



NASCAR SPECIAL: 800-HP TOOLS!

WORKBENCH[®]

WOODWORKING TO IMPROVE YOUR HOME[®]
February 2006

TOP 10 INNOVATIVE TOOL AWARDS 2006

3 STORAGE SOLUTIONS UNDER \$50

- FLOATING SHELVES
- GARAGE STORAGE
- MOBILE CLAMP RACK

STAIRS WITH FLAIR

SIMPLE DESIGN YIELDS
STUNNING RESULTS!



**TOP 10
INNOVATION**
Integral Castors
See Page 56

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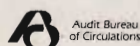
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As you might guess, we take all kinds of things into consideration when designing the projects that appear in *Workbench*. Not the least of which is the style of house where the project will be built. Is it a Craftsman bungalow, a split-level Ranch, or a Colonial two-story?

In this issue, we built our feature project — a staircase facelift — in a house that was built in 1987. This recent date of construction makes this house fairly typical of a large number of our readers' homes. (Over 60 percent live in homes built since 1980.)

One of the things I like about houses built during this time period is they often have a relaxed, informal feel and an open, inviting floor plan. Too often, though, they're missing a signature style.

The staircase I mentioned is a good example. As you can see in the *Before Photo* above, it was nice enough. But with its carpeted stair treads, 2x2 deck-like balusters, and a bulky newel post, this staircase was remarkable only in how very unremarkable it was.

Because the stairway is the first thing you see when you walk in the door, the homeowners felt it needed to be jazzed up a bit. So we opted for a more up-to-date style (*After Photo*). Notice how the thick slabs of red oak that form the stair treads and the "brushed" metal spindles make for a clean, contemporary look that creates a new focal point for the house.

Best of all, the project is relatively simple to complete. That's because it has none of the complications of actually *building* a staircase. All we're doing is refacing an existing staircase by replacing the elements that define it. So be sure to check out how we turned a job that would make a professional trim carpenter proud into a do-it-yourself project (*details begin on page 44*).

New Department — And don't miss our new department beginning with this issue, called *Against the Grain*. It's filled with short bits of information that are at times edgy, often lighthearted, and always entertaining. I'm anxious to see what you think. Please let us know by taking a quick poll at WorkbenchMagazine.com/atg.html

Tim



C O N T E N T S

44

WORKBENCH® February 2006



FEATURES

44 Stairs with Flair

A plain staircase is really just untapped potential. Reveal its true character with solid-wood stair treads, metal spindles, and a sturdy handrail. It's easier (and less expensive) than you might expect.

56 Top 10 Innovative Tool Awards

Our Innovative Tool Awards turn five this year, and the 2006 crop of tools make it a birthday worth remembering. New designs in everything from table saws to cordless batteries will revolutionize the ways you work with wood.

64 "Floating" Display Shelves

One cool thing about these shelves is how they appear to "float" on the wall with no visible supports. The other cool thing? All three can be built in a day for \$50, using only a table saw.

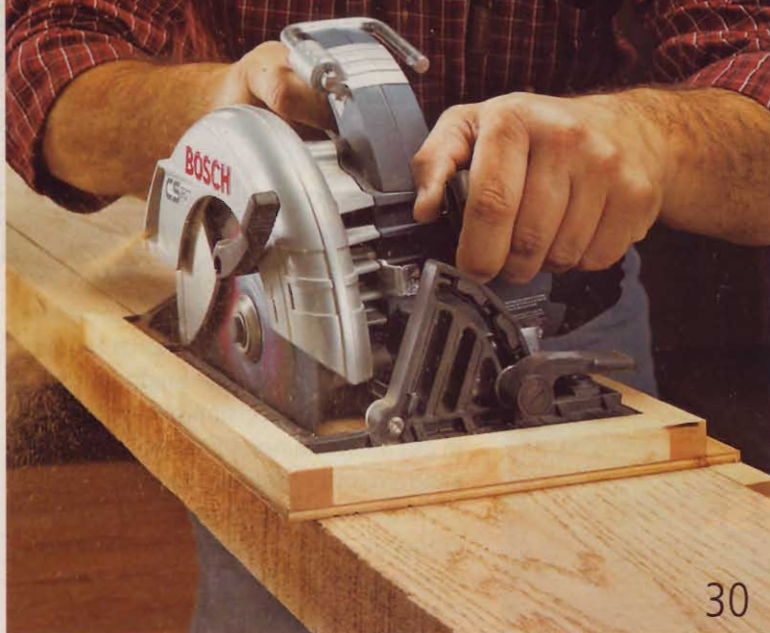
68 Garage Storage Loft

If every nook and cranny of your garage is filled to capacity ... look up! This ceiling-mounted storage loft packs big-time storage into a simple project.

72 800-Horsepower Tools

The DIY and home improvement industry is a driving force in NASCAR. See how this connection goes well beyond just the logos on their cars.





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Outfit your circular saw with this simple guide to make ripping long boards a manageable one-person job. Plus, simple stud-finding and plug-cutting tips.

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34 Mobile Clamp Cart

The secret to this simple cart is the "A-frame" design. It creates a shop fixture that can corral all your clamps in under four square feet of space.

BENCH BASICS

38 4 Rules for Router Setup

Get your router set up and running right every time using these handy tips.

40 Take Routing to the Edge

Create decorative profiles, cut joinery, and duplicate patterns with nothing more than your handheld router and a few basic bits.

THE CUTTING EDGE

78 One Bit — Many Profiles

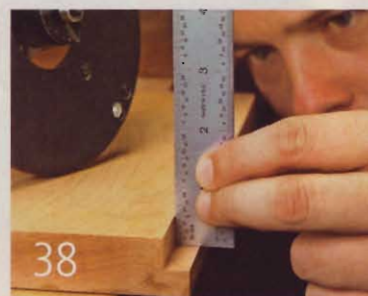
A look at the hottest new trend in router bits: interchangeable carbide inserts. See how these new bits can save you money and make routing easier.



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John Deere is just one example of unrelated companies getting into the tool business as a new way to promote their brand.



NEW PRODUCTS

The Label Game

Private label tools are designed to extend unrelated brands and reflect their qualities. It's a good idea ... and one we'd like to build on.

The tool industry is a trendy business. Which isn't to say the industry follows popular trends. But it does have a history of starting its own trends and then riding them to the point of exhaustion. Case in point — laser-guided everything.

The latest, and perhaps most curious, trend is private labeling tools for unrelated industries. In the past year or so, we've seen new tool offerings under the names Hemi and Kawasaki. Those join established lines branded Hyundai, Jeep, and John Deere.

The tool companies are happy to have another channel to reach buyers, and for companies like Dodge and John Deere, these are great promotional tools for value-added offers — buy a tractor, get a recip. saw. (Obviously the free-hat thing wasn't getting it done.)

Apparently, the idea is that the power and performance of the tools is supposed to reflect the qualities of the cars, trucks, and tractors of the same name.

Frankly, we like the idea. And we think there's a lot of potential for other brands that deserve tools that reflect the quality of their character. So here are a few brands we'd like to see. We promise full editorial coverage on the day they're released.

Pop Star Power Tools — This line could be amazingly profitable for a forward-thinking tool company. Simply build a tool to be incredibly loud without actually doing anything of worth. And as long as each tool comes with only half its housings, so most of its parts are exposed, this is a sure winner.

Reality TV Tools — Here's another low-cost, high profit idea. These tools just have to look great on TV. They don't require working motors or even sharp edges. In other words, they don't need to be substantive in any way. Pull the trigger on any of these tools, and it

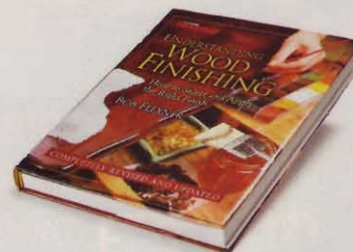
emits the distinctive whining sound that is the hallmark of this line. But don't be complacent around these tools; they can't cut anything, but they can sure stab you in the back.

Politician Power Tools — These tools are all about persuasive packaging. When you're shopping, they seem like the perfect tool for the job. But as soon as you buy into them, they either stop working altogether, or worse, start working against you. And don't bother calling customer service — they'll simply deny any knowledge of ever having made such a tool.

BOOK REVIEW

Finishing With Flexner

Bob Flexner, largely considered to be the last and best word on wood finishing, has just released the second edition of his popular finishing how-to book, *Understanding Wood Finishing: How to Select and Apply the Right Finish*. The new edition offers several improvements over the first, including full-color photography and illustrations throughout, and new chapters on advanced coloring techniques, exterior finishes, and wax finishes.



The book is available in hardcover through traditional booksellers and softcover in woodworking stores and catalogs. For more information, visit BobFlexner.com.

WORKBENCH JURY DUTY

Judging Design

Workbench goes to San Diego, California, to participate in the Design in Wood Exhibition.

Among the many other reasons to visit San Diego, California, add to the list the San Diego County Fair and the annual Design in Wood Exhibition. The exhibition is sponsored in part by the San Diego Fine Woodworker's Association, one of the largest and most active wood-working groups in the country.

The highlight of the exhibition is a juried gallery show, in which woodworkers have their projects judged by industry experts.

Workbench was honored to participate in the 2005 exhibition by providing a jury member for the contest. Creative director Ted Kralicek attended the fair on behalf of *Workbench* and selected Steven M. White's "Hall Table" (below) for an Excellence in Design award.

Mr. White also received top honors in the Art Furniture class for his unusual "Tip-Top Semainier" (above).

Another show standout was the "Art Deco Vase" created by Ed Zbik, which earned him first place in the Wood Turning — Laminated/Segmented class.

For more project photos, plus full details on the Design in Wood Exhibition and the San Diego Fine Woodworker's Association, visit www.sdfwa.org.

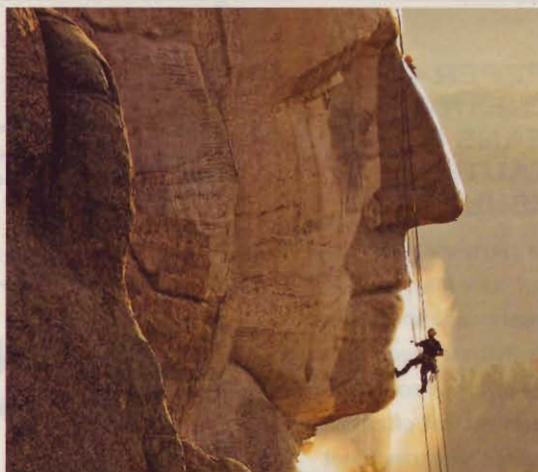
The Excellence in Design Award went to Steven M. White for his "Hall Table" during the 2005 Design in Wood Exhibition.



Steven M. White's unique take on a classic design earned him first place in the Art Furniture class.



This elaborate vase by Ed Zbik took honors in the Wood Turning — Laminated/Segmented class.



Chin up, George, this won't hurt a bit.

MONUMENTAL FACELIFT

Talk about a problem complexion. A few blackheads and a patch of dry skin are nothing compared to the lichen, algae, and moss that were messing up the countenance of the Rushmore Four.

Fortunately, the National Park Service recently teamed with Karcher, a German cleaning equipment manufacturer, to give our presidential likenesses a high-pressure, hot-water facial. No chemicals were used in the process, just five diesel pressure washers and a team of really brave guys in good harnesses.

After the work was completed, visitors agreed that the appearance of former presidents Washington, Jefferson, Lincoln, and Roosevelt were dramatically improved.

RUSHMORE FACTS

14 - Years spent carving the four presidential likenesses into granite.

10,000 - Years it takes for 1" of granite to erode from the monument.

\$8 - The daily wage of a laborer on Mt. Rushmore.

450,000 - Tons of granite dynamited off the mountain before "carving" could begin.

0 - The number of fatalities that occurred during the carving of Mt. Rushmore.

1,849 - Gallons of boiling water used each day during the recent cleaning of Mt. Rushmore.



CURRENT HAPPENINGS

Tape Races

What do you get when you mix contractors, tape measures, and a slick bar top? A racing league, of course.

Further proof that men can turn anything into a competition — we now have tape measure races.

What began as a simple bar game — contractors would race their tapes to see who buys the next round — has grown into an organized league complete with a custom-built track, electronic timing, and computerized statistics.

The racing circuit consists of three taverns in northern Iowa

where racers compete each week. As the sport has caught on, the competitors have found interesting ways to modify their tapes for higher speeds. Wheels are added, springs are custom-wound, and the blade is replaced with monofilament fishing line.

Visit WorkbenchMagazine.com to see a video of tape measure racing. Also be sure to check out RacersPowerTapeRacing.com.

PENOFIN FIRES BIG-BOX STORES

Penofin Performance Coatings recently took the bold move of removing their products from America's largest home centers. Penofin made the decision to sacrifice the retail might of the big-box stores rather than move their manufacturing overseas — a move they say would have been necessary to meet the growing list of demands from the mega-retailers.

"We are a family-owned company," says Penofin CEO Dr. Barbara Newells, "and we are not about to go overseas to make a buck at the expense of our employees."

To learn more about Penofin Fine Wood Finishes, including where they are available in your area, visit Penofin.com or call 800-736-6346.



Workbench associate editor Wyatt Myers cutting for a cause.

WORKBENCH STAFF

Out of The Office

Workbench editors build a lot of projects for a lot of reasons — to improve their homes, to demonstrate techniques at woodworking shows, and sometimes to meet a higher need. Wyatt Myers took advantage of just such an opportunity recently at the Woodworking Expo held at the Woodsmith Store in Des Moines, Iowa.

Myers teamed up with advertising sales manager George Clark to build a "Patriotic Planter Box" (PlansNow.com/usaplanner.htm). The planter and the tools used to build it (donated by Bosch) were auctioned off to benefit the Unmet Needs programs, which offers assistance to families of U.S. military service men and women (UnmetNeeds.com).

Large capacities, smooth operation, and overall quality of construction make the Rikon 70-100 a solid choice.



PRODUCT REVIEW UPDATE

Rikon Midi-Lathe

Rikon was preparing to launch their midi-lathe as we were concluding a test of the category.

It's a shame that Rikon's lathe didn't arrive in time to be included in the midi-lathe review that appeared in the December 2005 issue of *Workbench*.

As you may recall, we tested lathes from Jet, Delta, Grizzly, Fisch, General International, and Penn State Industries.

Based on our testing of the Rikon, it would have competed with Jet for the "Editor's Choice" award. The 70-100 is a powerful, smooth-running lathe with more capacity than most in this category (12" over the bed and 16" between centers). We measured

virtually no runout inside the spindle or on the shoulder. The tool rest and tailstock adjusted easily and locked securely. We were also impressed with the overall fit and finish of the lathe.

What's more, this lathe has a couple features that the others don't. Those are a 12-position indexing head (Photo, upper right) that allows you to lock the workpiece for detail work, and a tool rest on the back of the machine for storing accessories (Photo, lower right).

The 70-100 sells for about \$250. Contact Rikon for more information.



A 12-position indexing head and an accessory tray are Rikon extras not found on competitive lathes.



Virtues: Powerful; Smooth-running; Easy setup; Large capacities; Good fit and finish; Long quill travel; Useful extra features.

Vices: None.

Verdict: If you haven't purchased your midi-lathe yet, add this one to your list of top contenders.

RikonTools.com
877-884-5167



DALLAS WOMAN IS FIRST

To Make "The Cut"

She's 5 feet 8 inches tall and weighs less than 130 pounds. She's attractive, intelligent, well-spoken ... and she can cut a car in half in less time than it takes you to order a grande-organic-blend-double-espresso. So you may want to rethink double parking next to Ann McLean.

McLean is the newest and first female member of "Team Hackman,"

a seven-member squad that travels the country cutting cars in half to demonstrate the strength and durability of Lenox saw blades.

It takes less than two minutes for any member of the team to bisect a car with a reciprocating saw.

For more on Team Hackman, including a video of the team in action, visit LenoxSaw.com.

Questions & ANSWERS

magnetic switch ADDS SAW SAFETY

Q While shopping for a new power switch for my table saw, I noticed some called “magnetic” switches. What’s the difference between these and standard switches?

Mark Rasmussen
Olympia, WA

A A magnetic switch is a great safety upgrade for a table saw. The switch might look like any other two-button switch (Photos, right), but it works quite differently.

Mechanical Switch — A standard switch works by making a mechanical connection between two metal contacts that lock together when you turn the switch on.

The problem is that the contacts stay locked together until you turn the switch off, even if the power goes out. This may happen if you overload the saw and trip a circuit breaker. Forget to turn the switch off, and the saw will start running again as soon as you reset the breaker.

Magnetic Switch — A magnetic switch, on the other hand, reverts back to the “off” position if a breaker trips. It does this thanks to a device called a “solenoid.”

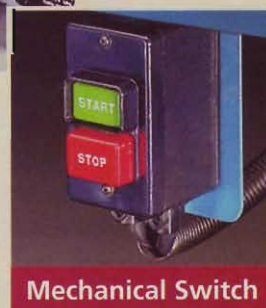


Magnetic Switch

A solenoid is an electromagnet with a piston inside. When electricity is applied, the magnetic field pushes the piston out.

This piston is connected to one of the contact plates in the switch. Push the “on” button, and the solenoid pushes the piston to bring the two contacts together. As long as electricity flows through the solenoid, the contacts stay together. But if power is lost, the piston retracts, which separates the contacts and turns the switch off.

You can purchase a magnetic switch from a number of tool dealers. Be sure to specify the motor voltage and horsepower of your saw when ordering.



Mechanical Switch

butcher blocks & BACTERIA

Q I enjoyed learning about butcher-block counters in your December 2005 issue. But should I be concerned about bacteria?

Mark Felder
Barton, OH

A Several years ago, reports claimed that wood cutting boards shouldn’t be used with raw meat because bacteria in the meat could get trapped and then transferred to other foods.

