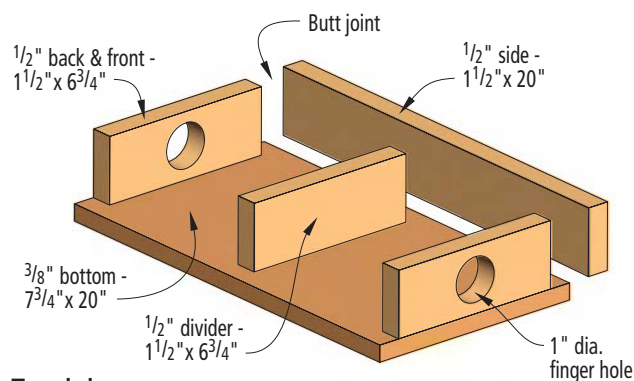
Install the horizontal muntins the same way. First glue a backing strip into the rabbet on the backside of the door. Then flip the door over and glue the muntin to that.

But before getting mired in those details, you need to assemble the doors. Here's how they work: The stiles and rails are joined using mortise-and-tenon joints. For mid-size doors such as these, I use $\frac{3}{8}$ "-thick x 1"-long tenons.

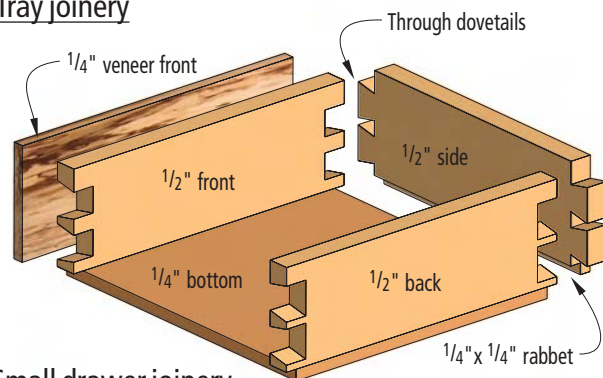
Cut your tenons and your mortises, then mill a $\frac{1}{4}$ "-wide x $\frac{3}{8}$ "-deep groove in the rails and stiles to hold the door panel. I generally make this groove on the rout-

er table using a straight bit and featherboards. It's the easiest way to make the groove start and stop in the right place in the stiles.

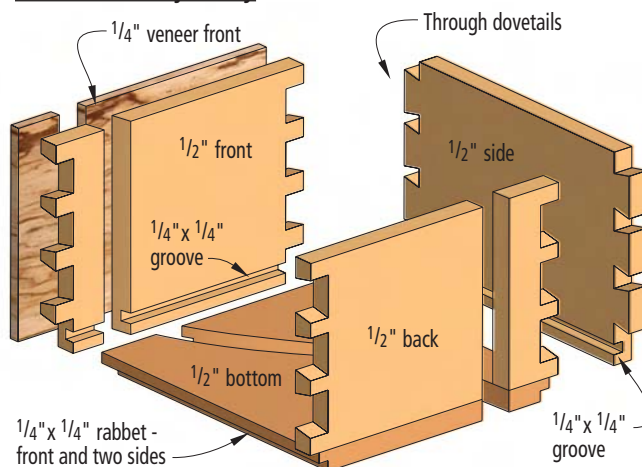
The door panel needs a rabbet on its back to fit in the groove. But before you mill the panel, you should know a bit about spalted maple. Its black spidery lines are caused by the spalt fungus, which attacks the tree after it's been felled. In short, it's partly rotted.



Tray joinery



Small drawer joinery



Large drawer joinery

It's always best to wear a respirator when dealing with spalted wood. There are numerous accounts of people who have had respiratory problems after breathing in the dust.

Once you fit the panel, assemble the doors – the mullions and muntins are added after assembly. Once the glue cures, cut a $\frac{1}{4}$ "-wide x $\frac{1}{2}$ "-deep rabbet on the backside of the opening for the glass. This rabbet will hold the narrow backing strips that are built up into the mullions and muntins.

This technique was explained fully by Glen Huey in our August 2002 issue ("Simple Divided-light Glass Doors"). But the photos at left explain it better than words can. Essentially, you create the T-shaped moulding that makes the mullions and muntins by gluing together $\frac{1}{4}$ "-thick x $\frac{1}{2}$ "-wide strips of wood. It's simple work.

What's not so simple is mounting the doors with the strap hinges. These hinges are inexpensive, beautiful and handmade. As a result, they need a bit of tweak-

ing and bending and hammering and cursing to get them just right to hang a door.

Here's my best tip: Screw the hinges in place with the cabinet on its back. Then stand it up, loosen the hinge screws and make your final adjustments. I used a block plane to make some adjustments, and a mallet for others. Let your frustration level be your guide.

Getting a Handle on Drawers

The drawers are a long slog. Even though I'm a fair dovetailer, it took

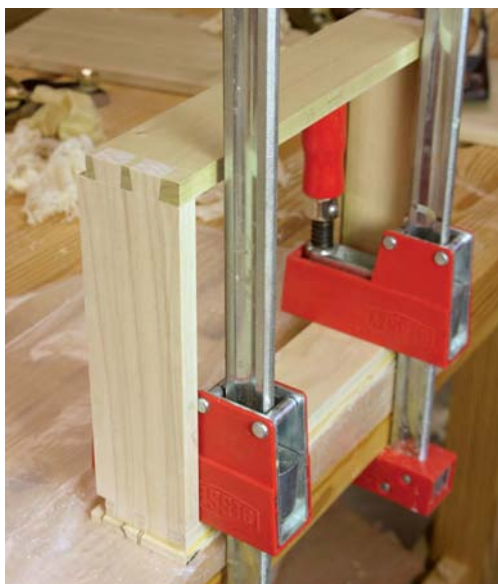
me three solid days of work to get the drawers assembled and fit. But before you start listening to that lock-miter router bit whispering in your ear, remember this: The drawers are going to hold a tremendous amount of steel. And when you open the drawers during a future project, you'll never be disappointed to see dovetails.

To make things a tad easier, I built all the drawers using through-dovetails and $\frac{1}{2}$ "-thick material for the front, sides and back. Then, with the drawer glued up, I glued on a $\frac{1}{4}$ "-thick piece of spalted maple to the front piece. This trick also allowed me to stretch my supply of spalted maple.

The four small drawers are built a little differently than the two larger ones. Because the small drawers are shallow, I wanted to use every bit of space. So the bottom is $\frac{1}{4}$ "-thick plywood that's nailed into a $\frac{1}{4}$ " x $\frac{1}{4}$ " rabbet on the drawer's underside.

The larger drawers are more conventional. Plow a $\frac{1}{4}$ " x $\frac{1}{4}$ " groove in the sides and front pieces to hold a $\frac{1}{2}$ "-thick bottom, which is rabbeted to fit in the groove.

Build all the drawers to fit their openings exactly, then use a jack plane to shave the sides until the drawer slides like a piston. Finish the doors and drawers, then it's



Build the drawers with through-dovetails. Then glue a piece of $\frac{1}{4}$ "-thick veneer to the front.



Here you can see the two different ways of installing the drawer bottoms. The bottom in the top drawer rests in a rabbet in the sides. The drawer bottom for the larger drawers slides into a groove.



Install the dividers in the drawers so they can be easily removed in the future. A 23-gauge pinner is an excellent tool for this job.



Once everything is finished, install the glass using small strips of cherry ($\frac{1}{8}$ " and $\frac{1}{4}$ " thick). A few dabs of clear silicone and a couple small pins do the trick.

time for the fun part: dividing up the drawers, building trays for the tools and tweaking the hardware so everything works just right.

As you divide up the drawers and trays, one word of advice: Don't fasten any of the dividers permanently. Your tool set will change, and you want to be able to easily alter the dividers. I fit mine in place with friction and a couple 23-gauge headless pins. The divid-

ers can be wrenched free when I need room for a new tool.

When you hang the cabinet, use wide cleats—mine were each 5" wide. This allows you to get more screws into the cabinet and into the studs. Also, for extra insurance, I rested the bottom of the cabinet on a 2"-wide ledger that also was screwed into the studs.

With the project complete, the voice of Ruskin was final-

ly silenced for a short time as I assessed my work. (I for one was happy for the silence; Ruskin vacillated between madness and lucidity during the last years of his life.) I scolded myself for a few things: the reveals around the drawers on the left edge of the cabinet are a tad wider than the reveals on the right side. And in a couple of the dovetails at the rear of the drawers, there are a couple

small gaps. It's not perfect.

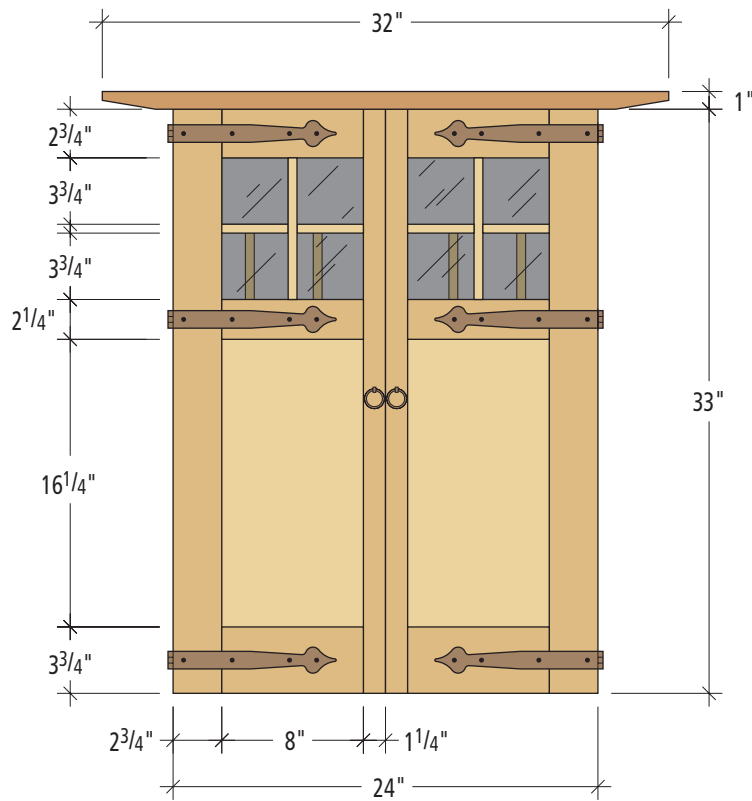
But before I got too down on myself, I remembered one more quote from Ruskin that relates to handwork and the pursuit of perfection. This one deserves as much ink as the first.

"No good work whatever can be perfect," he writes, "and the demand for perfection is always a sign of a misunderstanding of the ends of art." **PW**

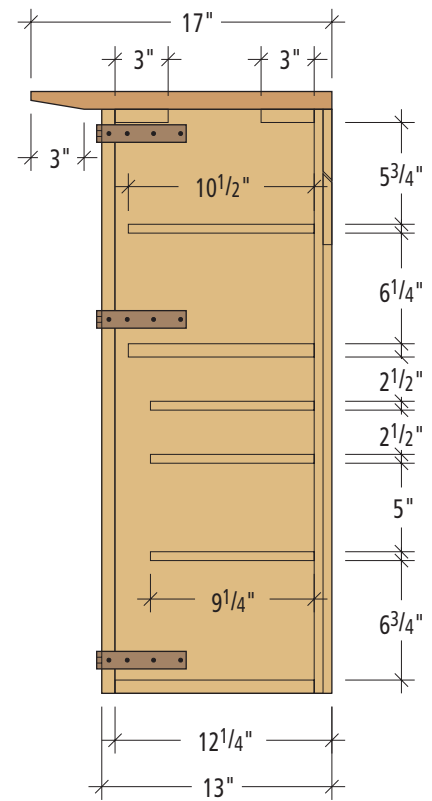
ARTS & CRAFTS TOOL CABINET

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS	
		T	W	L			
Carcase							
□	2	Sides	3/4	12 1/4	33	Cherry	3/8" -deep x 1" -wide rabbet at back
□	2	Top rails	3/4	3	24	Cherry	Dovetailed into sides
□	1	Bottom	3/4	11 1/4	24	Cherry	Dovetailed into sides
□	1	Top cap	1	17	32	Cherry	1/2" -deep x 3" -wide bevel
□		Shiplapped back	1/2	23 1/4	33	Maple	1/4" x 1/4" shiplaps
□	1	Major horizontal divider	3/4	10 1/2	23	Cherry	In 1/4" -deep x 1/2" -wide dados
□	1	Thin horizontal divider	1/2	10 1/2	23	Cherry	In 1/4" -deep x 1/2" -wide dados
□	3	Thin horizontal dividers	1/2	9 1/4	23	Cherry	In 1/4" -deep x 1/2" -wide dados
□	5	Vertical dividers	1/2	10	6 1/2	Cherry	In 1/8" -deep x 1/2" -wide dados
□	2	Small vertical dividers	1/2	9 1/4	2 3/4	Cherry	In 1/8" -deep x 1/2" -wide dados
Doors							
□	2	Large stiles	3/4	2 3/4	33	Cherry	
□	2	Small stiles	3/4	1 1/4	33	Cherry	
□	2	Top rails	3/4	2 3/4	10	Cherry	1" TBE
□	2	Intermediate rails	3/4	2 1/4	10	Cherry	1" TBE
□	2	Lower rails	3/4	3 3/4	10	Cherry	1" TBE
□	2	Panels	1/2	8 1/2	16 3/4	Maple	In 1/4" -wide x 3/8" -deep groove
□	2	Vertical muntins	1/4	1/2	8	Cherry	
□	4	Horizontal muntins	1/4	1/2	3 3/4	Cherry	
□	2	Backing strips	1/4	1/2	8 1/2	Cherry	In 1/4" -wide x 1/2" -deep rabbet, glued to vertical muntin
□	4	Small backing strips	1/4	1/2	4 1/8	Cherry	Glued to horizontal muntin
Drawers							
□	4	Small drawer fronts	3/4*	2 1/2	11	Maple	1/4" -deep x 1/2" rabbet on bottom edge
□	8	Small drawer sides	1/2	2 1/2	9	Poplar	1/4" -deep x 1/4" rabbet on bottom edge
□	4	Small drawer backs	1/2	2 1/4	11	Poplar	
□	4	Small drawer bottoms	1/4	10 1/2	9	Plywood	Screwed to drawer box
□	1	Medium drawer front	3/4*	5	22 1/2	Maple	1/4" -deep x 1/4" -wide groove for bottom
□	2	Medium drawer sides	1/2	5	9	Poplar	1/4" -deep x 1/4" -wide groove for bottom
□	1	Medium drawer back	1/2	4 1/2	22 1/2	Poplar	
□	1	Medium drawer bottom	1/2	8 3/4	22	Plywood	1/4" -deep x 1/2" rabbet on bottom edge
□	1	Large drawer front	3/4*	6 3/4	22 1/2	Maple	1/4" -deep x 1/4" -wide groove for bottom
□	2	Large drawer sides	1/2	6 3/4	9	Poplar	1/4" -deep x 1/4" -wide groove for bottom
□	1	Large drawer back	1/2	6 1/2	22 1/2	Poplar	
□	1	Large drawer bottom	1/2	8 3/4	22	Plywood	1/4" -deep x 1/2" rabbet on bottom edge

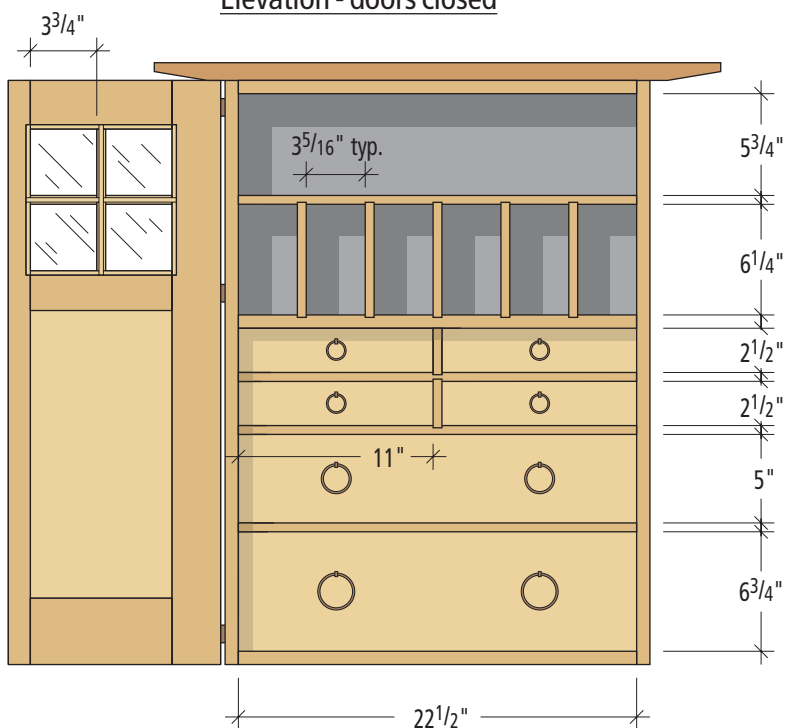
* Finished dimension, laminated from two pieces of wood; TBE= tenon, both ends



Elevation - doors closed



Profile



Elevation - doors open

SUPPLIES

Lee Valley Tools

800-871-8158 or leevalley.com

6 • 28mm ring pulls, 01A61.28,
\$1.65 each

2 • 40mm ring pulls, 01A61.40,
\$2.45 each

2 • 50mm ring pulls, 01A61.50,
\$3.10 each

6 • Unequal strap hinges, 9 1/2" x
5", 01H21.39, \$8.60 each

4 • Magnetic catches, 00S16.01,
\$1.15 each

7 • #6 x 5/8" black pyramid-
head screws (bags of 10),
01X38.65, \$1.40 a bag

Prices as of publication date.



Photo by Al Parrish

Mini Lathes

We found 3 great machines priced from \$225 to \$1,550.

Mini lathes, which used to be a tool for crafters, have evolved into capable, powerful machines. Most manufacturers now offer a mini, midi or maxi version of their full-size lathe. And most woodworkers have one or want one.

The market is diverse. You can spend \$160 or as much as \$1,550 and still be in the so-called mini lathe category. The premium Oneway aside, all the lathes we tested have 1/2 hp motors. All provide adequate power and torque for basic turning and have a 10" swing. Differences arise when examining their moving parts.

In concept, a lathe is a simple machine. But in practice, many

things have to be working just right in order for a lathe to function as well as it was intended.

All lathes have a headstock and a tailstock. The headstock, which is located on the left side of the lathe, has a threaded spindle mounted in bearings. Attached to the spindle is a multi-step pulley system that is activated by a drive belt, which is powered by the lathe's motor. Most spindles have a Morse taper bored in them, which is a hole that accepts various drives such as a spur center. A faceplate threads onto the spindle.

Turning between centers, or spindle turning, requires the use of your lathe's tailstock. The tailstock slides on the lathe's bed and is locked in place with a locking clamp. Most tailstock spindles also have a Morse taper bored in them. These accept a live center (which supports the work and revolves with it). The tailstock handwheel allows you to adjust the position of the quill feed and the spindle lock locks it.

Whew. That's a lot of parts. And as you begin to cut a piece of wood that's spinning wickedly

fast you want to be sure that all those parts are tight and secure. That, along with ease of use, is what you must look for in a quality mini lathe.

Tested by a Pro Turner

For our review we invited Judy Ditmer, our "At the Lathe" columnist and professional turner, to help. We first unpacked all the lathes; little assembly was required. However, each machine still needed to be tuned up.

We cleaned off and waxed the parts that slid on one another. We ensured the headstock and tailstock aligned, and on some we had to attach the belt and a few handles. Most importantly, we

by Judy Ditmer & Kara Gebhart

Judy, the author of two turning books, has been turning since 1985. Comments or questions? Contact Kara at 513-531-2690 ext. 1348 or kara.gebhart@fwpubs.com.

made sure everything clamped tightly. When it didn't we made the necessary adjustments.

Next we examined initial setup, toolrest design, ability to clamp parts tight and the ease of changing speeds. Then Ditmer

did some spindle turning and faceplate turning on each one, testing for ease of use and power.

Our Winners

Oneway's 1018 mini lathe earned an Editor's Choice award. It's built

to higher standards than any other lathe in our review. Professional woodturners routinely buy this lathe. If money is no object, or you're serious about the craft, this lathe is the best.

But if you don't have \$1,550,

Jet's electronic variable speed lathe is top notch – it also wins Editor's Choice. And if you want to save money, get Jet's JML-1014 – you get the same quality without the electronic variable speed; it's clearly a Best Value.