Newer studies, though, show that wood cutting boards are actually safer than plastic. That means you can cut meat directly on the countertops, as long as you scrub them with hot, soapy water.



GOT QUESTIONS? WE HAVE ANSWERS!

Include full name, address, and daytime phone number. You’ll receive one of our handsome **Workbench** caps if we publish your question.

HOW TO SEND YOUR QUESTIONS:

Email: Q&A@workbenchmag.com

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Hitachi's Latest Innovation

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C12LSH

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HITACHI

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Product Information Number 291

Questions & ANSWERS

simple spray STOPS RUST

Q My workshop is in an unheated, uninsulated garage, so the temperature and humidity fluctuate a lot. Because of this, the surfaces on my cast-iron tools are always covered with a thin coat of rust. How can I clean the rust off and keep it from coming back?

Jason Conrad
St. Paul, MN

▲ After three hours covered with water, bare cast iron rusted. The portion coated with rust inhibitor didn't.



A Cast iron makes a great surface for tool tables, but it does rust quickly if left unprotected.

To get rid of rust, try Rust Free from Boeshield (Boeshield.com). Just spray it on the rusted surface, let it soak for a few moments, and then wipe the rust away with a rag or abrasive pad (*Inset Photo*). Repeat the process if necessary.

Now is also a good time to get rid of any scratches in the surface. You can do

this easily with a random-orbit sander and 220-grit sandpaper.

Next, coat the bare cast iron with a rust inhibitor. My favorite is T-9 spray, also from Boeshield. To show how well it works, I sprayed a coat on half of a cast-iron wing from a table saw, set it outside, and misted the entire surface with water. The unprotected half rusted in about three hours, while the coated side stayed clean (*Photo, above*).

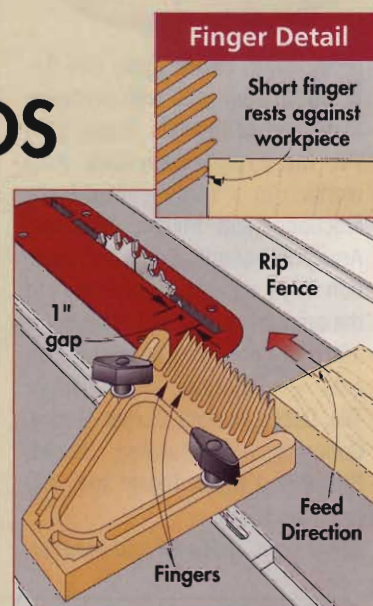
proper setup for FEATHERBOARDS

Q When ripping on the table saw, where should a featherboard be positioned in relation to the blade and the board?

Jeffrey Miles
Cedar Rapids, IA

A When ripping, the featherboard should sit just before the blade (*Illustration*). Never put a featherboard alongside the blade or on the outfeed side. It will pinch the kerf and may cause kickback.

On many featherboards, the first finger is about 1/8" shorter than the others. That's to aid setup. Just slide the featherboard against your workpiece until this finger contacts the edge (*Inset*). Tighten the featherboard, and the rest of the fingers will apply the correct pressure.



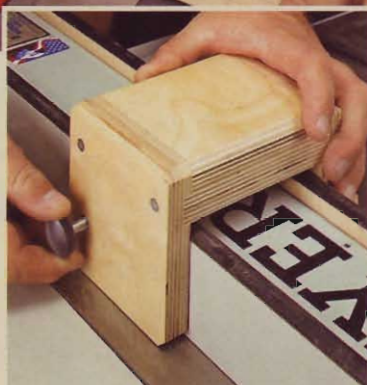
▲ For proper holding power, position a featherboard just before the blade, with a consistent gap between the fingers and the fence.

Tips & techniques

easy-on, easy-off SETUP BLOCK



▲ A setup block makes it easy to cut multiple pieces to identical length. Just turn a knob to secure this one to the rip fence quickly (*Inset*).



When crosscutting multiple pieces to length on the table saw, it's common to clamp a scrap block to the rip fence *before* the blade as a stop for setting cutoff length. To use it, just butt the end of the workpiece against the block to position it along the miter gauge, then push the piece through the blade (*Photo*). This leaves a gap between the workpiece and the fence, so the cutoff can't get trapped and kick back.

This setup block takes that concept one better. Instead of fiddling with a

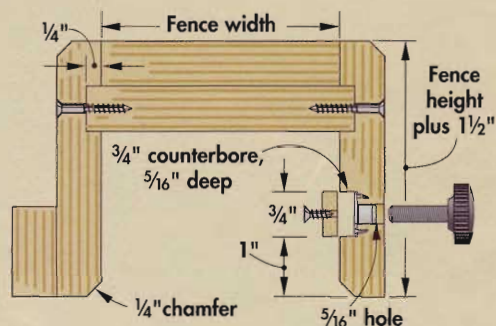
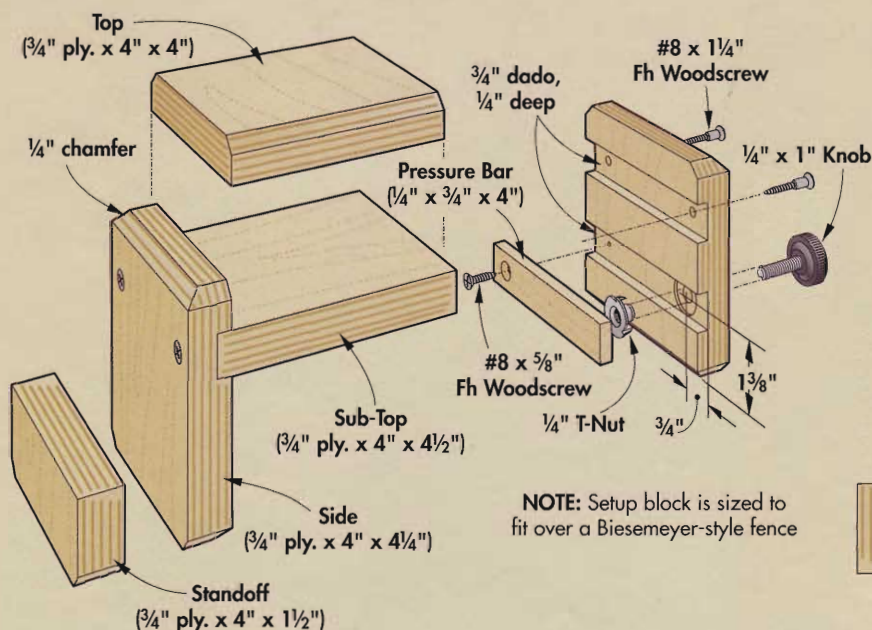
clamp to attach the block, it slips over the fence. Tightening a knob engages a built-in "clamp" that secures the setup block to the fence (*Inset Photo*).

The body of the setup block is a U-shaped assembly made of $\frac{3}{4}$ " plywood that's sized to fit over the fence. A dado in each side holds a sub-top that connects the sides.

To make the clamp mechanism work, cut a second dado in one side for a hardwood pressure bar. Tightening a knob into a T-nut installed in this side pushes the strip against the rip fence to "lock" the setup block in place. This strip distributes pressure evenly, and keeps the end of the knob from marring the fence.

After screwing the sides and sub-top together, just glue on a top and a "standoff" (*Illustration, left*).

Tom Hintz
Concord, NC



SECTION VIEW



BEST TIP WINNER!

For sending us this feature tip, Tom Hintz wins a new CPK-2PB 3-Tool Combo Kit from Bosch!

SEND US YOUR GREAT TIPS

Email: tips@workbenchmag.com
Mail: Workbench Tips & Techniques,
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space-saving GLUE-UP STATION

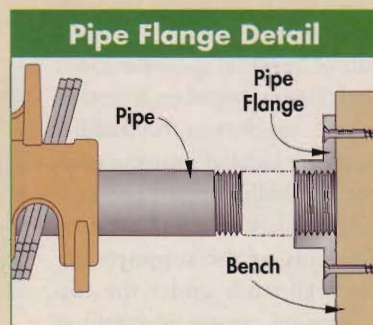
My workbench is without a doubt the most useful "tool" in my shop. The surface of the bench, in particular, is far too valuable to tie up while waiting for a glued-up panel to dry.

So when edge-gluing several boards together to make a solid-wood panel, I temporarily attach pipe clamps to the side of the bench (*Clamp Station Assembly*). This creates a large clamping area, while still leaving the top of my bench free for other work.

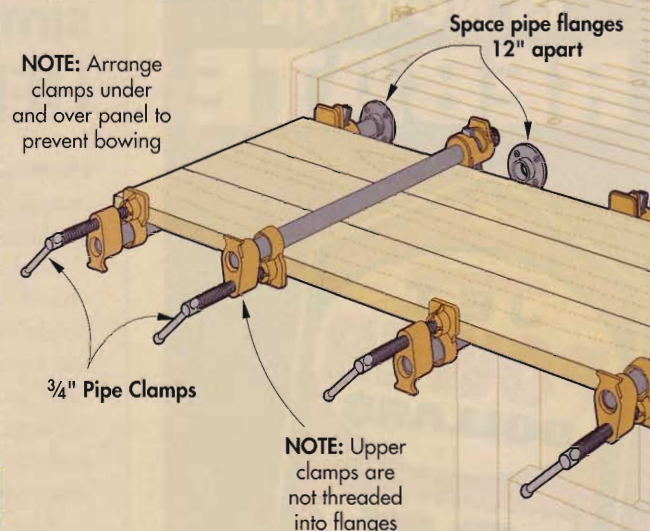
When they're needed, the clamps are held in place with round pipe flanges that are fastened to the side of the bench with screws. (Pipe flanges are available in the plumbing department at home centers and hardware stores.)

To use the clamping station, simply thread the ends of the pipe clamps into the flanges, as shown in the *Pipe Flange Detail*. Then glue and clamp the boards as usual. As with any glue-up, be sure to clamp on top of the panel, as well, to avoid bowing.

Lewis Lowe
Sumter, SC



CLAMP STATION ASSEMBLY



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Product Information Number 209

Tips & TECHNIQUES

simple supports HELP HANG DRYWALL

Hanging drywall on a ceiling is always a struggle. And this is especially true if I'm working by myself.

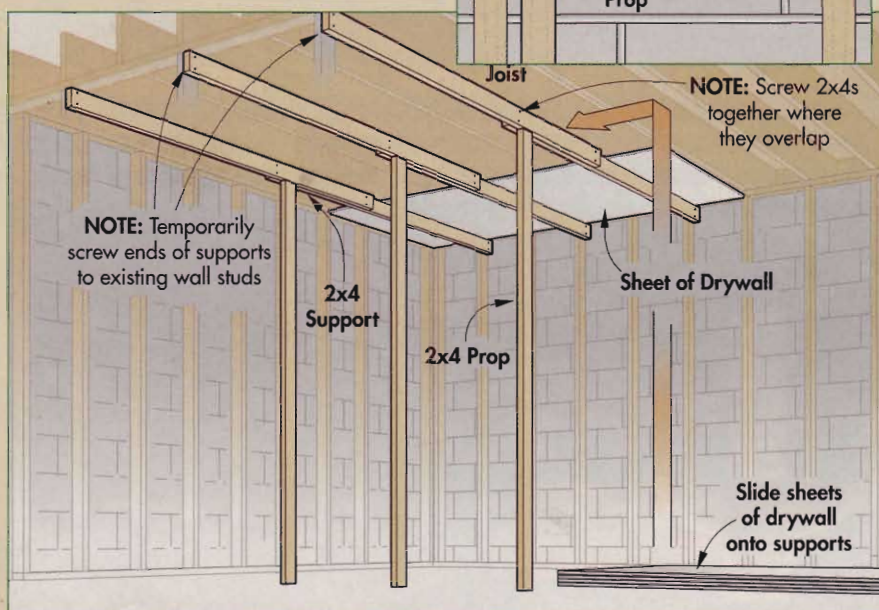
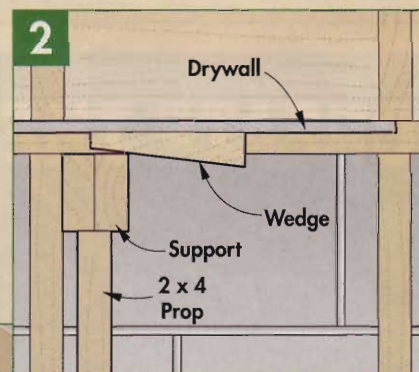
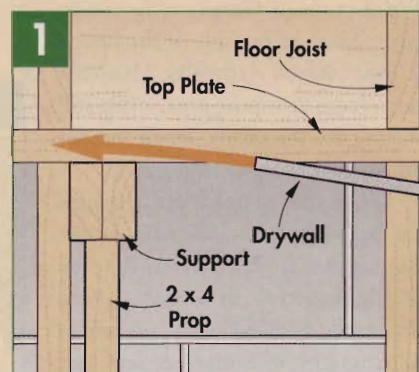
So I use 2x4 supports to give me a "hand" and hold the sheet at ceiling height. You simply slide the drywall onto the supports like sliding a cookie sheet onto an oven rack. Then insert wedges between the supports and the drywall to push the sheet snugly up against the joists while you screw it in place.

Each pair of 2x4s that spans the room is lapped and screwed together. A vertical 2x4 props each support in the middle. Two supports are located near the ends of the sheet. A middle support prevents sagging and holds half-sheets (*Illustration, below*). The ends of the supports are attached to wall studs under the top plate. This spacing creates an opening for the drywall and wedges, and it gives you a little "elbow room" for tipping and sliding in the sheet to reduce the risk of breakage (*Fig. 1*).

With the sheet of drywall suspended on the supports, you can easily raise it to the ceiling and hold it there with wedges made of scrap 2x4 (*Fig. 2*).

When you've screwed the sheet to the joists, just move on to the next section, and repeat the process to hang drywall across the entire ceiling.

Michael Hauck
Ashville, OH



Tips & TECHNIQUES

put patterns IN THEIR PLACE

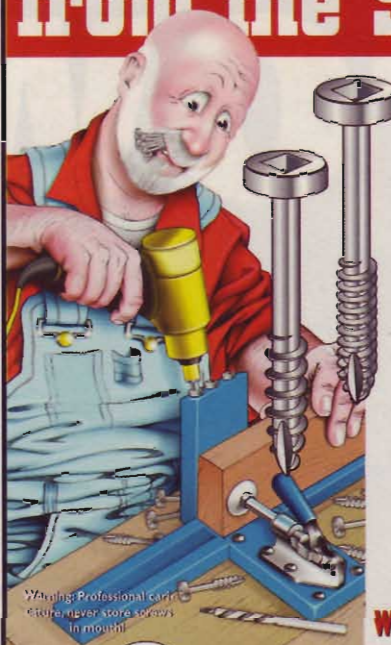
I've always enjoyed cutting patterns on the scroll saw. But what I don't enjoy is getting the pattern from paper to wood. I used to attach the paper patterns with spray adhesive, and then spend several minutes sanding away the paper after completing the cut.

But I recently found a better solution at the grocery store: this "Press 'n' Seal" plastic wrap (left). Now I can just trace a pattern right onto the plastic, then press it firmly onto the workpiece. It adheres well and peels off without leaving any residue.

John Vitamvas
Lincoln, NE



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Product Information Number 197

Finishing Fundamentals

slippery stairs? here's a NON-SKID SOLUTION

On this issue's staircase "facelift" (page 44), we replaced carpet with thick, solid-wood stair treads. Although the wood treads looked great, they can be quite slippery with just a standard finish. To avoid this hazard, we used a "non-skid" finish as a topcoat on the stair treads.

No-Skid Compound — The key ingredient in this finish is "Intergrip No-Skid Compound" from Interlux. It's available through Jamestown Distributors for about \$9 per 1/2-pint can (800-497-0010; JamestownDistributors.com).

This compound is a marine-grade product that's mixed with paint to add extra grip to boat decks, docks, and other slippery surfaces. It looks like common table sugar and is nothing more than fine plastic beads that produce a textured surface.



▲ Mix It Up

First, pour a half-tablespoon of the no-skid compound into a pint of finish, and mix thoroughly.

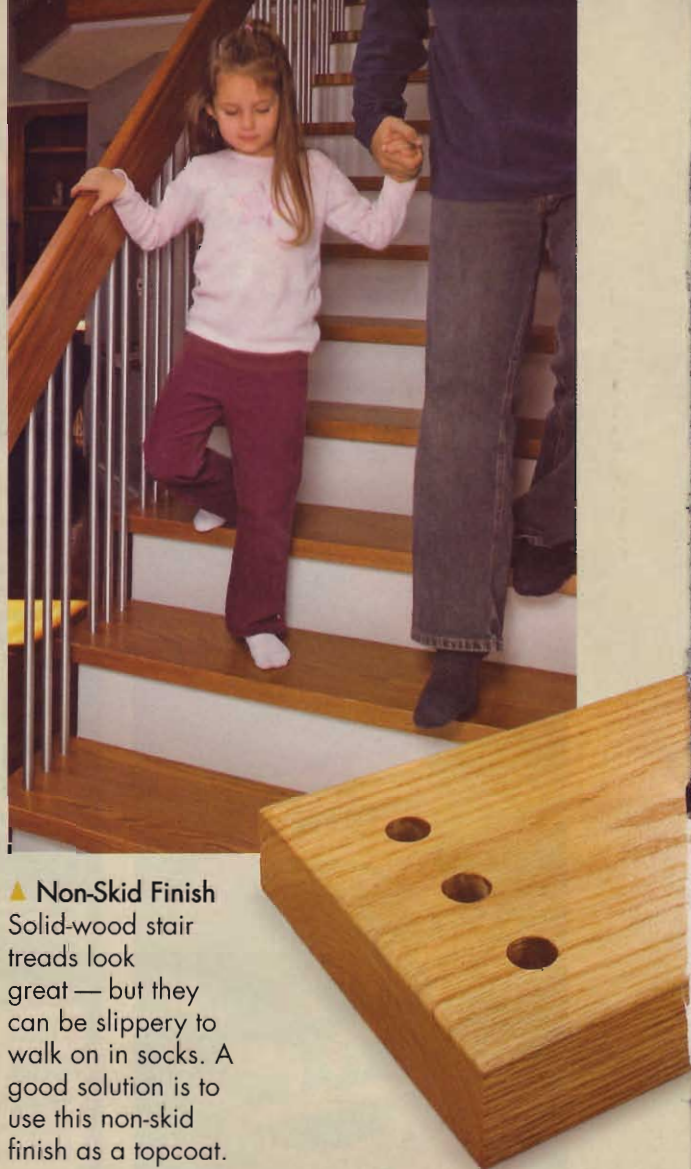
Applying the Finish — To create your own non-skid finish, start by finishing the stair treads like you usually would. I used stain and four coats of a water-based floor finish (see Box, below right). Then, mix a small amount of the compound with a pint of the same finish (Photo, below left). This amount of Intergrip is actually less than what's recommended for marine applications, but it's plenty for this job. This creates a non-skid surface without obscuring the wood.

After mixing the finish and non-skid compound, simply brush it onto the treads (Photo, below right). Only apply it to the center portion of each tread (where people will walk), and use painter's tape to establish a fine line between the non-skid and the surrounding finish.



▲ Brush It On

Then brush the finish onto the part of the tread that gets walked on. Painter's tape creates a clean line.



▲ Non-Skid Finish

Solid-wood stair treads look great — but they can be slippery to walk on in socks. A good solution is to use this non-skid finish as a topcoat.

WATER-BASED FLOOR FINISH



Water-based floor finish was a natural choice for the stair treads.

Not only does it dry faster than an oil-based finish (a second coat can go on in two hours), but it also has great scratch-resistance and doesn't require sanding between coats.

One difference to note between water- and oil-based finishes is that water-based (right) doesn't impart an amber tone to wood like oil-based does (left).



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Mail: Workbench Finishing Fundamentals, 2200 Grand Ave., Des Moines, IA 50312

an ebonized FINISH MADE EASY

Ebonized finishes have become quite popular today. Often created with aniline dye, ebonizing creates a black finish that allows the wood grain to show through.

The only drawbacks to ebonizing are that the dye can be messy and expensive. But you can achieve a similar finish using common spray paint and a simple burnishing technique.

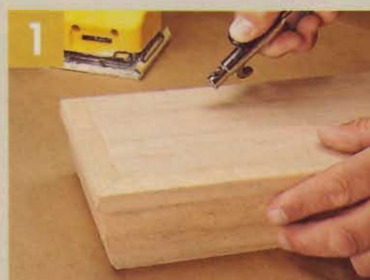
This “ebonizing” technique works best with open-grain woods like oak, walnut, and ash. These woods have large pores that allow the paint to soak into the grain. So if you’re interested in this technique, choose wood with this in mind. (We used oak for the “floating” shelves shown here and on page 64.)

Ebonizing Technique — After sanding the surfaces, use compressed air to blow the dust out of the grain (Fig. 1). If you don’t have an air gun, a shop vacuum will also work well.

Once that’s done, finishing the shelves only requires a can of semi-flat spray paint (I used Krylon Black #1613), synthetic steel wool (like a Scotch-Brite pad), and a paper towel (see Figs. 2-4 at right).

► Ebonize with a Can

You can create a solid-color finish that still showcases the grain of the wood. All it takes is a can of spray paint and a few common household items.



▲ After sanding the wood with 180-grit sandpaper, use an air gun to blow dust out of the open grain.



▲ Hold the can perpendicular to the wood, and spray on 2 to 4 coats until the pores are filled.

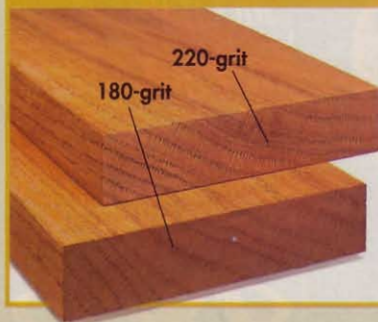


▲ When it dries, rub the paint with ultra-fine synthetic steel wool to create a smooth, even sheen.



▲ Making a final pass with a paper towel will clean up any dust and “burnish” the paint.

STAINING WOOD: THE END GRAIN/FACE GRAIN DILEMMA



When it comes to staining wood, one all-too-common problem is ending up with end grain that’s darker than the face grain of a board.

The simple reason for this starts at your saw blade. Crosscutting wood always leaves a rougher surface on the end grain. And when you stain this rougher surface, it inevitably retains more of the color.

So the easiest solution is to sand the end grain more thoroughly than the face grain. In the two examples at left, the end grain and face grain of the lower board were sanded the same, through 180-grit. But the end grain on the upper board was sanded more thoroughly with each grit, and then received a final pass with 220-grit before being stained.

circular saw EDGE GUIDE

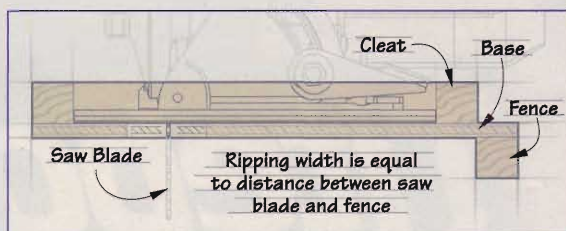
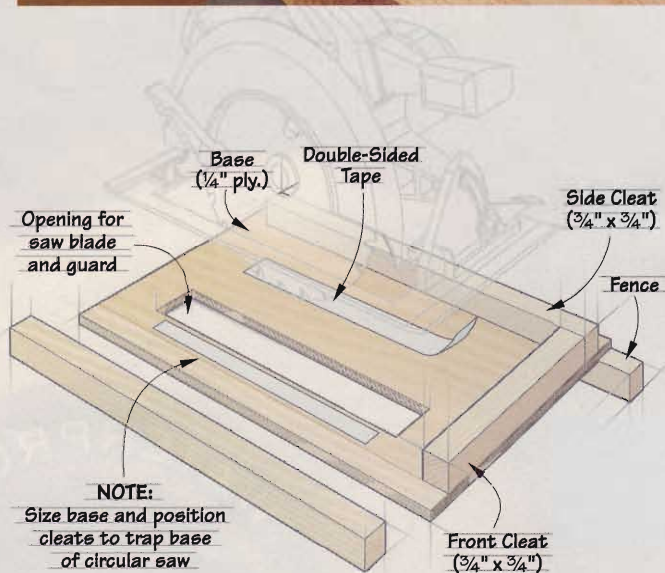
At over 12-feet long, the handrail for the staircase (page 44) can present a challenge if you rip it on the table saw. The main problem is space, or more to the point, the *lack* of space. There just isn't enough room in front of and in back of the saw in most shops to rip a board that long.

So when it came time to rip the handrail to width, I used a circular saw and a simple shop-made edge guide (Photo, right). A fence mounted underneath the guide rides against the jointed edge of the workpiece, ensuring a straight, accurate cut.

The edge guide consists of a $\frac{1}{4}$ " plywood base, wood cleats that surround the saw on three sides, and a fence. You'll need to start with an extra-wide base to allow for the two side cleats and the fence. After cutting the base, lay out and cut an opening in it to provide clearance for the saw blade and blade guard.

Since the saw will be contained by the cleats, some double-sided tape is all that's needed to secure it to the base. That done, glue and clamp the cleats around the saw.

As for the fence, it's best to make it about 1" longer than the base to help guide the jig at the start of the cut. The fence also must be parallel to the blade. Otherwise, the blade will bind. And the distance from the fence to the blade should equal the desired width of the workpiece (6" for the handrail). With those things in mind, align the fence, and glue it in place. To complete the jig, apply a coat of wax to the inside face of the fence to make the edge guide slide smoothly.



MODIFYING A SPADE BIT

The spindles for the staircase (page 44) are made of $\frac{3}{4}$ " aluminum tubing. However, I discovered that the diameter of the tubing is actually $\frac{23}{32}$ ". That's not a common bit size. And if I used the next largest bit ($\frac{3}{4}$ "), it would produce a sloppy fit.

So to get tight-fitting spindles, I ground down a $\frac{3}{4}$ " spade bit to drill smaller holes (Photo, near right). A quick pass on the grinder is all that's needed. Grind a little at a time, and drill "test" holes until the spindle fits tightly (Photo, far right).



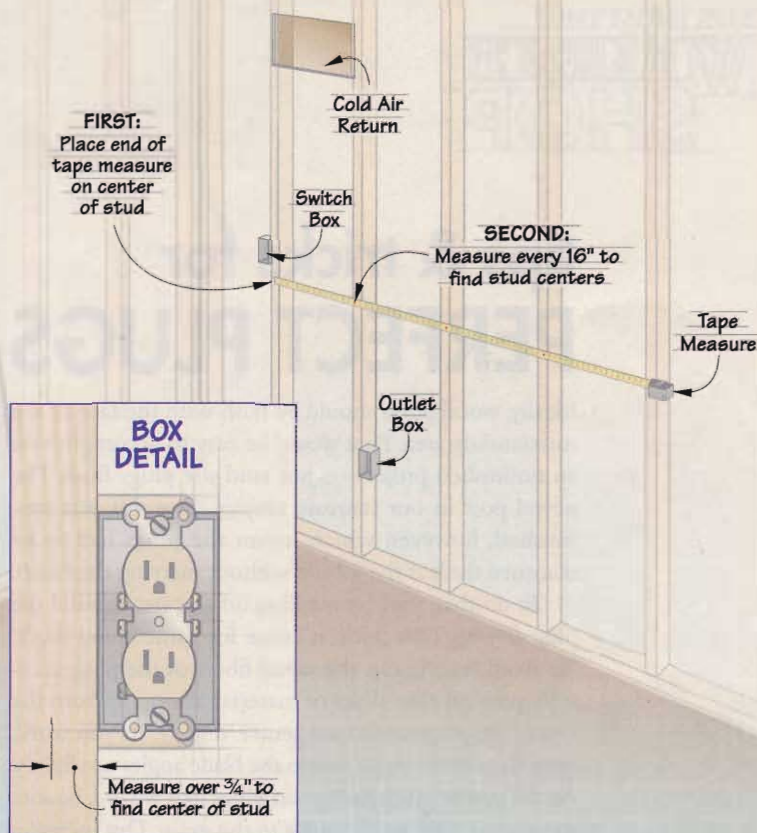
▲ Grind both edges of the spade bit, removing roughly the same amount of material from each edge. Drill test holes to check the fit of the spindles.

quick & easy STUD FINDER

Before installing a wall-mounted project (like the display shelves on page 64), you have to make sure the mounting screws will hit the wall studs.

If you don't have a stud finder, another way to locate the studs is to look at the switches, outlets, and cold air returns in the room (*Illustration, right*). They're almost always mounted to the side of a stud. To see which side they're attached to, remove the cover plate of the electrical box (or air return grill), and peek inside.

Once you've identified which side of the stud the box is mounted on, lay out a mark $\frac{3}{4}$ " (half the thickness of the stud) from that side, as shown in the *Detail* at right. Then measure 16" over to find the next stud, and so on. To avoid marking on the walls, use a piece of masking tape to mark stud locations.



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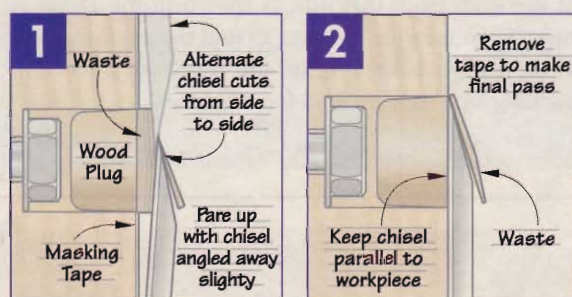
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tips & tricks for PERFECT PLUGS

Ideally, wood plugs should be flush with the face of the surrounding area. That would be easy to accomplish on an unfinished project — just sand the plugs flush. The newel post in our staircase project (page 44), was pre-finished, however, which meant the plugs had to be trimmed flush at the jobsite without marring the finish.

To do that, start by masking off the area around the plug (Photo). That done, it's time for some chisel work. To avoid tearing out the wood fibers of the plug, carefully pare off thin slices of material, slicing in from the rim of the plug toward the center (Fig. 1). As you work, keep the chisel handle low, so the blade angles up slightly. And if you're using face-grain plugs like we did, be sure to shave at a 30° to 45° angle to the grain. This increases chisel control and reduces the risk of tearout.

You'll need to peel off the tape to remove the remaining material. Then pare off the waste as before, only this time keep the blade flat against the post (Fig. 2). Complete the job by "spot-finishing" the plug.

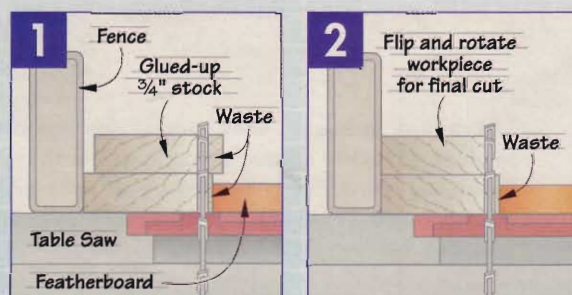


thick molding from THIN STOCK

To make the 1½"-thick molding for the display shelves on page 64 (Photo, left), I face-glued two pieces of ¾"-thick stock together. If you're making thick moldings like this, it's not a good idea to glue up pieces that are already ripped to final width. The glue will make them slip out of alignment when you tighten the clamps, and by the time you clean up the edges, the molding will be too narrow. The solution is to start with extra-wide pieces (about ¾" wider than needed). Glue them together so one edge overhangs the other along the entire length of the molding.

Once the glue dries, the thick stock can be ripped to width in two passes. First, set the fence so the blade slices off one overhanging edge, along with a sliver of the edge it overhangs (Photo and Fig. 1). Then adjust the fence to cut the molding to final width. Flip the molding so the flush-cut edge is against the fence, and rip it to width (Fig. 2).

▲ When complete, it's hard to see that this molding came from glued-up stock.





space-saving CLAMP CART

Woodworkers have struggled with clamp storage for years. This cart, with its slanted-side design, is a perfect solution. It lets you hang 100 clamps or more and only takes up four square feet of floor space.

Even the most cleverly designed wall-mounted clamp rack has two basic problems. First, it takes up a lot of valuable wall space. Second, it's fixed in place. This means you're always having to walk back and forth between the clamp rack and your project. Then the clamps end up piled on the bench until you're ready to use them for your project.

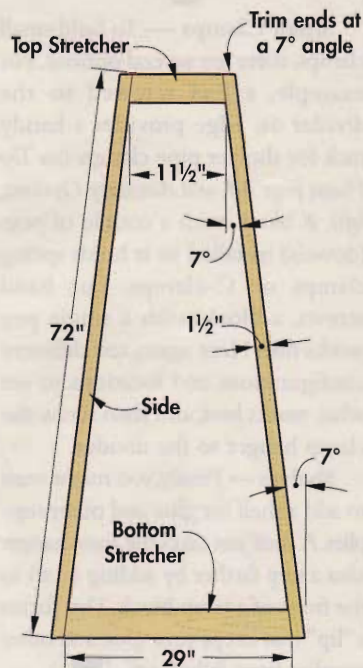
This dilemma had James Hansford of Mosinee, WI, using a stepladder near his workbench as a makeshift clamp rest. He did this so often, in fact, that the ladder inspired him to build a similarly shaped clamp cart. It holds over 100 clamps, yet has an extremely small "foot-print" (less than four square feet), so it takes up very little floor space. And because it's mobile, the cart keeps his clamps at the ready anywhere in his shop.

The clamp cart is shaped like the letter "A," which creates angled rests to hold long clamps. And it's four-sided to provide more mounting surfaces in less space. This lets you load the cart on all four sides, while still keeping everything easily visible and accessible. A tall, vertical divider on the cart offers even more storage options. It's also equipped with dowels for smaller clamps and a shelf for glue bottles.

Cart Overview — The clamp cart is built from dimensional lumber and plywood. The basic structure consists of two A-shaped frames made from 2x stock, which are connected by 1x4 rails. A plywood bottom forms a trough for large clamps at the base of the cart, and a top plate caps it off. Two layers of plywood form a divider in the center of the cart. And locking swivel casters make the cart mobile (*Construction View*, page 35).