Delta

800-438-2486 ■ deltawoodworking.com



LA200

The toolrest is this "midi's" best feature. The toolrest base is its worst. Many turners like a deep hollow on the toolrest profile, which allows you to easily orient your hand when turning. But we couldn't get the toolrest base to clamp down tight. Pulling its locking lever only made the lever slip. Cleaning off the grease didn't help; it frequently slipped while faceplate turning. For light turning, this isn't an issue. But a dig-in could push your toolrest into your spinning workpiece, a real a problem. Also, the toolrest locking lever

was plastic. Plastic levers are the first to go. We could get the headstock's handwheel either tight or true, but not both. The casting was rough.

That said, this lathe offers great power and torque. Although there's no panic button, the on/off switch is ideally located. Changing speeds is easy. Included are a spur center, faceplate, knockout bar, wrenches and spacer ring that's required to make the faceplate fit (and that you must keep track of). The knockout bar releases the spur drive and live center. The knockout bar is also used to lock the spindle. The bar is stored on the front, which may be in the way. Instead, use a magnet to store it on the back.

This \$270 lathe will do what you need it to do. But for about \$45 less, you can buy a better one.

Fisch

724-663-9072 ■ fisch-woodworking.com



TC90-100

This \$300 lathe was well made. The bed was nice and smooth. The toolrest felt secure and featured a deep hollow, which many turners like. All the levers are metal and feature comfortable covers that aren't loose – very smart. Changing speeds is easy – simply pull the recently redesigned pulley cover off. The only thing simpler is electronic variable speed, which Fisch plans to offer in 2005. The speed-change chart takes time to decipher. But the learning curve

is short. Be careful not to bump the headstock cover while turning. Doing so will cause it to contact the spinning pulley inside – it's not a big deal, but it is something to be aware of.

When turning spindles, the lathe is stable, has little vibration and lots of torque. Faceplate turning caused the lathe to bog down slightly. Included are a faceplate, live center, dead center, knockout bar and wrench. The knockout bar is used to release the spur and center, and to lock the spindle lock.

Our only complaint was locking down the tailstock. We couldn't get it as tight as we'd like. Add an extension to get more leverage – it should help.

It comes to this: It was a great lathe. But for an additional \$50, you can get electronic variable speed.

General

514-326-1161 ■ general.ca



25-100 M1

This \$300 "maxi" lathe offered plenty of power and torque. The toolrest featured a deep hollow, keeping our fingers secure. The on/off switch is in a good location and features a panic button and lock. The lathe has a handy lift-off headstock cover for easy speed change and a decent casting. Out of the box, everything lined up.

When setting up the lathe, the manual said to mount it firmly on a bench. But the lathe featured rubber leveling feet – nice in concept but they had to

be removed to bolt the lathe down.

The levers interfered with one another (a common problem with many lathes). Several were made with heavy-duty metal, but two were plastic and could easily strip out. (One was damaged upon arrival.)

The tailstock required some adjustment when we set the machine up, but then locked down tightly. It featured a peg to catch its locking lever when moving – a nice touch. The toolrest support, however, doesn't tighten as snugly as some of the others in this review, but it was acceptable. Included with the machine were safety goggles, a live center, spur center and knockout bar (with no knob).

Again: This is a good machine, but there are better lathes in our test.

Jet

800-274-6848 ■ jettools.com

Editor's Choice



JML-1014VS

A lathe with electronic variable speed is a lot like a dishwasher. There's no sense in hand washing dishes when you can simply flip a switch (or in this case, turn a knob). This lathe was a joy to use. If we were to take Oneway's 1018 mini lathe out of the test for cost considerations, this one would be alone at the top of the list. Therefore it deserves our Editor's Choice award.

The \$350 lathe featured three speed ranges that work like the gears on a bike. Changing the spindle speeds simply requires swinging the electronic variable-speed control box out of the way, and then opening the pulley cover on the back.

All the levers were metal and didn't interfere with one another when making adjustments. When spindle turning, we couldn't bog down the motor. When faceplate turning at the slow end of a speed range, you could bog the motor down a

bit – but that was expected with a DC motor and is a trade-off we're willing to make.

The lathe came with a faceplate that's beefier than others in our review. Also included were a live center, spur center, safety goggles and knockout bar. The knockout bar stores in the front – get a magnet and move it to the back so it's out of the way.

If you can't afford the Oneway (and many can't), get the Jet. You won't be disappointed.

JET JML-1014

Jet's JML-1014 mini lathe was the same quality lathe as the JML-1014VS minus the electronic variable speed – and it costs only \$225. The Penn State lathe aside, it's the least expensive one in our review, offering superior features and functionality. Therefore it deserves our Best Value award.

Best Value

Penn State

800-377-7297 ■ pennstateind.com



TCL PRO

This was the least expensive lathe. Though it had decent power and torque, you might tire of its shortcomings, and that would be \$160 wasted.

The bed was nicely machined. Included were a faceplate, spur center, live center, two hex wrenches for adjustments (which you must keep track of) and a spare belt (which is nice). The tailstock handwheel handle wasn't fixed, which is good. Although parts of the levers were plastic, it was a much better expression of that form than other

plastic levers on lathes we tested. The toolrest had a decent configuration but was sloppily made and would require some extensive filing. The tailstock slipped, but it was comparable to other lathes.

Changing speeds was difficult. You must turn two knobs and swing two cover plates out of the way to access the pulleys – when you do so, the speed change chart is upside down. This is minor and something that could be easily fixed. The cover plates were plastic and one of ours was cracked. There was bad lever interference. The lathe featured plastic feet – you'll need to take them off to bolt your lathe down.

If you're looking for a bargain machine, we recommend you spend a bit more and get the Jet entry-level lathe. You'll save yourself some headaches.

Vicmarc

+61-7-3284-3103 ■ vicmarc.com



VL100 PRO

The Vicmarc lathe is sold in two configurations – we tested the VL100 Pro-Package (\$650), which included an enclosed steel cabinet and motor. You can buy a less expensive (\$340) version where you supply a motor and build a base. As none of the other lathes in our review required such work we tested the Pro-Package. The lathe itself offered quality power and torque, plus 24-pin indexing. Included are a faceplate, spur center, two nice live centers and a knockout bar that locks your spindle. But the base caused too many problems.

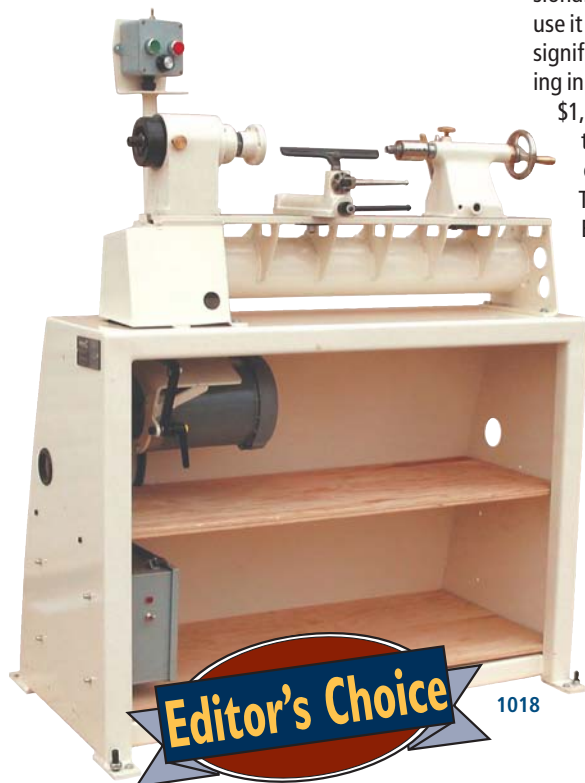
Changing speeds verged

on the ridiculous. You must completely remove two access plates, each attached with two machine screws, to access the belt. Once these plates are removed, the access holes were small.

The base also made the lathe too high for a typical workbench. You'll have to buy or build a stand to get the lathe to a comfortable height. Also, our pulleys were misaligned and couldn't be fixed. This would eventually shred the belt. The only decent part of the base was its built-in drawer.

On the lathe itself, the toolrest lever wasn't long enough to get adequate locking leverage. We liked other toolrest configurations better. The switch was in a location where it could easily be bumped.

If you want a decent lathe, and you have a spare motor and time on your hands to build a base, you might consider this machine. But as popular as this lathe has been, we think that better ones exist.



Oneway's 1018 mini lathe is hand-built and machined to industrial standards. Professional turners choose this lathe and they use it every day, all day, for years, with no significant problems or thoughts of upgrading in the future. Most of you don't have

\$1,550 budgeted for a lathe. We know that. But this is the best, the cream of the crop and worth every penny. This is why the Oneway is worthy of an Editor's Choice award.

Overall, this lathe was solid and stable. The toolrest, toolrest base and tailstock stayed put with reasonable pressure. The levers were long and solid, and all worked smoothly. The toolrest lever could be moved so it locked in the position we wanted, and it swung out of the way of the base's locking lever when we needed it to.

The electronic variable speed and reverse were great features. There was plenty of torque at all speeds and in all three ranges. There were two settings for acceleration and one for deceleration speed,

and it featured a powerful 1 horsepower AC motor. The lathe's speed and reversing controls were convenient and never in the way.

Changing the belts for speed change was pretty standard. There was a groove at the base of the threaded headstock spindle so you could lock the faceplates on with the setscrews that come on them. This was a good safety feature because the lathe reverses. Also, the headstock's handwheel had a threaded spindle for a vacuum chuck.

Of course, no machine is perfect. The knurled knob on the top of the tailstock for locking quill feed was difficult to get tight enough – you might want to add a little lever. (But even despite this, it still tightened as well as, if not better than, the other lathes in this review.)

A heavier magnet will take care of a weak magnet that's on the pulley access cover. Adding a magnet to the back of the cover will hold the door open while you're changing the pulleys.