The Frame-Up — Each A-frame is composed of two sides (A), a top stretcher (B), and a bottom stretcher (C). Note that the ends of all these pieces are mitered





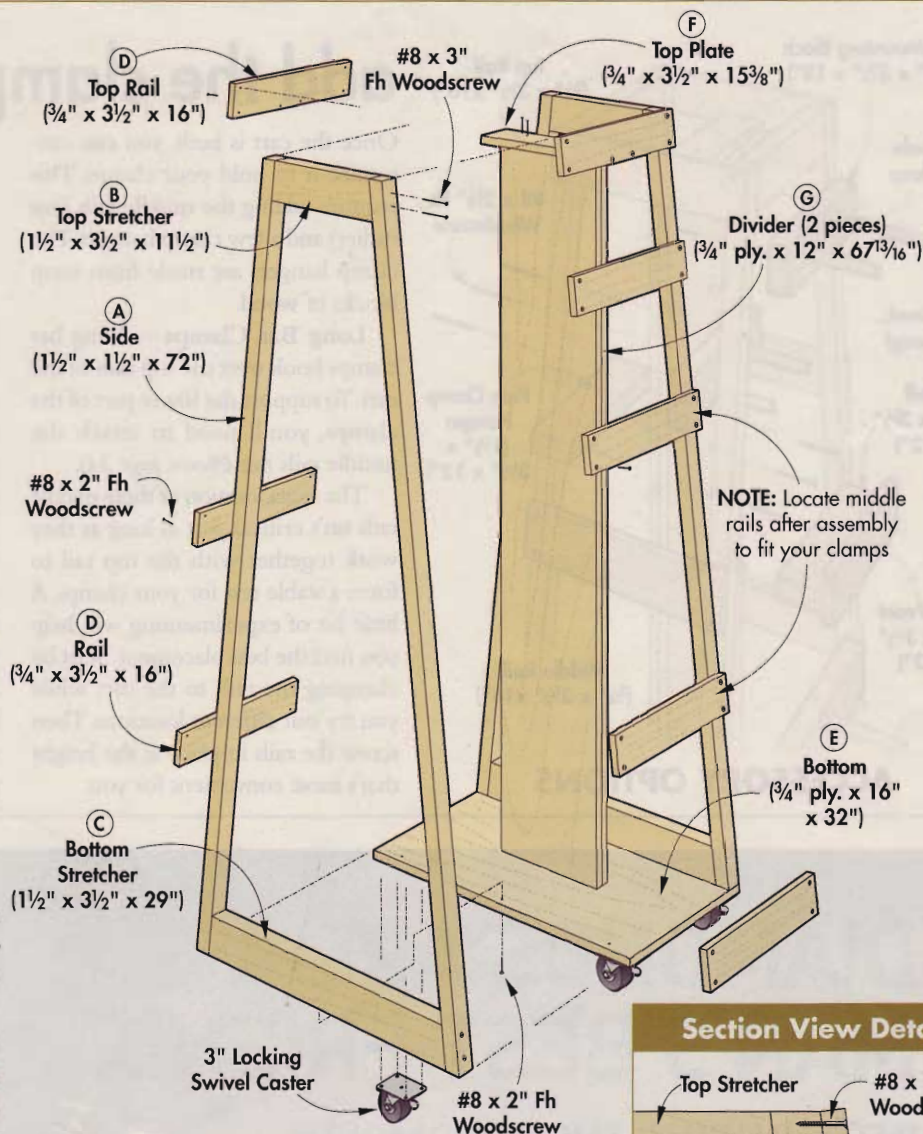
FRAME ASSEMBLY

at a 7° angle to give the clamp cart its "A" shape (see *Frame Assembly* above). That done, screw the frame pieces together.

The next step is to join the A-frames together with rails (D). These are simply cut to length from 1x4 stock. Screw the top and bottom rails in place, but don't attach the middle rails just yet. You'll want to position them later according to the sizes and types of clamps you store on the cart.

Bottom, Top, & Divider — With the two main frames assembled, it's time to add the bottom (E). This is just a piece of $\frac{3}{4}$ " plywood that's cut to size and screwed to the bottom stretchers. Lying the cart on its side makes it easy to install the bottom. Once it's attached, you can mount the casters.

Then turn your attention to the top plate (F). This is a 1x4 with the ends beveled at the same 7° angle to fit between the top rails. After cutting the top plate, screw it in place so that its bottom face is flush

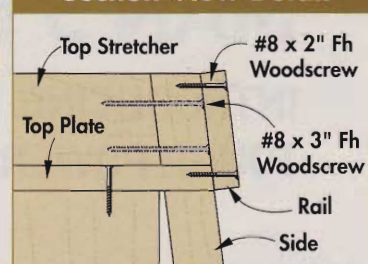


CONSTRUCTION VIEW

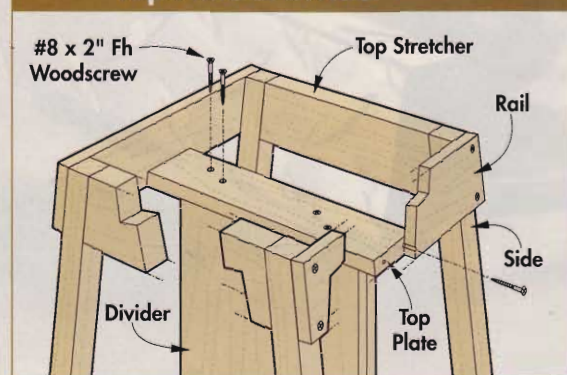
with the bottom edge of the top rails (see *Section View and Top Plate & Divider Details*).

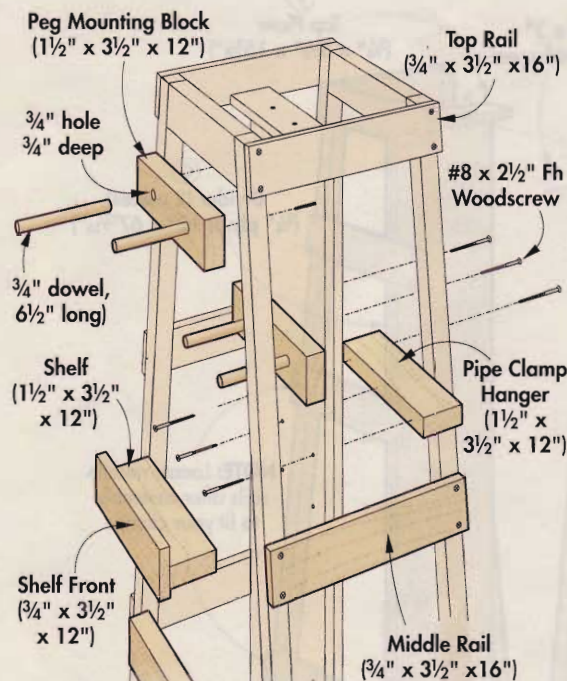
All that's left on the basic cart structure is the center divider (G). This divider not only adds rigidity to the cart, but it also provides mounting surfaces for smaller clamps and accessories (see *Accessory Options*, page 36). To hold these accessories, it needs to be thick. That's why it's composed of two pieces of $\frac{3}{4}$ " plywood. Once you've cut these plywood parts and glued them together, go ahead and screw the divider to the top plate and bottom.

Section View Detail



Top Plate & Divider Detail





ACCESSORY OPTIONS

add the clamp hangers

Once the cart is built, you can customize it to hold your clamps. This requires adding the middle rails (cut earlier) and a few clamp hangers. The clamp hangers are made from scrap blocks of wood.

Long Bar Clamps — Long bar clamps hook over the top rails of the cart. To support the lower part of the clamps, you'll need to attach the middle rails (*see Photos, page 34*).

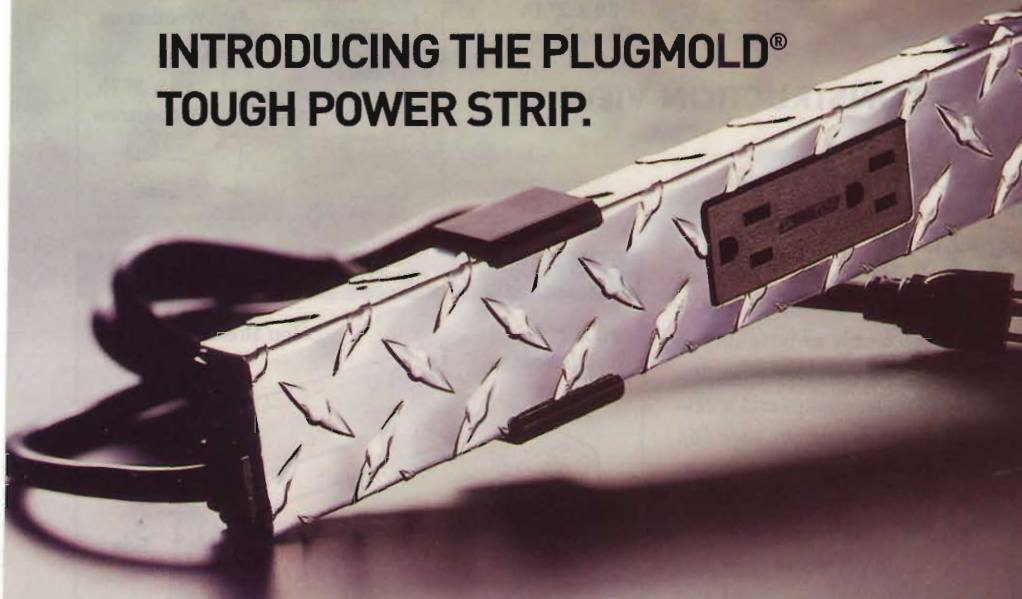
The exact location of these middle rails isn't critical, just as long as they work together with the top rail to form a stable rest for your clamps. A little bit of experimenting will help you find the best placement. Start by clamping the rails to the cart while you try out different locations. Then screw the rails in place at the height that's most convenient for you.

Small Clamps — To hold small clamps, there are several options. For example, a 2x4 screwed to the divider on edge provides a handy rack for shorter pipe clamps (*see Top Photo, page 34, and Accessory Options, left*). A block with a couple of pegs (dowels) installed in it holds spring clamps or C-clamps. For hand screws, a block with a single peg works fine. Here again, test different configurations and locations to see what works best, and then screw the clamp hanger to the divider.

Shelves — Finally, you might want to add a shelf for glue and other supplies. A shelf just takes the basic hanger idea a step farther by adding a 1x4 to the front of a scrap block. This forms a "lip" that keeps your glue and other supplies from falling off. 

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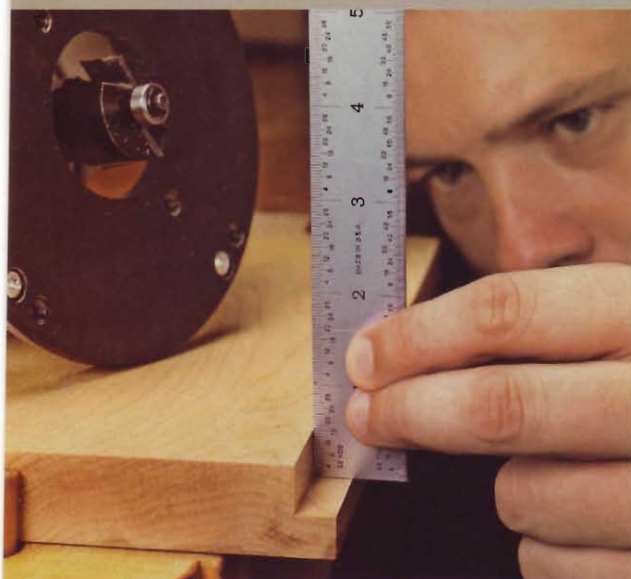
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BENCH BASICS

FUNDAMENTAL SKILLS FOR BETTER WOODWORKING

4 RULES FOR ROUTER SETUP

Follow these simple rules for setting up and dialing in your router, and you'll get great-quality cuts with every bit, every time.



Compare a router to many other woodworking tools, and you'll quickly notice that there aren't any fences, measuring scales, or other devices that help you figure out how to set it up and establish depth of cut. Heck, there aren't even any great indicators of how the tool fits against the workpiece, or what direction to move it.

Because of that, you need to really understand how to set up your router for safe, controlled cuts.

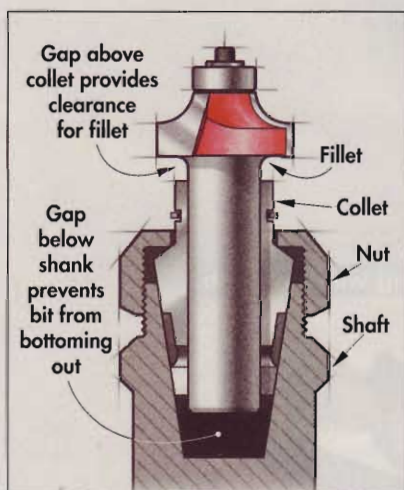
It Begins with Bits — Naturally, the first thing you'll need to do is install the bit properly. This isn't hard, but there are a few things to

remember to ensure that the business end of the router is ready to go.

Depth of Cut — Next up, you need to figure out how to establish depth of cut reliably. Then you need to know just how big of a cut that bit can make in a single pass. Since every bit varies in size and shape, there are no hard-and-fast rules. But we'll share some hints for making sure you don't bite off more than the bit can chew.

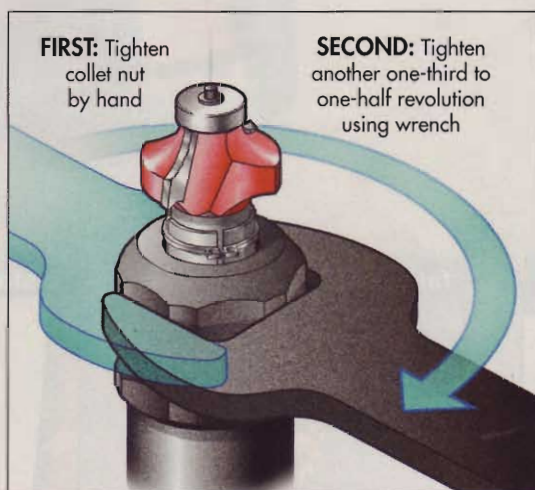
Way to Go — You'd never push a circular saw in the wrong direction because that tool's design makes feed direction clear. A router's doesn't, so we'll help you figure it out easily.

FIT THE BIT



GET A GOOD GRIP

When inserting a bit, push the bit all the way in, and then pull it back out about $\frac{1}{4}$ " before tightening the nut.



DON'T OVER-TIGHTEN

The design of a router collet gives it a tremendous grip on the bit. That means you don't need to crank down hard on the nut to secure the bit.

To hold the bit securely, the collet needs to grip as much of the shank as possible. But you don't want to just shove the bit all the way in. Doing this can cause two problems.

First, the shank may bottom out in the router shaft (*Illustration, far left*). Because tightening the collet nut draws the bit in deeper, a bottomed-out bit won't allow the nut to tighten fully.

Second, the collet could grip the small fillet where the shank and body meet. If this happens, it can't get a tight grip on the rest of the shank.

When securing the bit, don't tighten the collet nut too much, or bit removal will be a real chore. The collet offers plenty of holding power with only a moderate amount of pressure from the nut (*Illustration, near left*).

MEASURE, THEN MAKE TEST CUTS

After mounting a bit in the router, you have to adjust the router to set the bit at the correct cutting depth. And because bits vary in size and placement in the collet, there's no simple measuring scale that can be used accurately every time.

The best way to set depth of cut is to first measure how far the cutting edges protrude from the base (Photo, right). Use a high-quality steel rule with clear, fine markings to get an accurate reading.

Now you need to make a test pass in a scrap piece of wood. Then use the same ruler to measure the test cut (Photo, page 38). Adjust the router, and make test cuts until the depth is dialed in.

If you know you'll need to duplicate that same cutting depth later, then save your test cut. You can use it as a setup block the next time you mount that bit.



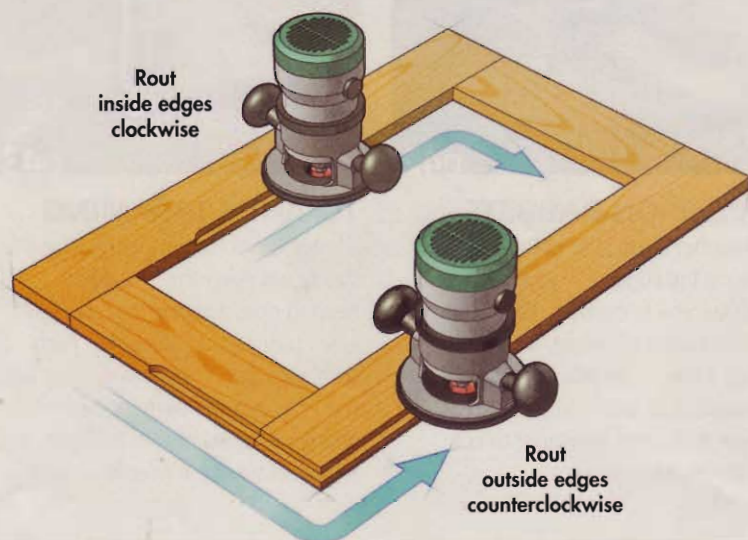
ROUT IN THE RIGHT DIRECTION

With most tools, the proper feed direction is pretty obvious. With a router, though, this isn't necessarily the case. It's possible to move the router along the workpiece in either direction, and there's nothing about the design of a router that clearly indicates which direction is the correct one.

To figure out the correct way to move the router along the edge of a

workpiece, you need to think about the rotation of the bit. When looking from above, the bit spins clockwise. And you want to move the router *against* the rotation of the bit.

Instead of having to think about this every time you rout, though, just use the guidelines below and "rule of thumb" at right. And remember that most of the time you rout as you read: From left to right. 