Aside from these (very) minor complaints, this lathe was top notch. Save up your money and buy it. We know you won't be disappointed. **PW**

MINI LATHES

	DELTA LA200	FISCH TC90-100	GENERAL 25-100 M1	JET JML-1014VS	ONEWAY 1018	PSI TCL PRO	VICMARC VL100 PRO
Price*	\$270	\$300	\$300	\$350	\$1,550	\$160	\$650
Motor	1/2hp, 120V	1/2hp, 120V	1/2hp, 110V	1/2hp, 110V (DC)	1hp, 110V or 220V	1/2hp, 110V	1/2hp, 110V
Swing over bed	10"	10"	10"	10"	10"	10"	10"
Distance between centers**	14 1/2"	15"	15 13/16"	12 7/8"	18"	16 3/4"	13 15/16"
Number of speeds	6	6	6	3 ranges	3 ranges	5	6
Range of speeds (rpm)	500 to 3,700	500 to 3,700	480 to 4,023	500 to 3,900	0 to 4,000	500 to 3,200	570 to 3,600
Headstock spindle thread	1" x 8 tpi	1" x 8 tpi	1" x 8 tpi	1" x 8 tpi	1" x 8 tpi	1" x 8 tpi	1" x 8 tpi
HS spindle through hole	3/8"	3/8"	5/16"	3/8"	3/8"	3/8"	13/32"
Head and tailstock taper	#2 MT	#2 MT	#2 MT	#2 MT	#2 MT	#2 MT	#2 MT
Tailstock through hole	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
Tailstock spindle travel	1 1/2"	2 1/2"	3 1/4"	2 1/4"	3"	1 5/8"	2 1/2"
Toolrest	5 7/8"	5 7/8"	6 3/8"	5 7/8"	8"	5 7/8"	3 1/4" & 6"
Bed extension capability	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Indexing capability	No	No	No	No	Yes	No	Yes
Variable speed	No	No	No	Yes	Yes	No	No
Weight (lbs.)	85	94	106	69	280	68	88

*All are Internet retail prices as of publication deadline. * Distance between centers measured with back of tailstock flush with end of bed.

Contemporary Torsion-box Desk

This sharp-looking desk is sturdy and easy to make using basic tools and simple joinery.



John Hutchinson is much more than *Popular Woodworking's* illustrator. He's also a talented furniture designer. When an e-mail comes in from John it's likely to include an attached drawing of his latest outlandish project idea. But we've seen many of these ideas come to excellent fruition. This desk is just another example of his wide influence on your magazine.

The top of the desk is actually a scaled-down version of an original design by Italian designer Rodolfo Dordoni (1954 -). A Dordoni original was purchased for the director of design at John's architectural firm. John admired the desk but didn't have the cash or the space for it.

Being the architect that he is, John went to work: He scaled down the top, designed and built prototype plywood legs (the original has a metal base) and created this homage to Dordoni.

The top is a torsion box – the joining of vertical and horizontal surfaces make a super-strong and stable box. We've used torsion boxes for many projects in our shop, but this was a first for functional furniture. The open spaces created by the torsion box offer a playful drawer opportunity.

The parts for the legs are joined using lap joints at the "bends" by sandwiching $\frac{1}{2}$ " and $\frac{3}{4}$ " plywood for even greater strength. Though they look like fragile spider-like legs, they are quite stout.

Materials and Joinery

Though construction of the desk is simple, an important factor is the high-density plywood used. Whether sold as Baltic birch, ApplePly or Finnish ply, the benefit of nine thin plies in a $\frac{1}{2}$ "

thickness is great strength in very little space. Often used for drawer sides, the plywood also makes for a nice finished look on a contemporary piece.

The joinery used throughout is simple and can be accomplished with just a few tools. If necessary, you could knock this desk out with a jigsaw, drill/driver and a router, but a table saw is very handy.

I used pocket hole screws, regular screws and some brad nails to hold the glued surfaces together.

A Top-down Design

The $\frac{1}{2}$ " Baltic birch used for the upper and lower parts of the desk top is most commonly sold in 60" x 60" sheets. We decided to take advantage of those dimensions and made the desktop 30" x 60". That's the "planned" size, but you

may end up with 29 $\frac{7}{8}$ " x 60" after ripping the plywood in half.

Select the best-looking face for the top surface of the desk. Flip that piece to put the good side down on your work surface, then get your layout tools.

The ribs and dividers that make up the eight drawer spaces are $\frac{3}{4}$ "-thick birch ply. We chose $\frac{3}{4}$ " because splitting is less likely when screwing into the edge of the thicker ply. That said, make sure you measure the thickness of your ply before starting. Because this plywood is made in Europe, it is often metric.

After checking the plywood thickness, strike a center line in both directions across the underside of the top. Strike lines to either side of the center lines to center the plywood thickness on

those lines. Use the actual ribs and dividers to layout the lines and ensure a good fit.

To lay out the spaces for the ribs you could measure each space, but any slight error will make fitting the drawers difficult. Instead, cut an 11 $\frac{1}{16}$ " spacer to mark the locations of the other four ribs.

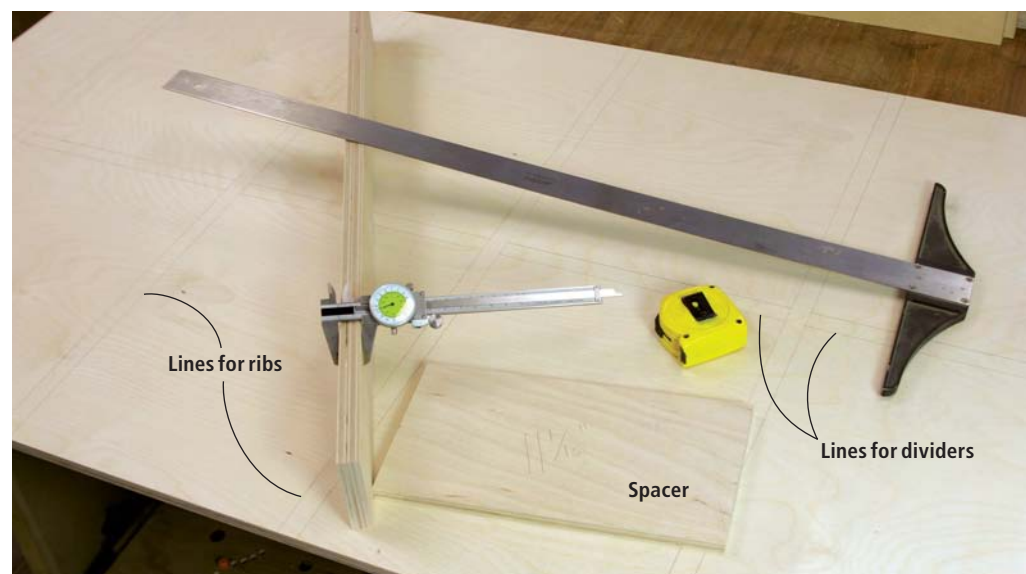
The ribs and dividers are all 3" wide. I held the ribs $\frac{1}{2}$ " short of the total top width to allow a $\frac{1}{4}$ " set back on either side. It's easier to line everything up this way.

Pocket Holes

If you've never tried pocket hole screws, this is a great application for them. You could simply glue the ribs to the top, or even add dowels with the glue, but much of the strength of the torsion box comes from a firm attachment of all pieces. Pocket screws offer the great mechanical strength of a screw, but they're not visible from the outside of the piece.

by David Thiel & John Hutchinson

Comments or questions? Contact David at 513-531-2690 ext. 1255 or david.thiel@fwpubs.com. Contact John at jhutchi2@columbus.rr.com.



Carefully laying out the locations for the ribs and dividers makes the rest of the project simple. A spacer cut to the drawer opening dimension keeps things accurate for every space and saves you the possibility of making a measuring error. Pay attention to the plywood thickness before doing your layout.

Made of sandwiched $\frac{1}{2}$ "-thick and $\frac{3}{4}$ "-thick high-density plywood, the parts are face-glued together and layered in a manner that creates stout half-lap joints. To begin, first rip the $\frac{3}{4}$ " plywood pieces to 2" wide, and then rip the $\frac{1}{2}$ " strips to $2\frac{1}{8}$ " wide. Finally, use the cutting list to cut the rough lengths for the pieces.

One of the angles used on the

legs is $22\frac{1}{2}^\circ$, which is easy enough to create on a miter saw, but the other angle is $67\frac{1}{2}^\circ$ and is off the scale of a miter saw. You could work up a jig for your table saw or miter saw to cut the angle, but I simply used a protractor to lay out the angles, then cut the pieces on the band saw, cutting slightly wide of my line. I then used my disc sander to clean up the angles to

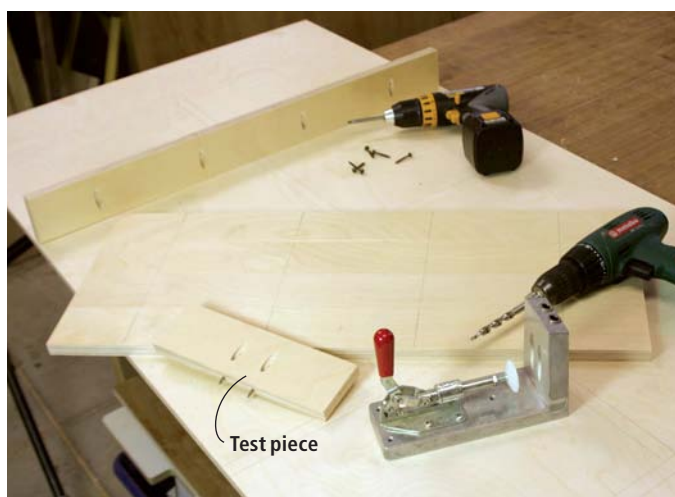
ensure a good gluing surface.

Gluing up the legs starts with the $\frac{3}{4}$ " pieces. The first step is actually a simple edge glue-up that's done to "shape" the leg, rather than build strength. Again, you could spend an hour or so building a complicated jig to clamp these edge joints, but I relied instead on an old trick – pinch dogs.

Pinch dogs are a centuries-old method to pull two odd-shaped pieces together using the angled interior edge of the dog's legs to apply pressure. Get a set! Simply glue the edges, push the joint together and tap the dogs in.

Second Layer

The second $\frac{1}{2}$ " layer on the legs is cut slightly oversized. This is,



Attaching the ribs and dividers to the top using pocket hole joinery provides great strength in a nearly invisible manner. Again, the plywood thickness is important. Do a test screw in a sample piece to make sure you won't put a screw through the top.



With the ribs attached, the bottom is simply screwed in place. Countersink the clearance holes, and use a square to help align the top and bottom pieces before sinking the first screw.