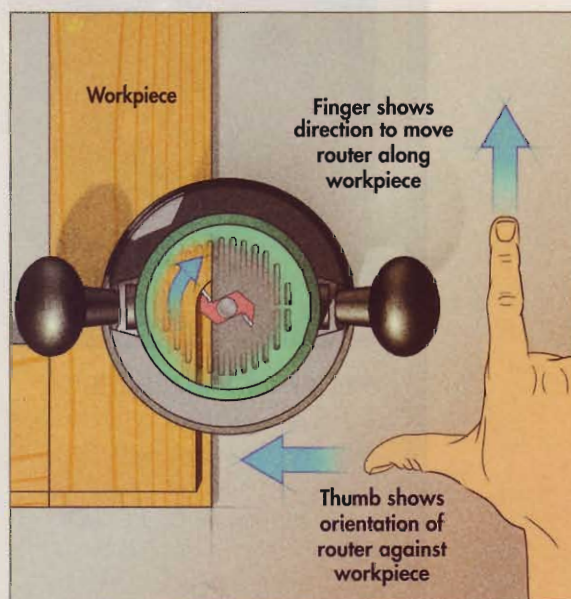
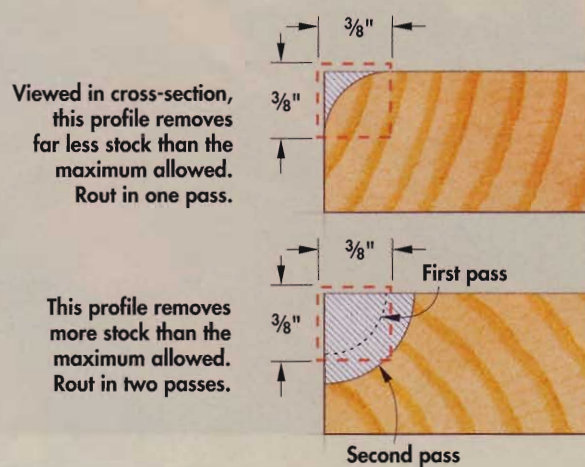


MAKE MULTIPLE PASSES

Router bits are capable of cutting a lot of material quickly, but can make a mess of things if you force the bit to cut too much material in a single pass.

If you do this, the force exerted by the bit may cause the cutters to dig in rather than cut. This will tear out the wood fibers and result in a rough cut.

Just how deep a cut you can make varies by type of bit and wood hardness. But a general rule can serve as a good guide: If you need to make a pass that will remove a cross-section larger than $\frac{3}{8}" \times \frac{3}{8}"$, cut it in multiple passes, as shown in the Illustrations below.



A RULE OF THUMB To determine feed direction, hold your right hand over the router. Point your thumb at the edge to be cut, and your finger shows the direction.



TAKE ROUTING TO THE EDGE

Your handheld router, a few bits, and these simple techniques are all you need to create decorative edges, cut joinery, and even copy patterns.

Some of the most useful things you can do with a router are also the simplest. Routing the edge of a board is the perfect example.

With just a handheld router and a handful of bits you can reshape the edge of a workpiece to add a decorative element or form simple but effective woodworking joints. You can even use your router and a pattern to trim a workpiece to shape.

An overview of each of these techniques is shown below, and the details follow on the next few pages.

Best of all, you'll be pleased to learn that you can do all of this without any fancy guides or jigs. The router itself is all you need.

To control the router, you simply use your hands. The bits provide cutting control. They're equipped with guide bearings that follow your workpiece or pattern to keep you on track as you rout.

This all sounds simple, and it really is. But there are still some things you'll need to know in order to avoid problems like tearout and burned edges. We'll point those out as we go.



p41

PERFECT PROFILES

From simple roundovers and chamfers to ogees, beads, and complex profiles, there's a decorative bit for just about every taste and project. Here, we'll show you how to create smooth, tearout- and burn-free profiles that will save you a lot of sanding and even prevent ruined workpieces.



p42

RIGHT-ON RABBETS

A rabbet is just a simple shoulder cut along the edge of a workpiece. But it allows you to create a number of different kinds of simple, sturdy joints. You'll learn how you can cut multiple rabbet sizes with a single bit, plus how to control the router to cut rabbets accurately.



p43

TO-A-TEE TRIMMING

Trimming bits reproduce the shape or size of whatever the bit's guide bearing rides against. That lets you easily trim hardwood edging flush with plywood or cut a workpiece to perfectly match a pattern. Learn about two types of trimming bits, and find tips to make trim-routing easier.

ADD PERSONALITY WITH PROFILES

Woodworkers have always liked to dress up tabletops, shelves, and other flat surfaces by reshaping the square edge into a decorative profile. For years they did this using special hand planes equipped with plane irons ground to the desired shape. After a lot of progressively deeper passes, a decorative profile was the result.

Eventually, someone came up with a way to speed up the process. They attached those cutters to a router bit and created a simple way for anyone to create profiles. Of course, there are a few things you need to know in order to produce those profiles perfectly.

Multiple Personalities — To form a specific profile, of course, you'll need the appropriate bit. The good news is that you'll find an array of styles. The roundover, chamfer, and cove bits at right are staples in my shop, and I'd recommend them for any starter set of router bits.

You'll also find more complex profiles, such as ogees, "classical" edges, beads, and flutes. You can buy these decorative bits in sets, but they often include profiles you may not use. I suggest that you purchase only the bits you need, as you need them.

A Bit About Burns — Router bits spin very fast, at up to 24,000 rpm. This makes them cut very quickly, but also generate heat that can burn the edge of the workpiece. Of course, you can sand away burn marks on a simple profile, but this can be tough to do on a complex profile with many little contours.

There's probably no way to completely eliminate the risk of burn, though you can take steps to minimize it. First, keep your bits clean and sharp. If your router has variable speed, slow the bit down. Both of these strategies reduce heat. Also, don't move the router too slowly as you work, or stop in one place with the spinning bit against the wood.

Don't Tolerate Tearout — If the bit gouges away part of the wood it shouldn't, which is known as tearout, you may find it impossible to repair. If you know where tearout is likely to occur, though, you can take steps to prevent it.

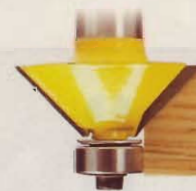
Most of the time, tearout occurs either when the bit exits the wood, or when cutting across the grain (rather than parallel to it). See the *Photos* below to learn how to protect these areas.



ACCENTING AN EDGE Adding a decorative profile, such as this beaded cove, is as simple as passing the bearing-guided bit along the edge of the workpiece.



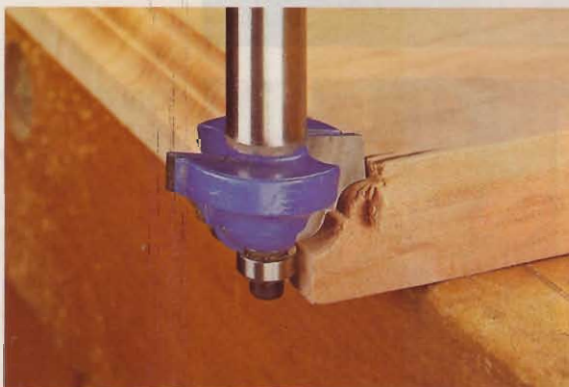
ROUND OVER



CHAMFER

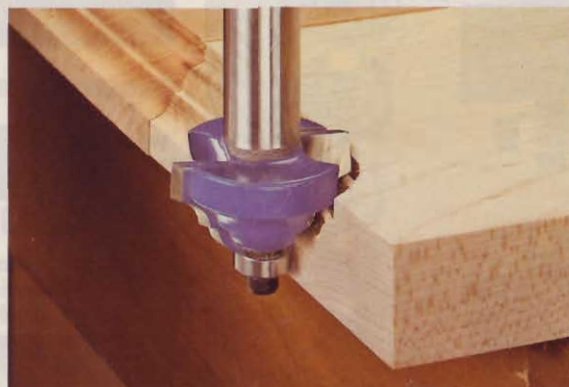


COVE



ENDS FIRST, THEN EDGES

When routing end grain, wood fibers can tear as the bit exits the wood. So always route the ends of a workpiece first. You'll trim off any tearout as you rout the edges.



ADD BACKERS TO STOP TEAROUT

Sometimes, the routed profile doesn't continue all the way around the workpiece. In that case, use a backer board to support the wood fibers as the bit exits the workpiece.



A SHOULDER TO LEAN ON A rabbeting bit cuts a right-angle profile. This seemingly simple cut can be used to produce versatile joinery.

RUN WITH A RABBET

A rabbet is nothing more than a square-cornered shoulder cut along the end or edge of a board, as shown at left. But the rabbet's simplicity belies its versatility.

This versatility stems from the simple fact that the shoulder creates a perfect resting place for a mating board. So the rabbet opens up a broad number of joinery options, especially for case assembly.

What this all means is that a rabbeting bit will see lots of action in your shop. So you'll benefit by learning how to use one properly.

Two-Way Adjustability — You can control both the width (how much of the board face is removed) and depth (the amount of edge removed) when routing a rabbet.

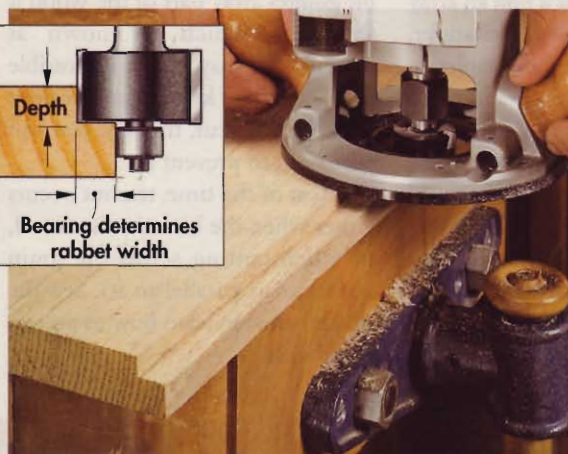
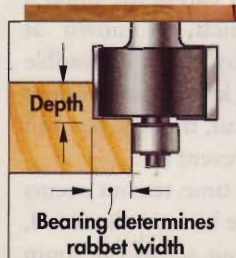
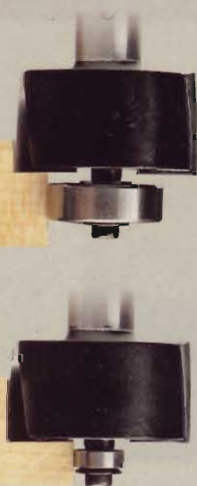
This is done by adjusting the router's depth of cut, and by using different sizes of guide bearings on the bit. A rabbeting bit that comes with multiple bearings lets you accomplish this easily (*Photos, bottom left*).

Two Ways To Adjust — How you adjust width and depth depends on how you have the router positioned on the workpiece. Most of the time, you'll rout rabbets with the router base resting on the *face* of your workpiece (*Photo, below*).

Sometimes, such as when rabbeting a case to receive the back panel, you'll have to rest the router base on the edge of the workpiece (*Photo, bottom right*). When doing this, clamp on a piece of scrap, such as a straight 2x4, to provide stable footing.

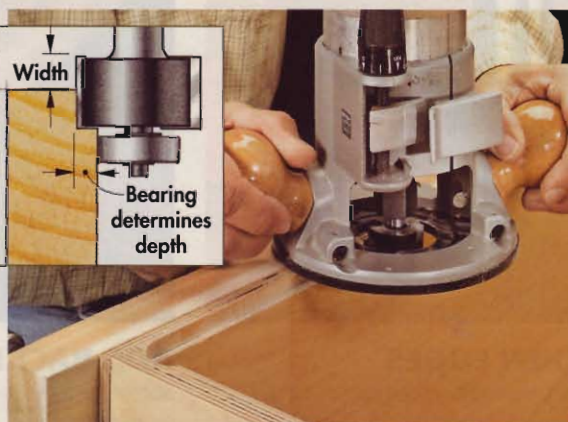
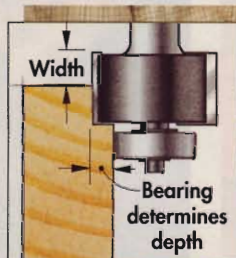
BEARINGS

The difference between the diameter of the bit body and the diameter of the bearing determines the cutting width of a rabbeting bit (*below*). A multi-bearing bit comes with bearings of several diameters (*right*).



ON FACE

When rabbeting with the router base on the face of a board, the bearing on the bit controls rabbet width. Adjusting the router controls depth (*Inset*).



ON EDGE

With the router base resting on the edge of a board, router adjustment controls rabbet width. The guide bearing on the bit controls depth (*Inset*).

GO IN FOR A TRIM

When building projects that have long or wide panels, such as cabinets, bookcases, and even tabletops, it's often easier to build them from plywood rather than have to glue the panels up from multiple boards. The problem is that exposed plywood edges aren't pretty.

The solution is to cover the exposed plies with solid-wood edging. That's simple enough, but the challenge lies in cutting that edging to exact width, and then getting it glued on flush with both faces of the plywood.

About the Bit — A flush-trim bit makes edging easier thanks to its long, straight cutters. They're guided by a bearing of matching diameter that is mounted at the bottom end of the bit (*Photo, far right*).

Go Big — This means you can cut edging oversize, which makes gluing it on easier. Then just trim the edging flush by routing with the bearing riding against the face of the plywood.

To keep the router from tipping, clamp a support made from a 2x4 to the workpiece (*Photo, near right*). A wide rabbet along one edge of the support allows it to clear the overhanging edging.



A SOLID EDGE Thanks to a guide bearing that matches the cutting diameter of the bit, a flush-trim bit quickly trims solid-wood edging to match plywood panels.



DEVELOP A PATTERN

Most of the time, edge routing is used to simply change the profile of a piece that has already been cut to size or shape. But with pattern routing, you can use a router and a special bit to cut a piece to the exact shape of a pattern (*Photo, below*).

Those patterns can include curves and intricate shapes that you'd usually have to cut with a band saw or jig saw.



But sawing shapes can be inexact and result in rough edges. Rough-cutting the shape first and then routing it to exact shape by following a pattern, on the other hand, yields exact reproductions with smooth, clean edges.

Get Your Bearings Straight — A pattern bit is similar to the flush-trim bit discussed above. In this case, the guide bearing is located *above* the cutters, on the shank of the bit (*Photo, right*).

Make a Sturdy Pattern — Of course, to rout a piece to shape, you'll first need a pattern. I make them from 1/4" hardboard. This material is easy to cut to shape, and the edge can be sanded to provide a smooth surface for the bit's guide bearing to ride against.

Cut, Then Trim — Once you have your pattern made, cutting a workpiece to match it is a three-step process. First, lay the pattern on the workpiece and trace around it. Then remove the pattern.

Second, cut the workpiece to rough shape, about 1/8" outside the lines. The best way to do this is with a band saw or jig saw.

Next, attach the pattern to the top face of the workpiece with double-sided tape. Adjust the router so the guide bearing on the bit rides against the pattern, and then trim the workpiece to final shape. 



PATTERN POWER

To trim a piece to an exact shape, apply a hardboard pattern to it, and then follow the edge with the bearing on a pattern bit (*left*).



STAIRS WITH FLAIR

STAIRCASE FACELIFT

A staircase should make a strong statement. The one in the *Before Photo* below looked nice enough. It just didn't have much impact.

The homeowners were looking for something new, so we arrived at a solution that's simple to build yet has a big impact on the first impression the home makes on visitors (*After Photo*, below). And here's the best part: you don't have to live in the midst of a big construction mess. You simply build the stair parts in your shop, and then install them in a couple of days.

Removing & Replacing — For starters, we replaced the old carpeted steps with solid-wood stair treads. These treads are not only thicker, but also a little longer than the old ones, so the ends of the treads extend past the wall. That along with removing the existing trim board made the treads appear to “float” in midair.

To give the staircase an up-to-date touch, we also replaced the existing wood balusters with brushed metal spindles. These spindles are actually made from inexpensive aluminum tubing. Combine that with our polishing technique, and you can make spindles that look like stainless steel without breaking the budget.

In place of the old railing, we installed a solid-wood handrail. You'll notice that this rail has a clean look, highlighted by a hand-grip at the top that's routed using just two router bits.

Then to finish things off, we added a new newel post at the top of the stairs. Notice that the newel post at the bottom was removed. Of course, that meant figuring out a different way to stabilize the handrail. See our solution on page 52.

STEP UP THE STYLE OF YOUR STAIRCASE BY REMOVING AND REPLACING JUST A FEW OF THE BASIC PARTS. IT'S EASIER (AND LESS EXPENSIVE) THAN YOU MIGHT EXPECT.





STAIRCASE PLANNING GUIDE

The best part about planning this staircase facelift is that you already have a template for the new parts — the existing staircase (*Box, below*).

Using the old handrail, newel post, stair treads, and risers as guides, you can take the measurements you need to build the new components.

Handrail — First, measure the length of the old handrail (you'll make your new handrail about 1-ft. longer). Next, hold a bevel gauge between the existing handrail and newel post (*Handrail Angle, right*) to find the angle at which the new rail will rest. This angle will be critical for cutting the miters and drilling holes in the rail.

Newel Post — Size the upper post to match the old one. The lower newel post is removed altogether.

Treads — These treads will likely be wider and longer than the existing ones. Determine their size by removing the bottom tread and measuring the opening (*Sizing Treads, right*).

Risers — The existing risers stay in place, and the new "riser faces" fit in place over them to accept a decorative wallcovering. Size the riser faces so the width is $\frac{1}{8}$ " less than the existing risers. The length equals the distance from wall to wall (*Sizing Risers, right*).

Finally, be sure to review the "Before You Build" notes at right.

STAIRCASE AT A GLANCE

If you haven't worked on a staircase before, a brief overview of its basic components will help you better understand its construction, as well as what will be involved with this "facelift."

Stringers — These are the "sawtooth" 2x12 boards that form the backbone of the staircase. We simply used the existing stringers to hold the new treads and risers here.