The cuts on the legs need to be accurate. The $22\frac{1}{2}^\circ$ angle can be made on a miter saw, but the $67\frac{1}{2}^\circ$ angle was easier to cut on the band saw and clean up on the disc sander.



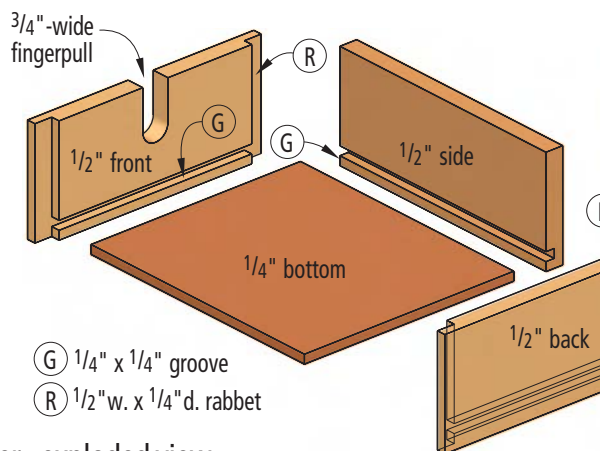
The first $\frac{3}{4}$ " layer of the legs is simply edge glued to form the shape. To gain some strength, I used pinch dogs. These large angled staples pull the two pieces tight across the joint with only a couple of taps of a hammer. Another good option is to use pocket screws – two at each joint should do the trick.



The $\frac{1}{2}$ " layer of the legs is cut with miters in different locations to form lap joints to add strength. Gluing the second layer in place can require a lot of clamps and some slipping around, or in my case – a brad nailer. Some wood putty before painting easily hides the holes and the nails hold everything nicely in place. I did add some clamps across the lap joints for extra pressure during drying.



Once the glue on the legs is dry, scrape any glue squeeze-out off the legs. To finish the shape, a bearing-guided flush-trim bit makes quick work of this task, though some sanding will still be necessary.



Drawer - exploded view

once again, an effort to make the work easier. To try and cut the second layer pieces at 2" wide and perfectly glue them to the first layer will have you pulling your hair out. It's much easier to cut them to $2\frac{1}{8}$ " wide and trim them to match. The $2\frac{1}{8}$ " dimension allows for that overage, but still is close enough to make cleaning up the legs with a router possible.

Another time-saving step is using a brad nailer to attach the two layers. I knew I was painting the legs, so hiding holes from the brad nailer was simple. And knowing how easily pieces slide around when glued and clamped, I wanted a more accurate sandwich than clamping alone would allow.

Clean-up

Once the glue on the legs has dried, it's time to clean up the two halves. By using a bearing-guided flush-cutting router bit, you can easily use the $\frac{3}{4}$ " layer as a template to rout the $\frac{1}{2}$ " layer flush.

A little hand clean-up will be required, but a file and a random-orbit sander will get things neat in short order. If you're painting the

legs, pay attention to making the leg joints flush and tight.

If you happen to have any gaps between layers, use a little wood putty to fill in the space. Don't worry about matching the color, just fill the gap. It all gets covered with black paint.

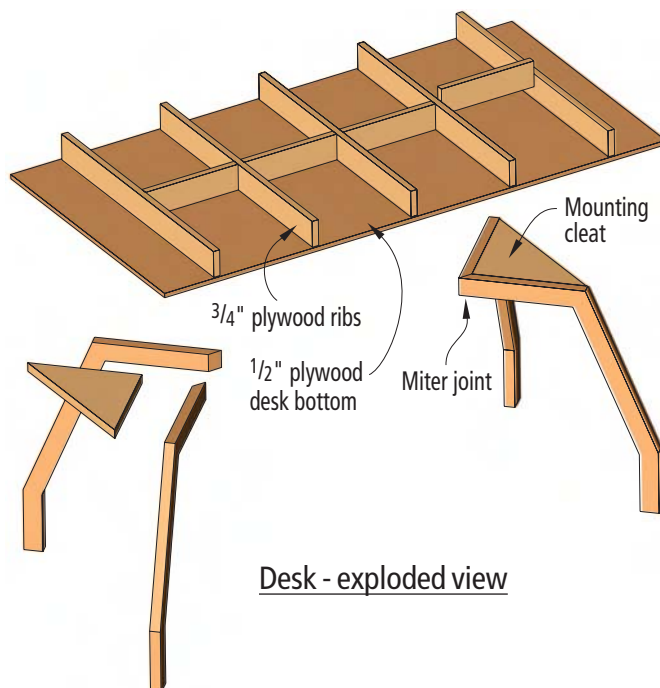
Getting the Legs Up

There's just a little more work until it looks like a desk. To attach the two legs to the mounting cleat, first cut matching 45° miters on the mating ends of the legs. This is most easily accomplished on the table saw with the leg clamped to your miter gauge.

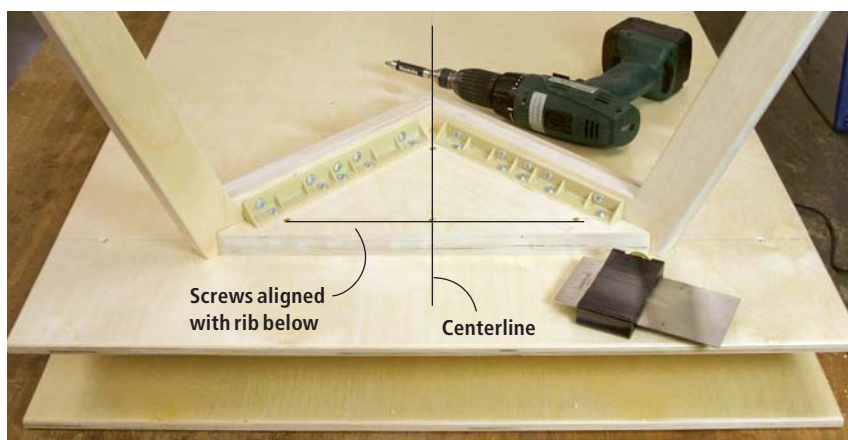
The mounting cleat also doubles as bracing for the legs. The pieces are two triangular $1" \times 11\frac{3}{4}" \times 11\frac{3}{4}"$ pieces of birch ply. I made them by first gluing two $\frac{1}{2}" \times 12" \times 12"$ squares together to make a 1"-thick block, then cut it diagonally on the band saw.

Then a couple plastic corner braces, some glue and screws attach the legs to the cleats.

You're now ready to attach the



Desk - exploded view



The mounting cleat is fit between the two mitered leg halves. Along with some glue, a pair of plastic supports hold everything in place.



The drawers are the crowning detail. The simple rabbeted drawers are quick to make on the table saw. Taking advantage of a pneumatic pin nailer (firing a 23-gauge wire) I was able to paint the drawer fronts before assembling the drawers, providing a clean look.

legs to the desk. The trick here is orienting the legs appropriately to the desk. When you set the legs on the top it's an optical illusion as to where the legs fall in relation to the top. They actually fit within the shape of the top. To place the legs correctly, draw a line on the side of the cleat (without legs) that's $\frac{3}{4}$ " in from the edge of the cleat. Then strike another line from the point where the legs meet, bisecting the line you just made at a right angle. Then pre-drill and countersink three holes along the first line and another one at the tip of the second line.

These lines allow you to locate

the legs and screw the assembly directly into the ribs in the tops, with the first line lying directly on the first rib in from each end. The second line will fall directly on the center dividers. Use $2\frac{1}{2}$ "-long screws to attach the leg assemblies. After the legs are positioned, remove them for painting.

Versatile Space

One of the fun features of this desk is the opportunity to customize it with the drawers. There are eight spaces for drawers (four on each side) and you can build drawers for all eight holes if you like. You don't even have to put drawers in

the spaces; you could leave each one as an open cubbyhole.

I made four drawers, and I'll probably move them around a few times until I decide how I like it. The drawers are a simple rabbeted design and can be made with one dado setup on the table saw.

First cut all the pieces to size. Then set up a $\frac{1}{4}$ "-wide stack dado set in your saw and set the height for $\frac{1}{4}$ " as well. Then set the saw's rip fence $\frac{1}{4}$ " from the right side of the dado stack.

Using your miter gauge, run both ends of the inside face of each of the drawer fronts and backs with the edge against the

rip fence. This sets the cheek of the rabbets, then slide the pieces away from the fence to nibble away the rest of the rabbets. That's all there is to it. Then run the inside face of all the pieces flat against the table, with the bottom tight against the rip fence to make the grooves to hold the bottoms.

Cut your bottoms to finished size, do some sanding and painting, and you're ready to nail your drawers together. These drawers are so simple – I love them.

Finishing Touches

At this point your desk is nearly done. The top already has a nice coat of lacquer on it (done during assembly), and the legs and drawer fronts are a nice solid black. To protect the paint job and add a nice sleek touch to the drawers, a couple coats of clear lacquer on all these parts is a good idea. We used Deft's aerosol lacquer on this desk, and it did a fine job.

There is one last optional step. Depending on where your desk is going, leveling things might be tricky. You can add a set of four chrome adjustable levelers to the legs to keep things balanced and to protect the bottom of the legs from scuffs and bumps. Add a few desk accessories and you'll be working in style. **PW**

TORSION-BOX DESK

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
❑ 2	Desk top & bottom	$\frac{1}{2}$	30	60	Birch plywood	
❑ 5	Desk ribs	$\frac{3}{4}$	3	$29\frac{1}{2}$	Birch plywood	
❑ 4	Rib dividers	$\frac{3}{4}$	3	$11\frac{1}{16}$	Birch plywood	
❑ 4	Leg tops	$\frac{3}{4}$	2	$14\frac{1}{8}$	Birch plywood	MOE
❑ 4	Leg middles	$\frac{3}{4}$	2	$17\frac{3}{4}$	Birch plywood	MBE
❑ 4	Leg bottoms	$\frac{3}{4}$	2	$11\frac{13}{16}$	Birch plywood	MOE
❑ 4	Leg tops	$\frac{1}{2}$	$2\frac{1}{8}$	12	Birch plywood	MOE
❑ 4	Leg middles	$\frac{1}{2}$	$2\frac{1}{8}$	$25\frac{1}{2}$	Birch plywood	MBE
❑ 4	Leg bottoms	$\frac{1}{2}$	$2\frac{1}{8}$	$6\frac{5}{8}$	Birch plywood	MOE
❑ 2	Mounting cleats	1	$11\frac{3}{4}$	$11\frac{3}{4}$	Birch plywood	Triangular
❑ 8	Drawer sides	$\frac{1}{2}$	$2\frac{7}{8}$	$13\frac{3}{4}$	Birch plywood	
❑ 8	Drawer fronts & backs	$\frac{1}{2}$	$2\frac{7}{8}$	11	Birch plywood	$\frac{1}{4} \times \frac{1}{2}$ RBE
❑ 4	Drawer bottoms	$\frac{1}{4}$	$10\frac{1}{2}$	$13\frac{3}{4}$	Plywood	

MOE: Miter one end; MBE: Miter both ends; RBE: Rabbet both ends



Photo by Al Parrish

working small

Safely cutting parts that are too small to handle is easy with some simple jigs.