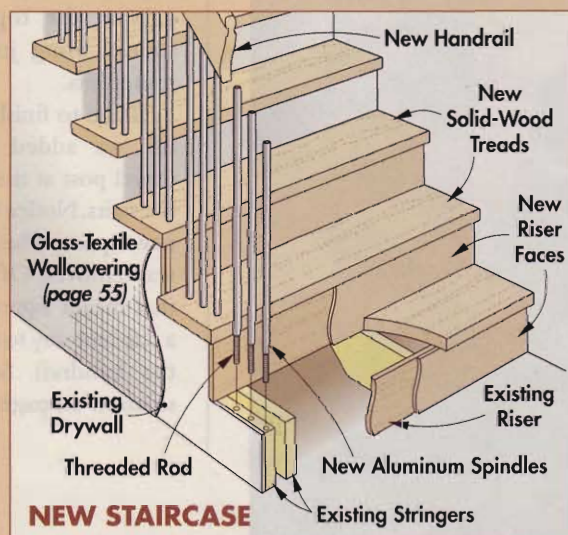
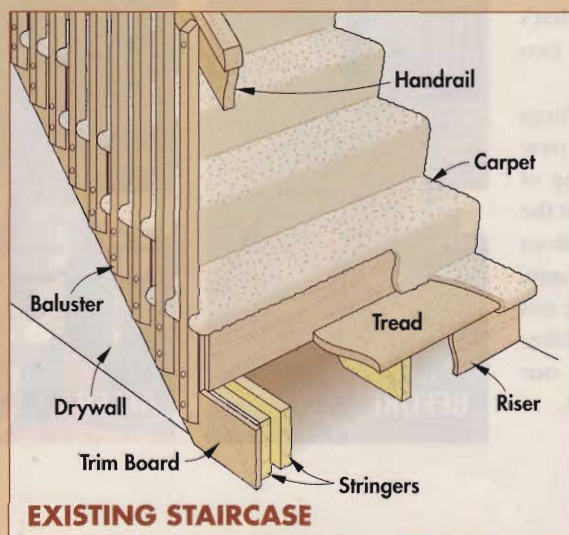
Treads — Treads are the flat steps of the staircase that you walk on. We replaced the existing treads with thick solid-oak versions on this staircase.

Risers — The vertical "kick plates" of each step. To create a smooth surface for wallcovering, we faced the existing risers with $\frac{1}{2}$ " MDF.

Balusters — Vertical uprights that span between the treads and the handrail. We replaced wood balusters with brushed aluminum spindles.

Newel Post — A thick vertical post that anchors the handrail (*Illustration, right*). We replaced the top newel post, and used reinforced spindles in place of the lower newel post.

Handrail — An angled wood rail that you grasp for support. Typically, it runs the length of the stairs and is attached to the balusters and newel posts.



Balcony
features a rail and
spindles that match
the staircase

Newel Post
is sized to match existing
newel post and profiled to
match the handrail

Handrail
is cut from one
long piece
of 1½"-thick oak

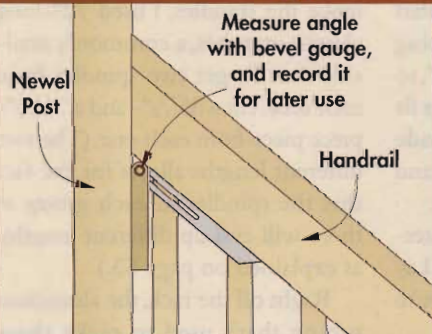
Top Tread
is notched to
fit around
newel post

Spindles
are actually
aluminum tubes
that are sanded
and polished
to look like
"brushed" metal

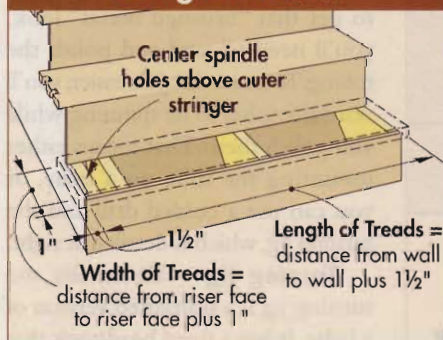
Riser Faces
mount to existing
stair risers to form
a smooth surface
for a special
wallcovering

Stair Treads
made from 1½"-thick
oak boards glued
edge to edge

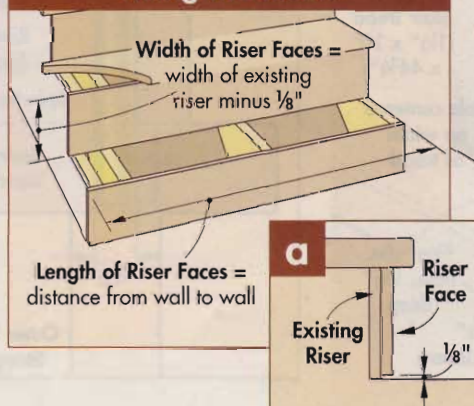
Handrail Angle



Sizing the Treads



Sizing the Risers



BEFORE YOU BUILD

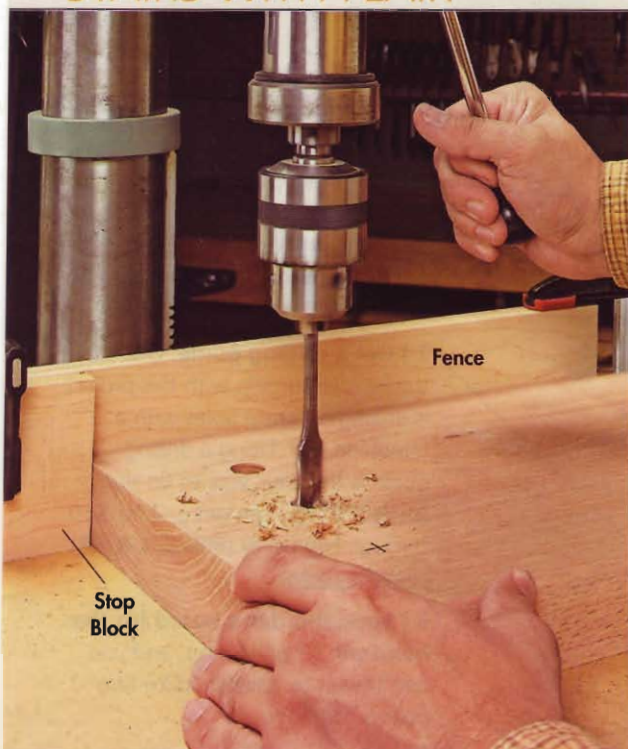
1] Pre-finish parts in the shop to make the job easy and minimize any mess in your house. Plugs and wood filler take care of any leftover finish work.

2] Get a drilling guide. One of the keys to success with this project is drilling accurate holes with a handheld drill. Using a drilling guide is the ideal way to do that (page 53). You can get one for \$30 through Lee Valley (800-871-8158; LeeValley.com).

3] Special-order a board for the handrail. It's quite long, and you don't want to have to splice two boards together.

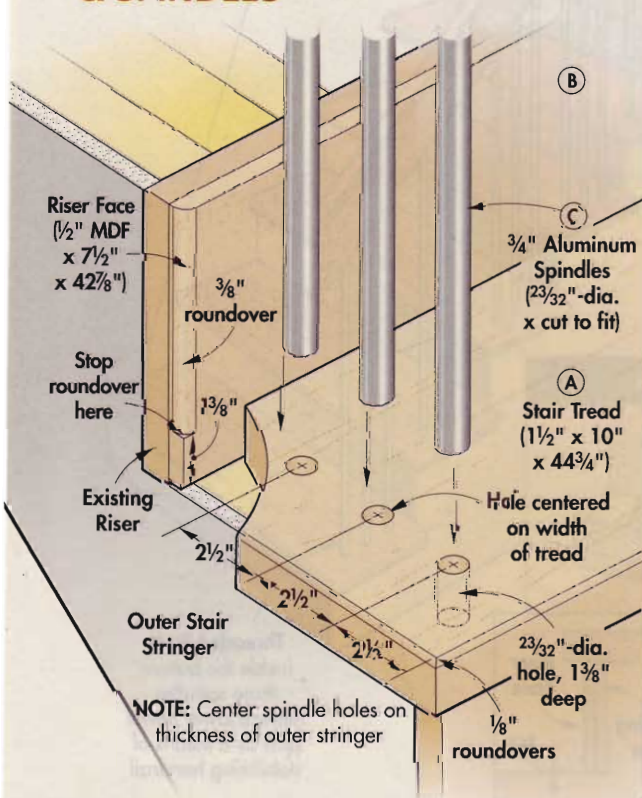
4] Go easy on the demolition. You only need to remove the first step to take measurements (see *Details below*). The rest can wait until prior to installation (page 52).

Threaded Rods
inside the bottom
three spindles
replace lower newel
post as a means of
stabilizing handrail



The spindle holes must align from tread to tread, and the easiest way to ensure this is with a drill press fence and a stop block. After drilling the first hole in each tread, reset the fence and block for the next set of holes.

TREADS, RISERS, & SPINDLES



STEPS & SPINDLES

Now that you have the critical part dimensions, you can get to work in the shop. I started with the "step" components: treads, risers, and spindles.

Treads — Each tread (A) is a $1\frac{1}{2}$ "-thick slab of red oak with three holes near one end for the spindles to fit into (*Illustration, below*). My treads were 10" wide, but boards that wide are hard to find and have a tendency to cup. So it's best to edge-glue narrow boards together to make the wide treads.

You'll need to glue up enough stock to make each tread wider and longer than its finished dimensions (*page 47*). For best appearance, select boards with matching color and grain. After edge-gluing the boards, rip the treads to width, cut them to length, and sand them smooth.

The next step is to drill three deep counterbores in each tread to accept the spindles. These spindles are made from $\frac{3}{4}$ " aluminum tubing, which is available at many hardware stores.

One thing to be aware of is that the outside diameter of this tubing is actually smaller than $\frac{3}{4}$ " ($\frac{23}{32}$ ", to be exact). So to make the spindles fit tightly, I ground down a $\frac{3}{4}$ " spade bit to drill slightly smaller holes and test-fit the spindles (*see page 30*).

The location of the holes is determined by the outer stair stringer. Lay out the holes in one tread, so they're

centered on the the thickness of this stringer. Then, to make sure that the holes align from one tread to the next, use a setup like the one shown at left when drilling the holes.

All that's needed to complete the treads is to rout a $\frac{1}{8}$ " roundover on the front edge and outer end.

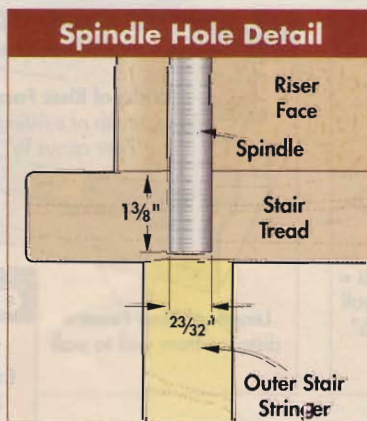
Riser Faces — As mentioned earlier, the risers on the old staircase are left intact and get covered with $\frac{1}{2}$ " MDF riser faces (B). These faces create a smooth surface for a wall-covering that's added later (*page 55*). Use the information on *page 47* to determine the size of the riser faces.

Notice that the outer end of each face is rounded over. This radius produces a smooth transition between the wall and the riser face, which will allow the wallcovering to wrap smoothly around the corner. Just be sure to "stop" the roundover $1\frac{3}{8}$ " from the bottom edge, so the tread will fit tightly against the riser face.

Spindles — Now you can turn your attention to the spindles (C). To make the spindles, I used 72"-long aluminum tubes, a commonly available size. To get two spindles from each tube, cut a $35\frac{1}{2}$ "- and a $36\frac{1}{2}$ "-piece piece from each one. (The two different lengths allows for the fact that the spindles in each group of three will end up different lengths, as explained on *page 53*.)

Right off the rack, the aluminum tubing that's used to make these spindles has a number of small scratches and mill marks. So in order to get that "brushed metal" look, you'll need to sand and polish the tubing. To make that job easier, you'll want the tubes to be spinning while you polish them. That means either mounting the tube on a lathe, or you can use a corded drill and the turning jig, which is detailed at right.

Turning Jig — Essentially, the turning jig is a simplified version of a lathe. It has a fixed headstock that holds the drill, a tailstock, and a bed



that connects the two. A shop-made mandrel that's chucked into the drill makes the spindle turn. This mandrel fits into one end of the spindle, and the other end fits into a hole centered in the tailstock.

The headstock parts are simply cut to size and screwed together. Then the drill is positioned upside down, and a hose clamp secures it in place. The headstock base then gets screwed to the bed. And the mandrel is constructed as shown in the *Spindle Mandrel Detail*, below.

As for the tailstock parts, they're simply screwed together as well. Then you'll want to drill a hole in the tailstock that's centered on the drill chuck. When it comes time to turn a spindle, this hole is simply slipped in place over the end of the spindle, and then the tailstock is clamped to the bed.

After cutting each spindle to rough length, it's just a matter of mounting them in the turning jig. Then, use the three steps shown in the *Sidebar* at right to sand, polish, and finish each spindle for a "brushed" metal appearance.



"BRUSHED METAL" SPINDLES

1] SAND SMOOTH

After mounting the spindle in the turning jig, turn on the drill, and sand the surface with 120-grit sandpaper to remove scratches and mill marks. Follow up with 220-grit sandpaper.

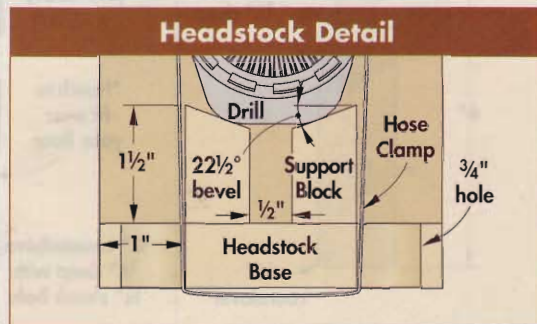
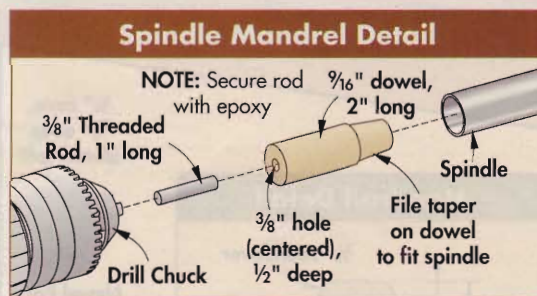
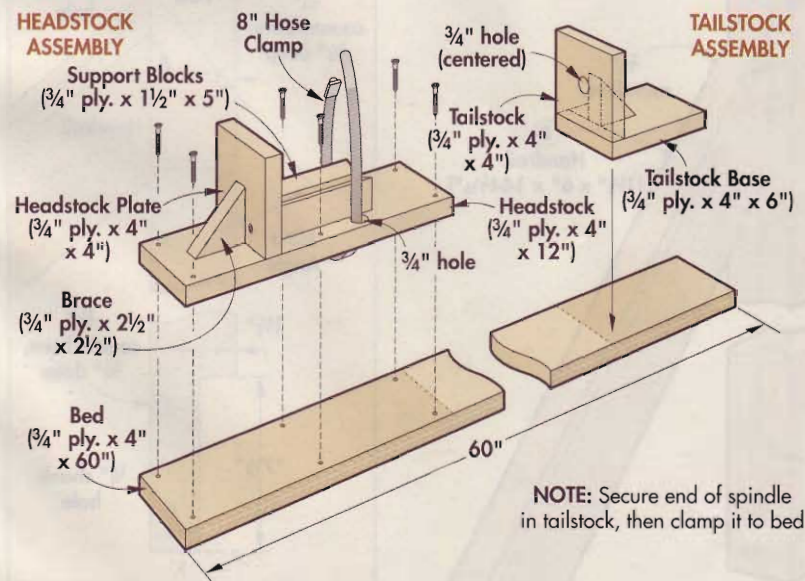
2] BUFF TO SHEEN

Now polish the spindle using an ultra-fine synthetic steel wool pad (such as a Scotch-Brite pad). This will give the entire surface of the spindle a "brushed aluminum" appearance.

3] SPRAY WITH LAQUER

Finally, spray a coat of lacquer on the spinning spindles. Let it dry for about 10 minutes, and then spray on another coat to build up the finish. Allow the spindle to dry, and then it's ready to cut to final length and install (page 53).

SHOP-MADE TURNING JIG





The handrail and newel post are both made from thick solid oak and have similar profiles at the top.

POST & RAIL

Like the other parts for this project, the newel post and handrail employ the use of subtle, decorative details. The decorative groove that runs around the top of the newel post is a good example of this (*Photo, left*). It's merely an echo of the functional handgrip in the rail.

Now, these details may be subtle, but they still take some careful consideration to create. In the case of the handrail, machining a 1½"-thick board that's over 12-feet long isn't something you can do on most stationary equipment (even if you do have room in your shop). The newel post isn't as long, but special considerations will still need to be made when machining this thick post.