Cutting and machining small parts can be one of the biggest challenges a woodworker faces. Beading, mullions and muntins, and small mouldings are difficult to make accurately and safely. Small pieces can bend and twist when meeting a router bit or saw blade, and the usual methods of controlling stock and working safely can either make it impossible to move parts for machining, or double or triple the amount of labor needed.

by Robert W. Lang

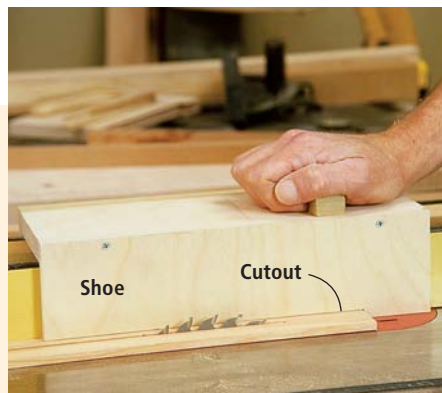
Comments or questions? Contact Bob at 513-531-2690 ext. 1327
or robert.lang@fwpubs.com.

The usual advice of milling large pieces and cutting the small parts from them sounds sensible, but it 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 or router bit.

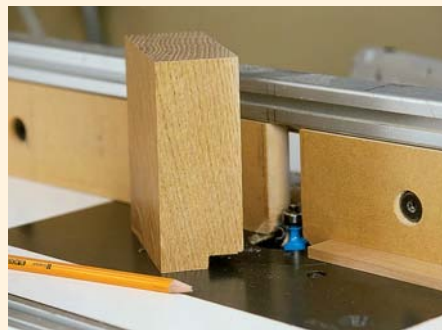
Here are two methods I have found to safely and accurately cut and mould small pieces of stock. I'm able to keep control of small pieces while keeping my hands at a safe distance from blades and bits. Plus, it virtually eliminates the chance of kickback.

A Fence-guided Push Block

When ripping small stock, a zero-clearance insert on the table saw is a must. The other essential is a push block (below) that rides



With a notch in the push block the thickness of the material to be ripped, pressure can be applied, and small parts controlled.



Make the block large enough to clamp to the router table fence, and mark the size of the notch directly from the stock to be milled.

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, (below) 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 dur-



A push block that rides on the rip fence keeps your hands at a safe distance from the blade.



Because the piece is surrounded by the notched block, it can't twist or roll, even though very little wood remains on the table surface.

ing use. A small piece of scrap on top serves as a handle, keeping my hand well out of harm's way.

Covered Bit, Guided Stock

The guide block for the router table is simply a block of wood large enough to be clamped to the fence, with a notch cut out of the bottom that's just a little bigger than the stock to be milled. The stock should slide through easily without binding. With the bit completely covered, I can apply

pressure against the fence and push the piece across the cutter without putting my fingers in dangerous places, as shown below.

After setting up the router bit and fence, find a piece of scrap wood big enough to cover the bit and clamp it to the router table's fence. I marked the size of the notch directly from the stock to be milled, and cut it on the band saw. It doesn't need to be a perfect fit – in fact this setup works better if the notch is a little bit bigger than the stock, as shown far left.

With the block clamped in place, I can turn the router on and go to work, as shown below. The block prevents the wood from twisting or rolling, even if very little wood remains on the surface of the router table. **PW**



A block of wood surrounding the router bit lets you apply pressure to the table and fence close to the action, while protecting your hands.



The wood to be milled should slide easily through the notch. Hand pressure on each side ensures an accurate cut.

Birdhouse Ornament

Photo by Al Parrish



Dale Nish, one of the principal architects of the turning revival, shares some turning techniques.

Birdhouse Christmas ornaments have become very popular the last few years, and they are excellent gifts for family and friends. Back in 1993, I saw a birdhouse ornament made by Ray Huskey from Gatlinburg, Tenn. I was intrigued by the possibilities of this small project as a gift for our grandchildren and friends. Since then, I have made birdhouse ornaments each year for the past 10 years. Each year I make a different design from a variety of woods, and I turn 40 or 50 for Christmas. No, we don't have 40 grandchildren, but we do have 18. The rest of the ornaments go to family and friends, and a few go for sale. So far I've turned a total of 400 to 500 ornaments.

Typically the ornaments are turned in groups of 10 or 12, usually from a variety of colorful or unusual woods. After the bodies and roofs are turned and finished, I match the tops and bodies for interest, contrast or color. The perches and finials are usually made from the same species, such as ebony or pink ivory, but any straight-grained and dense hardwood would do.

by Dale L. Nish

A professional woodturner and retired industrial education professor, Dale is the author of three woodturning books.

Turning the Body



1 Select a block of wood approximately 2" square and about 2½" long. This can be put in a chuck or turned into a cylinder between centers with the grain running lengthwise.



2 If a chuck is used, turn part of the block to round, then use a parting tool and calipers to establish a rough diameter dimension, which is the finished dimension plus 1/16", in this case about 1 11/16".

Step photos by Don Dafoe



3 Turn the cylinder down to the caliper dimension using a gouge, removing stock up to two-thirds of the length, but not getting too close to the chuck. Cut the end of the cylinder clean and smooth.



4 Reverse the stock in the chuck and turn off the square end. Turn the rest of the block to the correct rough dimension.



5 Measure and mark the cylinder to finished length. Part off the excess piece of wood. This should leave a cylinder 1¾" long. Examine the cylinder, checking for color or figure. The most interesting part of the work will be at the top of the body. It may be necessary to remove the cylinder from the chuck and reverse it to achieve this.



6 Insert a drill chuck into the tailstock and install a 5/8" Forstner or sawtooth bit. Drill a hole 1½" deep. This will leave ¼" of wood in the base of the body. (Here I'm working on a different ornament. Remember how many I had to make? So I apologize for the species change throughout the article. But note that the steps are the same.)

Mark the beginning of the cove at the top of the shoulder, the birdhouse opening and the perch hole. The marked points are difficult to see, so darken them with a pencil line. The pencil lines are marked with the cylinder turning.

The perch hole and birdhouse opening are best drilled using a V-block and a drill press. Center the V-block under the drill bit and clamp the V-block in position. Put the

marked cylinder in the V-block and rotate it until you find the place for the entry hole. Mark it. Now drop down to the perch hole line and offset the perch hole about $\frac{1}{4}$ " one side or the other from the entry hole. This is done so that when a bird is glued to the perch, the bird will not cover the entry hole. Mark the entry hole and drill it with a $\frac{1}{4}$ " bit. Drill the perch hole $\frac{1}{8}$ " diameter.



Place the body back in the chuck and turn the shoulder down to 1" diameter. A $\frac{3}{8}$ " spindle gouge works well for this. Try to get a nice smooth cove. Check the fit with a block that has a 1" hole drilled in it. Leave the area around the opening a little over finished dimension.



Sand the cove down to finished dimension using a Velcro disc and power sanding, or sand by hand. I use a grit sequence of #100, #150, #220 and #320. Frequently use the block to check the fit. It should be slightly loose, perhaps $\frac{1}{64}$ ". With power sanding, it's easy to sand off too much and get a sloppy fit.



The interior of the body is hollowed out using a small hooked scraper. Use light scraping cuts, stopping frequently to clean out the shavings. Be very careful not to damage the inside of the opening or remove the drill bit hole in the bottom. These must be used to accurately hold the body on the mandrel for finishing the outside. Check the section drawing on page 92 for wall sections and interior shape.



My mandrel is shop-made. Make one using the drawings on page 92. Install the mandrel for the body in the chuck and tighten it securely. Slide the body on the mandrel. The fit must be tight enough to hold the body while the outside is turned to shape. If the fit is too loose, use a little masking tape or tissue paper to make the fit tight. But, not too tight or the body may crack when the body is pushed on to the mandrel.

12



Move the tailstock and cone center in position to secure the body onto the mandrel. I use a $\frac{3}{8}$ " spindle gouge for final shaping, cutting from the large to the small diameter with a light shearing cut.

13



Drill a $\frac{3}{16}$ " hole in the bottom of the body to hold the finial.

14



Sand the body with Velcro discs using #100, #150, #220, #320, and, if necessary, #400. Don't sand too much and get the walls too thin. Look through the entrance hole and the perch hole to check the wall thickness.

15



Finish the body. I prefer a lacquer finish. Insert a $\frac{5}{8}$ " dowel 6" to 8" long into the body. This will make it easy to hold the body while spraying. I spray a full wet coat of Masters Magic high solids gloss lacquer. I prefer the gloss, as I want a shiny finish. After all, this is a Christmas ornament.

16



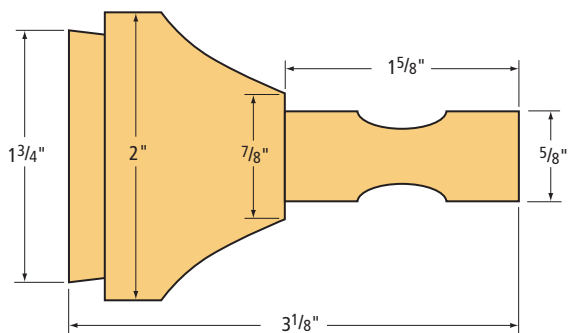
If any runs start to show, use the dowel to rotate the piece until the surface starts to set, then place the dowel in a holder until the finish is dry. Depending on humidity and temperature, the lacquer will be ready for a second coat in 15 minutes or so. When the finish is dry, the body is put back on the mandrel, the lathe turned on and the body is polished with #0000 steel wool and paste wax, then buffed with a flannel cloth.

Turning the Roof

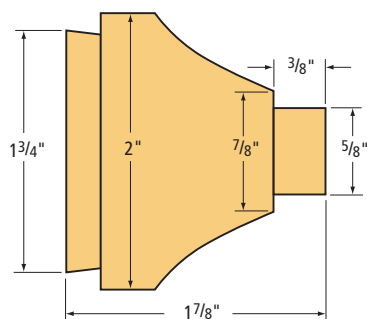
17



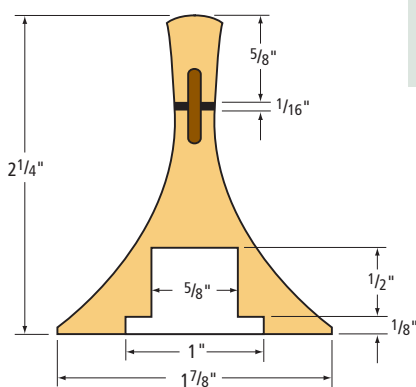
Select a block of wood for the roof. The procedure for roughing out the block and turning it to the required dimension is the same as shown in steps one through five for turning the body of the ornament. The only difference is the dimensions needed, and they are given on the drawing of the roof. For a basic roof, the block needs to be $1\frac{5}{8}$ " long and $1\frac{7}{8}$ " in diameter. Drill a 1" hole that's $\frac{1}{8}$ " deep to provide a counterbore area for the top of the body to fit into. Now drill a $\frac{5}{8}$ " hole that's $\frac{1}{2}$ " deep to allow the top to fit on the wooden mandrel. This also removes some of the wood in the top, making it lighter. Sand and finish the underside of the top.



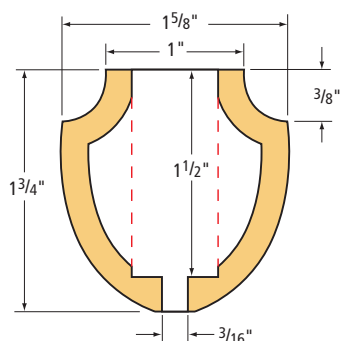
Body mandrel



Roof mandrel



Roof



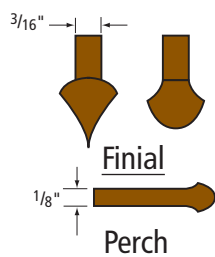
Body

SUPPLIES

Craft Supplies USA
800-551-8876 or
woodturnerscatalog.com

- 1 • Birdhouse Ornament Kit (includes wood blanks, hardware and decorative bird used to make the birdhouse ornament shown) \$12.99 postage paid
- 1 • Masters Magic high solids gloss lacquer #299-0002, \$8.99

Prices as of publication date.



Finial

Perch

Illustrations by Don Defoe



Install a shop-made roof mandrel (plans at left) in the chuck, and slide the roof block onto the mandrel. It should be tight, but I always move the tailstock up and move the revolving center in position to put a little pressure on the block and reduce any vibration, which may happen when the top is being turned. This photo shows a walnut top being turned with a 1/2" gouge, but a 3/8" gouge is also a good choice.



Sand the top, then use a drill chuck and a small bit to drill the hole for the screw eye.



An alternate method of making the roof is to use a piece of holly, which is hard, dense and white. Add a decorative tip using an ebony veneer and a small piece of pink ivory. This will make the top 2 1/4" high. Drill a 1/8" hole in the top using a drill chuck in the tailstock, then drill a 1/8" hole in a small piece of ebony that is about 1/2" thick, and a 1/8" hole in the small pink ivory block that is about 1/2" square and 5/8" long. You also need a piece of 1/8" dowel about 5/8" long. Put yellow or white glue in the hole in the roof and insert the dowel. Put glue around the dowel and on the top area of the roof. Put on the ebony piece, then put glue on the dowel and inside the hole in the pink ivory piece. Slide the pink ivory block onto the dowel and use the tailstock with the revolving center as a clamp to push the parts together. Wipe off any excess glue. The top only needs to be left clamped for 15 minutes or so, then set aside for an hour or more before turning.



Turn the top and decorative tip to shape, using a $\frac{3}{8}$ " gouge and the revolving center as a support.

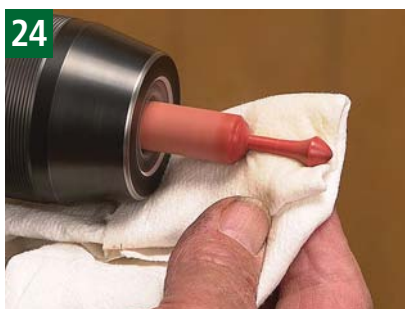


Sand the roof and drill a hole for the screw eye.

Turning the Finial and Perch



Turn a piece of pink ivory into a dowel that's $\frac{1}{2}$ " round and 3" long. This should give enough length for a finial and a perch. Insert the dowel into a drill chuck, which is seated firmly into the headstock. Turn the finial to the desired shape. Check the diameter of the finial end, which is inserted into the base of the ornament. This must be $\frac{3}{16}$ ", and fit snug into the hole. I use dial calipers to check this.



Sand and finish the finial. For the finish I put a few drops of lacquer on a cloth, and apply it to the spinning wood. Part the finial off and set it aside.



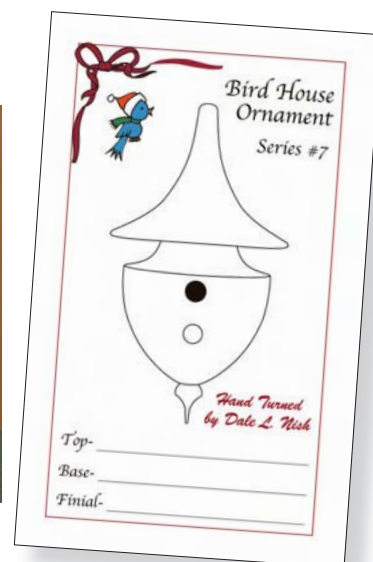
Use the same procedure as above to turn the perch to the dimensions on the drawing. Sand and finish the perch, then set it aside.



Insert the perch and finial into the base of the birdhouse, then put a drop of thick cyanoacrylate inside the base and around the finial and perch. Use a little accelerator to set the cyanoacrylate.



Glue the screw eye into the roof, then turn the roof over and put a small bead of thick cyanoacrylate around the inside of the counterbore hole. Decide where you want the position of the top to be on the body. Spray a little accelerator around the top of the body and put the two pieces together. Select a little bird (see Supplies box), if desired, and glue it in place.



This little project can become a family treasure. Just be sure to sign and date it under the edge of the top of the roof. Fill out the card, and it is ready for gift-wrapping. **PW**

Fertile Fields

In the last 11 years, Marc Adams's woodworking school has experienced explosive growth.

It's an unusually cool August day, and Marc Adams has all the doors of his woodworking school swung open, letting the bright Indiana sunshine in. In an intarsia class with Garnet Hall, scrollsaws hum. In a "mastering woodworking" class, 18 students applaud after Stephen Proctor finishes a quick seminar. And in a furniture design class, instructor Graham Blackburn watches as a student presents his latest furniture-design idea.

It's Friday, the last day for all three classes. Despite the long hours each student has put in, smiles abound. On average, they traveled 500 miles to be here. For most, this is their fifth or sixth time at the school. And they all paid good money, for good reason.

"It's a lot of fun," says Martin Lutz, from Montrose, Colo., who is taking his fifth class at the Marc Adams School of Woodworking. "And you learn an incredible amount."

A mere block on a patchwork quilt of rolling farmland in Franklin, Ind., the school has grown as fast as the surrounding corn that shoots up each summer. In 2004 Adams offered more than 85 classes taught by more than 50 world-renowned instructors. Next year, Adams predicts 2,500 students will walk through his doors. Almost too successful, the 300-plus waiting list got so long that Adams now reserves the month of April for non-alumni. (Alumni are given the first opportunity to register for classes, which generally sell out in only one day.)

The numbers are staggering considering that only 11 years ago, Adams opened his



Photos by Al Parrish

Eleven years ago Marc Adams personally taught 160 students. Next year, he predicts 2,500 students will take classes from more than 50 instructors.

school doors to 160 students, whom he personally taught. But Adams, a professional woodworker for more than 22 years, is accustomed to unprecedented success.

An Unexpected Career Change

Growing up, Adams says he didn't appreciate his father's woodworking hobby. In college, he pursued an undergraduate degree in education and a graduate degree in sports medicine. However, despite his lack of interest in woodworking, every year Adams and his dad would go to a craft fair in Indianapolis to visit the Shopsmith booth. His dad never had money to buy the machine, but loved to see its many uses demonstrated in the booth.

In the mid-1970s, just as Adams was finishing up his graduate degree, his dad, recently retired, fulfilled his dream of building a backyard woodshop. So at the next craft fair Adams talked his dad into buying a Shopsmith. Upon graduation Adams knew he'd have a steady income and could help with the payments.

by Kara Gebhart

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

The following Monday, Adams and his dad drove to Dayton, Ohio, to pick up the Shopsmith. On Tuesday, they assembled the machine. On Wednesday, his dad died, having never made a single cut.

Although Adams couldn't afford the payments, he couldn't bring himself to sell the Shopsmith. So he learned to use it, figuring if he could make a birdhouse here and fix a neighbor's table there, he could make the \$60-a-month payments.

"Woodworking then went from a hobby, to an addiction to, I think, a business," Adams says. "I had no right to succeed as a furniture maker." But he did.

His one-man shop grew into a multi-million dollar business. He and 35 employees built high-end furniture nationwide.

His success was noticed. In 1991 he became a technical consultant to the Western Wood Products Association, the Southern Forest Products Association, the American Hardwood Export Council and the U.S. government, lecturing internationally about business, industrial production and marketing.

While lecturing in third-world countries, Adams often was asked what the United States

does to educate woodworkers. In other countries, a child was raised to be a woodworker if his father was a woodworker. And while many other fields in the United States require schooling and a license to practice (electricians, plumbers, etc.), anyone in the United States can “become” a woodworker without any prior education. Adams saw a need.

He sold his business and used the money to buy all-new equipment to start a woodworking school. The first year, Adams taught 16 classes, allowing 10 students in each class. “It nearly killed me,” he says. “There were no assistants, no additional staff.” He knew he needed instructors.