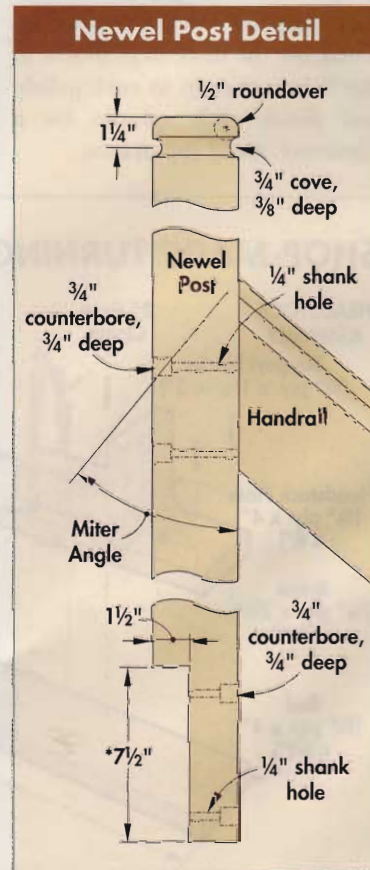
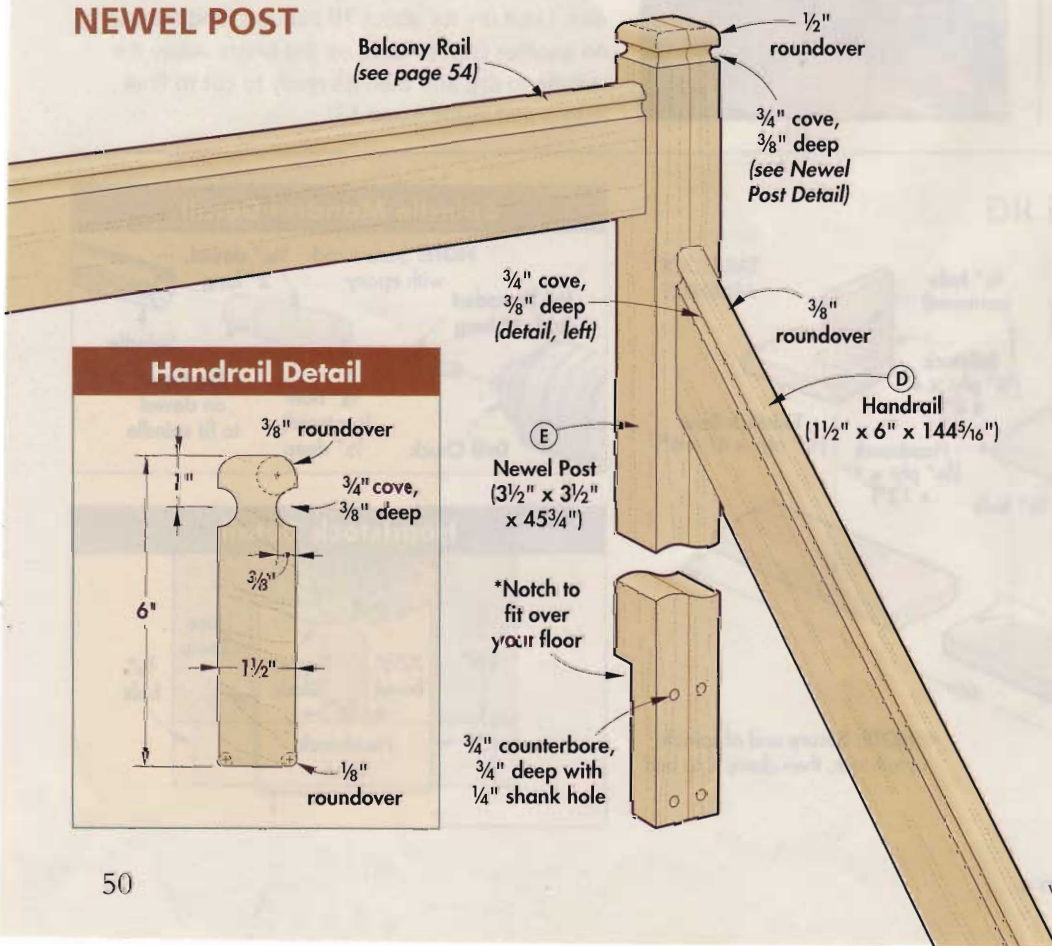
Handrail — The size of the handrail (D) may come into play even before you start work in the shop. You may have to place a special order to

get a board this long. If so, get a board that's at least a foot longer than your existing handrail, and specify a board that's surfaced on three sides (S3S). This designation means the board will be surface-planed on both faces and ripped straight on one edge. Having a straight edge is important, as it will allow you to use a circular saw and edge guide to rip the board to width. The edge guide is detailed on page 30.

With that in mind, set the board across a pair of sawhorses, and clamp it securely. Then mount your circular saw in the guide, hold it firmly against the "good" edge of the board, and rip the handrail to width (*Fig. 1*).

The next step is to rout the profile that forms the handgrip of the rail. It has a curved finger recess on each side, and a roundover on the top edges that provides a comfortable grip (*Handrail Detail*).

HANDRAIL & NEWEL POST



Routing a cove to form the finger recess is the first order of business. The recess is formed by routing a groove with a $\frac{3}{4}$ " core box bit. To ensure a straight, accurate cut, I made a "saddle" for my router (Fig. 2). Then I routed the profile by making two progressively deeper passes on each face of the rail.

To complete the handgrip, rout the roundover on the top edges of the rail. Then ease the sharp edges by routing a $\frac{1}{8}$ " roundover on the bottom edges.

Next, miter the top end of the rail to match the angle of the existing handrail (*Newel Post Detail, left*). But leave the bottom end of the rail long for now. It will get mitered to length before installing the rail (page 52).

Newel Post — The newel post (E) is sized to match the dimensions of the existing post. In my case, that meant making a $3\frac{1}{2}$ "-square post.

Start with two $8/4$ boards that are wider and longer than the final dimensions of the post. After gluing them face to face, rip the post to width, cut it to length, and sand it smooth.

Post Profile — I wanted the profile on the newel post to match the handrail. The easiest way to do this was on a router table (Fig. 3, right).

To support the long post as you rout the cove profile, screw a long auxiliary fence to the miter gauge, and clamp the post to it. It's also a good idea to place outboard support beside the router table to hold up the end of the post as you cut.

Once the cove is cut on all four faces of the post, you can rout the roundover at the top. All this requires is changing bits and moving the router table fence (see Fig. 4).

Notch It Out — The last step for this newel post is to notch it to fit over the floor at the top of the staircase. This is a simple two-step process. First, use the table saw and miter gauge to cut the shoulder of the notch (Fig. 5). Then cut the waste block free on the band saw (Fig. 6).

MAKING THE HANDRAIL



1] RIP IT TO WIDTH

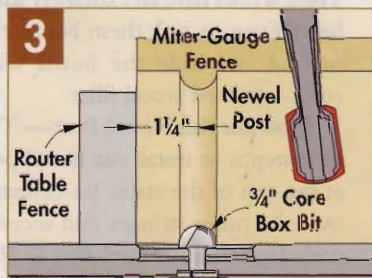
At over 12-feet long, the handrail is too awkward to cut on the table saw by yourself. A good solution is this simple shop-made ripping jig for your circular saw. (*Complete plans for building this jig are on page 30*).



2] ROUT THE HANDGRIP

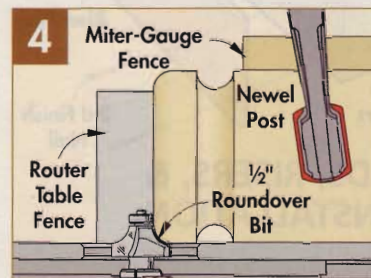
To keep the router running straight as you rout the cove profile in the face of the handrail, outfit your router with this "saddle." It's nothing more than a plywood base with an opening for the bit and two wood cleats that straddle the board.

MAKING THE NEWEL POST



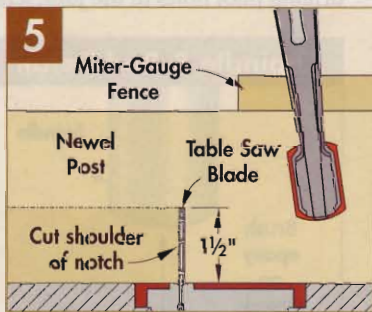
3] ROUT THE COVE PROFILE

Set the fence on your router table, and push the post past the bit with a miter gauge.



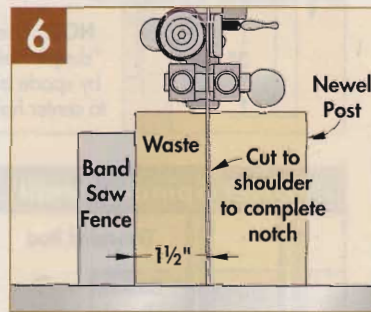
4] ROUND THE TOP

Switch bits, reset the fence, and reposition on the post to rout the roundover at the top.



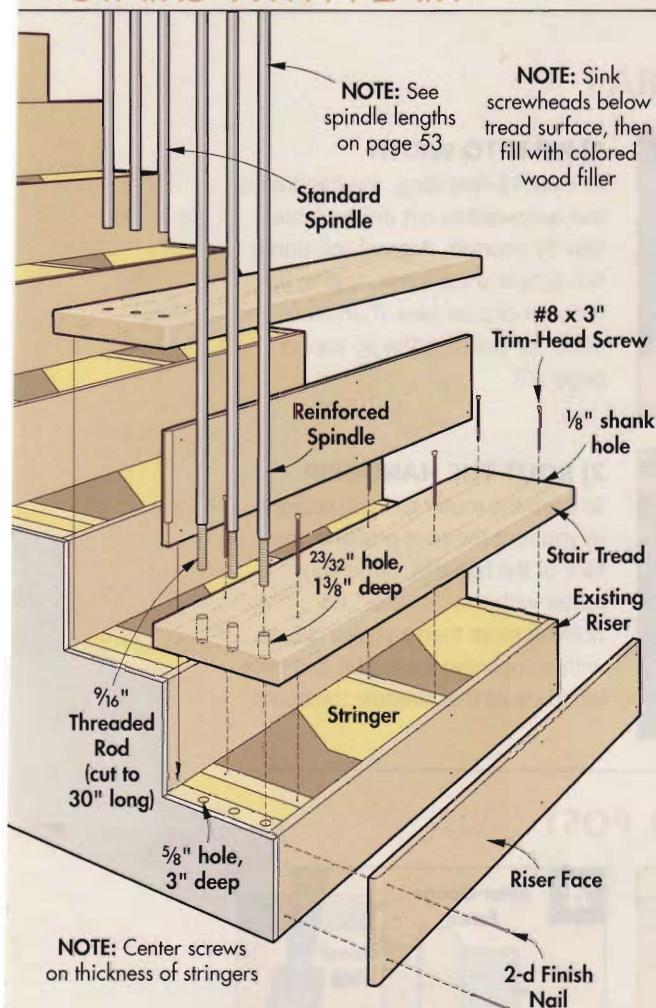
5] CUT SHOULDER OF NOTCH

Set your table saw blade to match the depth of the notch, and push the post over the blade.

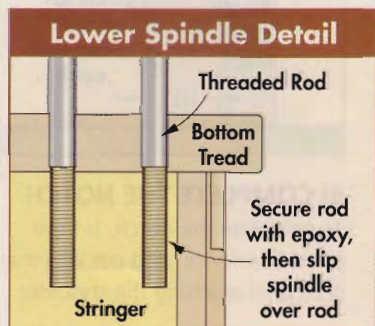
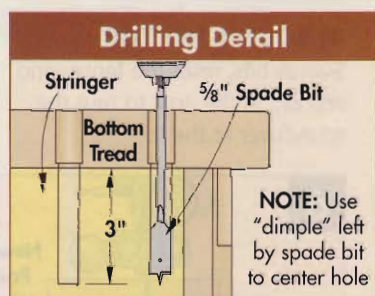


6] COMPLETE THE NOTCH

To complete the notch, set the band saw fence, and cut into the post until reaching the shoulder.



TREADS, RISERS, & SPINDLE INSTALLATION



EASY INSTALLATION

At first, the thought of installing a staircase may seem intimidating. But it's not as difficult as it looks. Just take it one "step" at a time, and you'll end up with a great-looking staircase.

Demolition — Of course, you'll have to remove the old balusters, handrail, and newel posts first. We also had to tear up the carpet and pry off the old treads. Also, to make sure the new treads sit flat, scrape any dried adhesive off the stair stringers.

Add the Riser Faces — The riser faces go on first. Position each face so the top edge is flush with the existing riser and the end is flush with the wall. Then use construction adhesive and finish nails to secure the faces.

Time for Treads — As for the treads, they're glued and screwed to the stair stringers. To avoid unsightly holes, I used special trim-head screws. These screws have an extremely small head. Even so, sink them below the surface and hide the heads with color-matched wood filler.

Now for the Newel Post — The next step is to install the newel post at the top of the stairs. It's centered over the outer stringer and secured with lag screws (*Newel Post & Rail Assembly*). You'll need to drill counter-bored shank holes for the screws. Then dry-fit the post, plumb it in both directions, and mark the hole locations on the rim joist. After drilling pilot holes in the joist, screw

the post in place. Then install wood plugs, chisel them flush (*see page 32*) and "spot-finish" the plugs.

Lay Out Holes in Rail — Before installing the handrail, you'll need to lay out the locations of the holes for the spindles in the bottom of the rail.

Start by masking the rail, so you won't have to mark directly on the finished rail. Now for the tricky part — transferring the location of the holes in the treads to the handrail. To do that, temporarily install the *middle* spindle in each tread. Next, rest the rail on the stair treads, and butt the mitered (upper) end against the newel post. Clamp the rail to the spindles, and then mark the location of the spindles on the tape (*Fig. 1*).

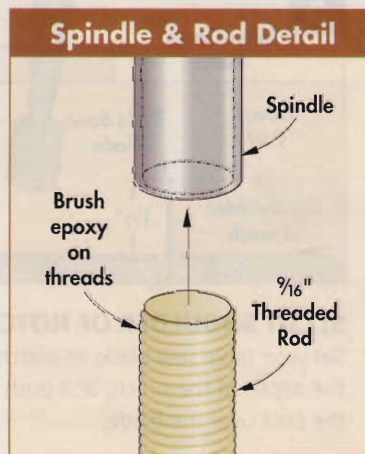
Miter Rail to Length — While the handrail is still clamped to the spindles, it's a good time to establish the final length of the handrail. The goal is to miter the rail to length so the end is even with the front edge of the bottom tread. A framing square makes this easy. Just set the square on the floor, and butt it against the bottom stair tread. Then mark a line where it contacts the side of the rail.

At this point, unclamp the rail and take it to the miter saw. Rotate the saw to match the layout line and miter the rail to length. Then sand and "spot-finish" the end of the rail.

Lay Out Remaining Holes — Now you can lay out the rest of the holes in the handrail. Begin by transferring the lines you marked earlier (the locations of the middle spindles) to the bottom edge of the rail. Then mark a centerpoint between each pair of lines for the middle spindles.

Once you get the middle spindle holes laid out, you can lay out the holes for the other two spindles in each group. Because of the angle of the handrail, the distance between these holes in the rail will be different than on the treads.

To figure out the exact spacing, you could dust off the old geometry



book — or simply use the information in the *Chart* below. Note how the spacing changes depending on the angle of the handrail. (Use the angle of your original handrail.)

After finding the correct spacing, lay out the rest of the holes (Fig. 2). Then use a drilling guide (and the modified spade bit) to drill the holes at the proper angle (Fig. 3). **Note:** Drilling guides are available from Lee Valley (LeeValley.com; 800-871-8158).

Cut & Install Spindles — After drilling all the holes, it's time to cut the spindles to final length. Here again, use the *Chart* to find the length of the spindles. Then cut the spindles with a miter saw.

That done, all of the spindles except for three will be installed the same way. The three bottom spindles require some special attention. Since the bottom newel post is no longer there, these spindles serve as the main supports for the lower end of the handrail.

To help strengthen the handrail, three long threaded rods are anchored in the stair stringer (*Illustrations, page*

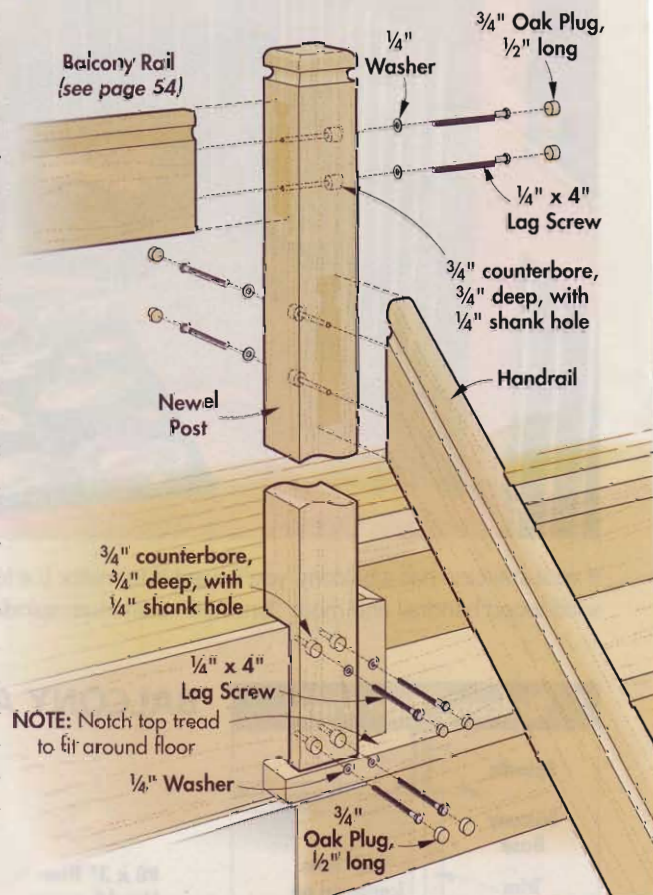
52). The spindles fit over these rods like a sleeve, creating a rock-solid support for the handrail.

To accept the threaded rods, you'll need to drill three holes in the stringer (*Drilling Detail*). Then brush the ends of the rods with epoxy, and install them in the holes (*Lower Spindle Detail*). Next, brush the threads of the rods with epoxy, and slip the spindles in place over them.

The rest of the spindles don't need the extra reinforcement. But I did use epoxy to secure these spindles in the treads. Sand about 1" of the bottom end of each spindle to ensure a good bond. Brush epoxy onto that end and in the hole, then insert each spindle into its respective hole.

Mount the Rail — After allowing the epoxy to cure overnight, you can mount the handrail. You'll want to recruit a friend to help with this. Butt the rail against the newel post, and work your way up the staircase, fitting each spindle into its hole in the rail. Then use a mallet and block to tap the rail down onto the spindles.

NEWEL POST & RAIL ASSEMBLY



3 STEPS TO PERFECTLY ALIGNED HOLES



1] Transfer the location of the middle spindle from tread to rail.



2] Use the *Chart* at right to determine and mark the location of Spindles #1 and #3.

3] Drill each hole using the drilling guide with your drill.