The next year Adams managed to get high-profile names such as R. Bruce Hoadley and Roger Cliffe to teach at his school. Since then he has stuck to a strict set of guidelines of who he allows to teach. “I will not compromise the quality of who I bring here,” he says. One of Adams’s strengths is his uncanny ability to get hard-to-find woodworkers from around the world to teach each year – he also turns many instructors down.

Today Adams also has 10 full-time assistants during the school season (April through October). Three of those assistants, Herman Bueno, Zane Powell and Doug Dale, work year-round. Dale drives 100 miles one-way each day to assist at the school.

The Ultimate Woodshop

The 20,000-square-foot air-conditioned facility looks like a barn from the outside. Inside, there are two power-tool rooms, three bench rooms, a multimedia/cafeteria room and a multi-purpose room scheduled to open in April 2005. Each instructor’s bench has two 35"-wide TVs tethered to cameras that allow students to see an instructor’s presentation up-close. Each student gets a bench, rubber mat and stool. Although there typically are three classes and 60-plus students working in the school on any day, it never feels crowded.

The two tool rooms include 10 table saws, 13 band saws, eight planers, nine jointers, 18 Oneway lathes, eight drill presses, 25 scroll saws, 10 miter saws, two shapers, eight router tables, three large down-draft tables, two 37"-inch drum sanders, six oscillating drum sanders, 10 mortising machines, four vacuum presses, 65 workbenches, more than 800 clamps and thousands of hand tools.



Steve Weaver works on a project in a “mastering woodworking” class. This is one of the three bench rooms in Adams’s 20,000-square-foot facility.

Remarkably, Adams’s school isn’t sponsored by any manufacturers. He personally buys every machine and tool that’s in his school – he refuses to accept gifts, donations or trades. As far as choosing brands, he maintains a wide variety of machines and tools his students can choose from. This enables students to try several brands before making a major purchase. This also ensures instructors will have the machine or tool they’re most comfortable with on hand. His stationary power equipment includes brands such as Jet, Powermatic, Delta, General and Felder.

There are, however, certain exceptions. For example, when turning, everyone has to have the same lathe as the instructor. Therefore, after much research, Adams chose Oneway lathes. The students also all have the same

benches. Adams recently spent more than \$30,000 on brand-new Lie-Nielsen benches. For several years Adams worked with the company to design the bench, which cost him \$1,800 each.

The tools and machines don’t go unused in the winter months. Manufacturers send their employees for training on their tools. This enables the employees the ability to ask questions and work with their machines and tools without worrying about outside criticism. Adams also hosts corporate outings. Employees will work on developing leadership skills while building one big project together, such as a new conference table.

Adams says he isn’t interested in running classes year-round for a couple reasons. One, Indiana’s winters can be harsh, making travel

continued on page 98



Students can see instructor Stephen Proctor’s demonstration up-close thanks to two TVs tethered to cameras. Two assistants operate the cameras.

continued from page 95

difficult. Two, winter is the only time Adams is able to pursue his personal woodworking projects – Disney-inspired furniture.

Thousands of small, plastic Disney toys are glued to shelves everywhere in the school – they're gifts from those who know Adams well. Adams builds high-end, functional furniture that incorporates Disney characters through carving, marquetry, intarsia and inlay. He doesn't sell the furniture. It's strictly for personal use and pleasure, and he spends hours researching movie clips to depict characters and scenes accurately. His son's carved bed, which looks exactly like the bed the dwarves slept in in "Snow White and the Seven Dwarfs," took 2,000 hours to complete. He and his wife's bed has an exact image from the movie "Pocahontas" inlaid into the headboard. The overall bed has the appearance of stretching pelts. "First and foremost I'm a furniture maker," he says. His father would be proud.

New Teachers and New Classes

Although the three classes are ending today, Adams is meeting with instructors tonight and 100 new students will arrive tomorrow. Adams, whose house is located next to the school, says some days people are on the property at 5 a.m. The hours are long and it's a seven-days-a-week job. "There's no way an average person could do that," he says. "I've been OK with it – but it's taken me 10 years to be OK with it."

Adams's wife, Susie, along with his mom, Doris, also work at the school, preparing the



Adams calls this room the "non-aggressive" bench room. While students have access to the power-tool rooms, they can work on things like furniture design in a quiet atmosphere.

students' lunches each day. Adams says his two young children have become accustomed to the loss of privacy. "When my son and I play basketball, I have three to four guys making fun of me when I miss a shot," Adams says. But he adds that the children appreciate the people they've met – professors, lawyers, doctors and movie stars. "We're trying to learn who we are and what we've become," Adams says. "We're trying to appreciate and accept."

Next year will be the school's biggest year yet. However, Adams says with the new addition, the school has reached its limit in terms of size. But no new growth doesn't mean no new change.

For four years the school has offered a Masters program. Students must take eight one-week classes plus a two-week apprenticeship class. Students who complete the program

receive \$1,000 worth of power tools from Bosch. (Adams hastens to note that manufacturers don't sponsor any of these programs – rather the gifts are something the manufacturers do on their own free will.) This year, Adams introduced a new Fellowship program, which is open to students who complete the Masters program. Students must take eight more one-week classes, plus a complete two-week artist-in-residency. Students who become Fellows receive a Delta Unisaw.

Along with the introduction of new programs, every year Adams strives to find new instructors and offer new classes. In 2005 he plans to offer 125 workshops, 100 of which will be different. Perhaps this is why he enjoys a 95 percent return rate. Perhaps this is why the students today are already talking about the classes they hope to take, next year. **PW**



A student works on an intarsia project in another bench room.



Instructor Graham Blackburn (right) works with student Jack Killia on furniture design.

Fighting Evil Alien Technology

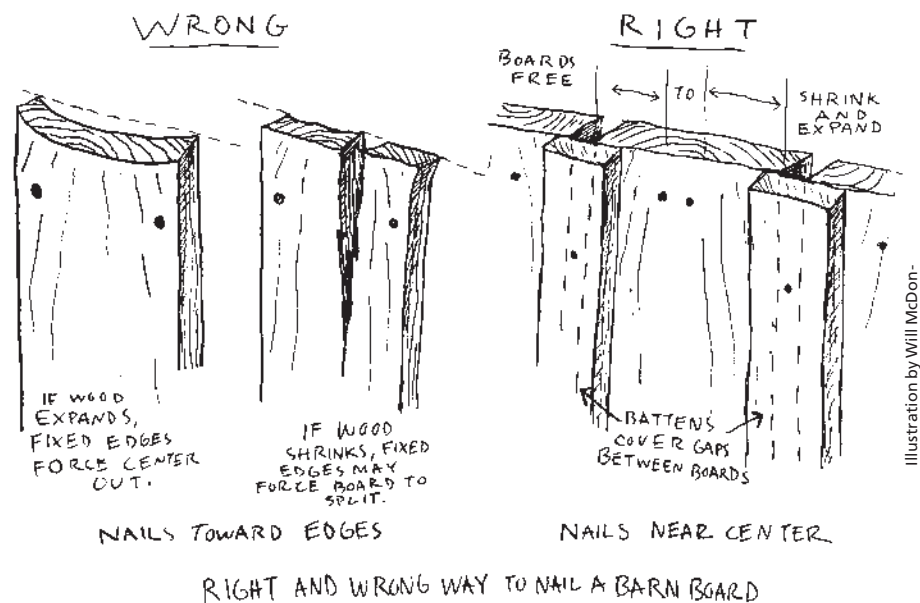
Beating it requires knowing the right way to nail a board.

When I was about 8 years old, I decided that I needed to construct a sturdy fort to protect myself from the army of aliens (who cleverly had taken the form of my older sister and her friends) that were constantly invading my backyard.

I had never built anything this large or complex before – a birdhouse in shop class was the only other dwelling-like structure that took shape under my hands – but I wasn't going to let that stop me. Gathering up some old boards and some random lengths of 2x4s, I used up an entire bucket full of old nails to encourage the wood to hold together as something that could be loosely interpreted as a fort. It was only a matter of weeks before the boards began to split around the nails. Soon after that, many fell off and deserted my garrison altogether. I attributed the structural failures to the work of evil and mysterious alien technology.

I never reassessed this diagnosis until many years later when I found myself pounding nails for a living. While reinstalling board-and-batten siding on the side of an old dairy barn, the owner came out to watch. When he saw me nailing them off in my usual fashion (which was little advanced from my fort-building days) he asked me what I was trying to do. I knew from the tone of his voice that I was in trouble – that obviously whatever it was I was trying to do was not what it was that he wanted me to be trying to do. Which was to put on his board-and-batten siding so it would stay there for at least another 100 years before his grandson had to hire another carpenter like myself to come out and put on some new boards. That is, if I was doing it right ... which I wasn't.

What I should have been doing, as the farmer clearly demonstrated to me, was to be putting one or two nails near the center of the board at each nailing station. "Any barn builder worth his chewin' tobacco should know that," he added. He



also showed me that the batten should be put on with a single, centered nail – with that nail going between the planks. In that way, he explained, the board could shrink or expand with the seasons, riding under the batten without splitting either the batten or the board, yet staying flat against the wall because of the pressure of the batten. My uninformed method of nailing-off was holding the boards and battens at their edges, which didn't allow them to change size at all. Any shrinkage or expansion of the board would demand something give somewhere. If the nails didn't give, then the wood would do so, either splitting down the middle during shrinkage or bowing during expansion. This was obviously not the

way to side a barn to last the generations – or to get paid for doing so as the farmer also clearly pointed out.

Since that cathartic day at the barn, I have changed the way I design and construct my projects. I have also come to understand why the woodworkers of the Middle Ages developed the now-ubiquitous frame-and-panel construction method and why later generations invented and now work extensively with plywood. I also now see why certain types of mouldings are commonly found in furniture and why mortise-and-tenon joints are purposely designed with gaps in certain places. These are all fundamental design strategies that allow woodworkers to deal effectively with the inherent nature of their medium. Learning the essential truth that all things organic can change shape and dimension over time, I can now build things that won't blow apart on my clients. Best of all, armed with this essential knowledge, I will be ready for the fateful day when those aliens return! **PW**

by Jim Tolpin

This article is adapted from Lesson 23 in "Jim Tolpin's Woodworking Wit & Wisdom: Thirty Years of Lessons from the Trade" (Popular Woodworking Books). To obtain your copy, visit your local bookseller, call 800-448-0915 or visit the Bookstore at popwood.com.