Rail Angle		HOLE SPACING & SPINDLE LENGTH			
Rail Angle	Hole Spacing	Spindle #1	Spindle #2	Spindle #3	
45°	3 1/16"	31 3/8"	33 7/8"	36 3/8"	
46°	3 1/2"	31 7/16"	33 7/8"	36 5/16"	
47°	3 7/16"	31 1/2"	33 13/16"	36 1/8"	
48°	3 3/8"	31 1/16"	33 13/16"	36 1/16"	
49°	3 5/16"	31 5/8"	33 3/4"	35 15/16"	
50°	3 1/4"	31 5/8"	33 3/4"	35 7/8"	
51°	3 3/16"	31 11/16"	33 11/16"	35 3/4"	
52°	3 3/16"	31 11/16"	33 11/16"	35 5/8"	
53°	3 1/8"	31 3/4"	33 5/8"	35 1/2"	
54°	3"	31 3/4"	33 1/2"	35 3/8"	
55°	3"	31 13/16"	33 1/2"	35 5/16"	



If your staircase has a balcony, you'll want it to mirror the look of the staircase, complete with a solid-wood handrail and more "brushed" aluminum spindles.

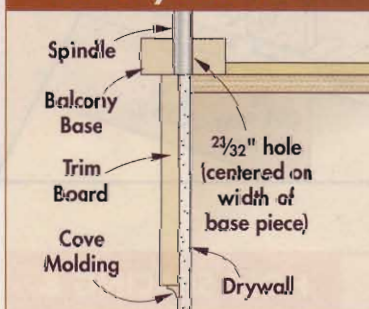
BALCONY

This staircase also had a balcony, so naturally, we wanted the look of the balcony to match the rest of the staircase. That meant replacing the existing balcony rail with a rail (F) that's identical to the one on the staircase. We also exchanged the balusters for metal spindles (G). So the spindles would have something to mount into, we added a balcony base (H).

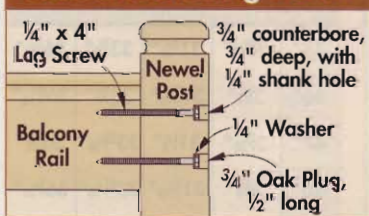
This balcony presented the unique challenge of "wrapping" around two 45° corners to form a landing. This meant we had to miter the three base pieces, and bevel the three rail pieces, at 22½° to wrap around the landing.

The other interesting challenge of this balcony is figuring out where to locate the spindle holes. You'll want them equally spaced, but not more

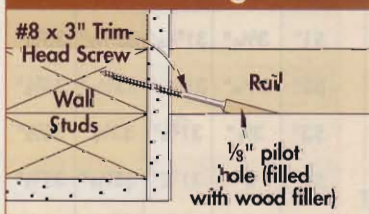
Balcony Side View



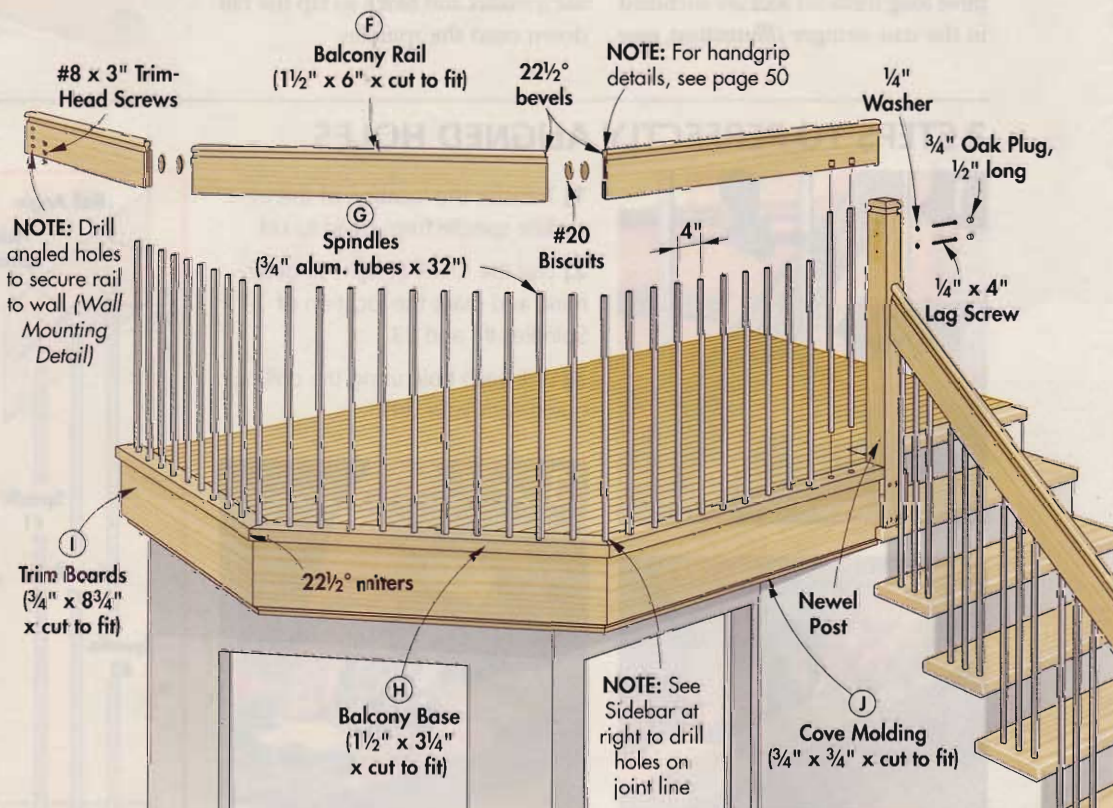
Newel Mounting Detail



Wall Mounting Detail



BALCONY ASSEMBLY



than 4" apart. Also, if the rail and base pieces of your balcony are connected at an angle like ours, you'll want one spindle hole at each joint line.

This time, the holes in the base align with those in the rail. Drill them with the modified spade bit to ensure tight-fitting holes.

The only challenging holes to drill are the holes where the base and rail pieces meet. The "Drilling Holes" Box at right makes that easy. Once the holes are drilled, the handgrip on the rail can be routed just as before (page 50).

Balcony Installation — Mount the balcony base to the floor with glue and trim-head screws. The spindles are secured in the base with epoxy, and the rail is tapped in place.

To join the three rails, I used biscuits and glue. I also made some clamp blocks to draw the joints together once the rails were in place (Photo, above).

To finish up, attach the rail to the newel post and the wall (Details, left). Then add some trim boards (I) and cove molding (J) to the wall underneath the balcony.

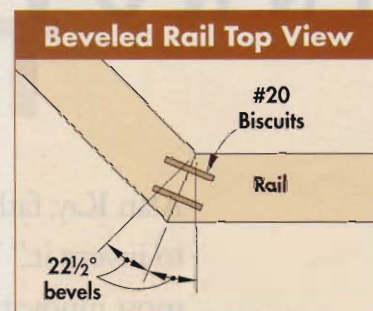
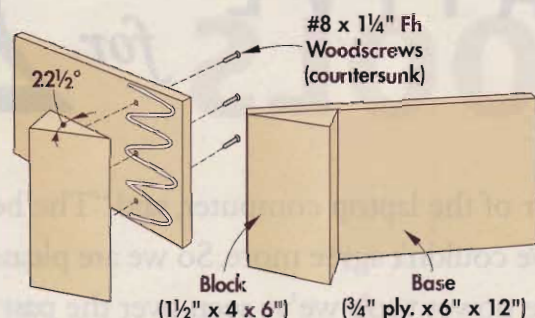


Glass-textile wallcovering helps smooth the transition between the wall and the risers (see page 94).

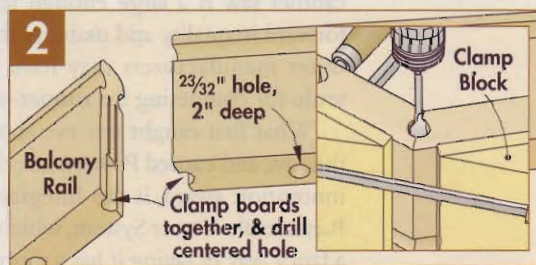
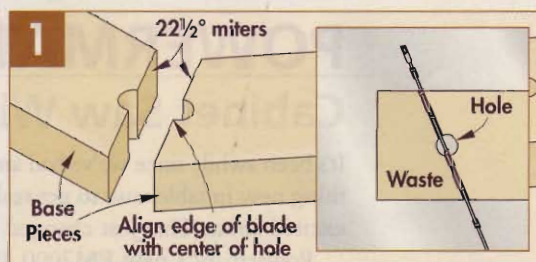
CLAMP BLOCKS AID ASSEMBLY



To draw the beveled ends of the balcony rails tightly together, I used clamp blocks. Each block is just a plywood base that's glued and screwed to an angled block. By clamping two of them to the mating rails, and then clamping them to each other, you can pull the rails tightly together.



DRILLING HOLES ON A JOINT LINE



One challenging aspect of building this balcony was drilling holes for spindles at the junction of two balcony base or rail pieces. For the base pieces, it's easiest to miter the pieces carefully to leave exactly half a hole on each piece (Fig. 1). On the rail, it's best to dry-assemble the pieces with clamp blocks (Photo, above), and then use the drilling guide to drill a centered hole on the joint line (Fig. 2).

MATERIALS & HARDWARE

Part	Qty	T	W	L	Material	Part	Qty	T	W	L	Material
A Stair Treads	12	1 1/2"	10"	44 3/4"	Red Oak	H Base Pieces	3	1 1/2"	3 1/4"	cut to fit	Red Oak
B Riser Fates	13	1/2"	7 1/2"	42 7/8"	MDF	I Trim Boards	3	3/4"	8 3/4"	cut to fit	Red Oak
C Aluminum Spindles	36	3/4"-dia.		cut to fit	Aluminum Tubing	J Cove Moldings	3	3/4"	3/4"	cut to fit	Oak Cove Molding
D Handrail	1	1 1/2"	6"	144 5/16"	Red Oak	• (100) #8 x 3" Th Screws (#0830-T50; McFeelys.com; 800-443-7937) • (100) 2-d Finish Nails • (1) Drill Guide (#25K18.50; LeeValley.com; 800-871-8158) • (4) #20 Biscuits • (8) 1/4" x 4" Lag Screws • (8) 1/4" Washers • (8) 3/4" Red Oak Wood Plugs • (34) 3/4" x 72" Aluminum Tubes (see Parts C and G) • (3) 1/16" x 36" Threaded Rods (Use-Enco.com; 800-873-3626)					
E Newel Post	1	3 1/2"	3 1/2"	45 3/4"	Red Oak						
F Balcony Rails	3	1 1/2"	6"	cut to fit	Red Oak						
G Aluminum Spindles	32	3/4"-dia.		32"	Aluminum Tubing						

TOP 10 INNOVATIVE TOOLS *for* 2006

Alan Kay, father of the laptop computer, said "The best way to predict the future is to invent it." We couldn't agree more. So we are pleased to once again recognize the most innovative power tools we've seen over the past year from manufacturers who are not content to await the future, but are actively inventing it.

POWERMATIC PM2000

Cabinet Saw With Integral Castors

It's been awhile since we've had anything new in table saws to get really excited about. That just changed.

Powermatic's new PM2000 10" cabinet saw is a large enough leap forward in quality and usability that other manufacturers may have to settle for competing for runner-up.

What first caught our eye about this saw, and earned Powermatic the innovation award, is the Integrated Retractable Castor System, which is a fancy way of saying it has a mobile base built right into it.

This seemed like merely a convenient feature at first glance, but we soon learned it has a significant impact on performance, as well.

Because the castors retract completely into the cabinet, the saw rests solidly on the cast-iron base when in operation. This is far superior to having the tool supported by four small wheels, such as on a conven-

tional mobile base. The additional vibration dampening that comes from this design is measurable.

The castor system is operated by the same wheel that controls the blade bevel angle, so the saw is not burdened with additional controls. Simply push the wheel in to make bevel adjustments, or pull it out to engage the lift system. As you turn the wheel, the castors extend or retract.

Beyond the castors, Powermatic loaded this saw with other valuable upgrades. Most notable are the quick-release blade guard and a riving knife.

Being able to quickly remove the guard for joinery cuts (like dados and rabbets) and then replace it just as quickly for through-cutting means there are no excuses for leaving the guard off and compromising safety.

The riving knife is another great addition. These knives have long been the standard on European saws

2006
TOP 10
 INNOVATIVE TOOLS
WORKBENCH
 WINNER

TOP 10
 INNOVATION
 Integral Castors

and are long overdue in the North America. A riving knife differs from a typical splitter in that it raises and lowers with the blade and is shaped to match the curve of the blade. This keeps the riving knife in the most effective position to eliminate binding, regardless of blade height.

Other enhancements include a locking arbor that allows single-wrench blade changes and an internal blade shroud and hose that improve dust collection dramatically.

Single-phase and three-phase models are available in either 3-hp or 5-hp versions. The saws come with Powermatic's Accu-Fence system and a micro-adjustable miter gauge.

Prices range from just over \$2,000 to just over \$3,000, depending on the model.

For more information on the PM2000, visit Powermatic.com, or call 800-274-6848.



Powermatic's new PM2000 10" cabinet saw features integral castors that retract into the cast-iron base (*Main Photo*) and a true riving knife that is easy to remove and replace (*below*).



CRAFTSMAN

Powder Coater

Craftsman's new Powder Coating System effectively puts one more durable, simple finishing option within reach of anyone who wants it.

Powder coating works by electrostatically applying a powder to metal (and some non-metal) surfaces (*Inset Photo*). The coated piece is then heated in a standard electric oven (though not one you plan to use for food

preparation) at 400° to cure for approximately 30 minutes. The resulting finish looks like paint but is more durable and scratch-resistant.

If you're not familiar with powder coating, simply look around your home. Chances are good that at least some of your appliances, tools, lawn equipment, and maybe even your barbecue grill are finished with a powder coating.

This is the first time that a truly affordable, simple system for applying powder coating has been available to consumers. Other versions have cost two to three times as much and required an air compressor to operate.

This system sells for just \$190 and is completely self-contained. The powder is loaded into a quick-change

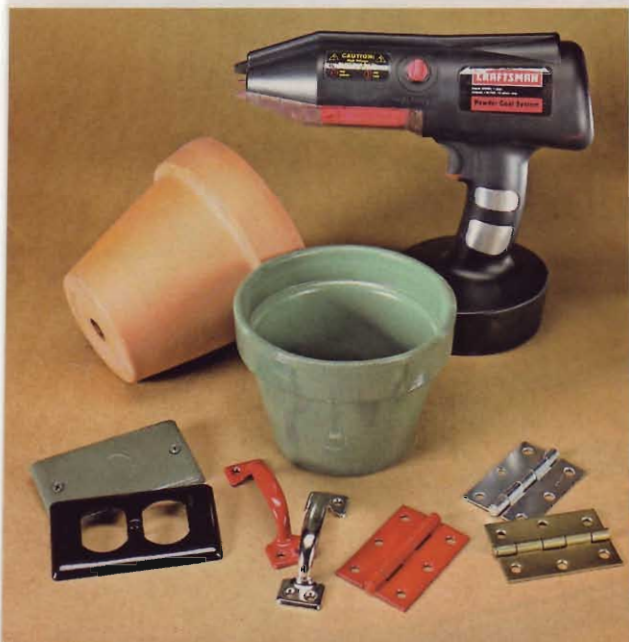
powder cartridge and an internal fan provides all the necessary airflow.

To make the powder adhere, you simply attach a ground wire to the piece that receives the coating. This causes the electrostatically charged dust particles to cling to it (*Main Photo*). A variable-speed trigger allows the user to regulate the volume of powder expelled from the gun.

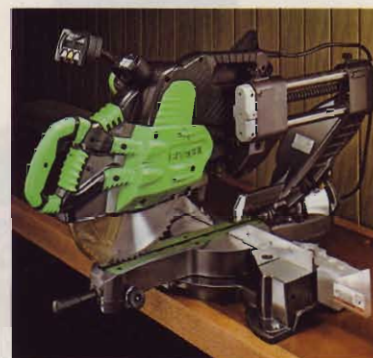
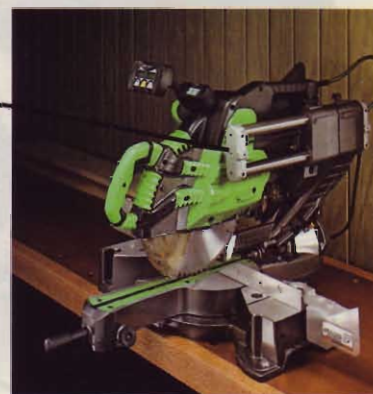
Cleanup is quick since any overspray can be vacuumed or swept up. The powder cartridge can be wiped or blown clean in less than a minute. A wide variety of colors are available, and additional cartridges can be purchased for faster color changes.

For more on the Craftsman Powder Coating System, visit Craftsman.com or call 800-349-4358.

Powder coating provides an attractive, durable finish on just about any metal surface. Some non-metal surfaces, like the clay pot in the *Photo* at left, also accept the finish.



**TOP 10
INNOVATION**
Zero-Clearance
Sliding Saw



Hitachi's new C12LHS miter saw uses fixed rails with a sliding cutter head. The new design allows maximum cutting capacity without sacrificing workspace.

HITACHI

Zero-Clearance Sliding Miter Saw

Hitachi's new 12" sliding miter saw provides maximum cutting capacity in minimal space thanks to an innovative new rail system.

Unlike conventional sliding miter saws where the rails slide, these rails are fixed and the cutterhead slides. That means this saw requires zero clearance behind it to operate (most conventional sliding miter saws require a foot or more of clearance behind the saw). The end result is the same large cutting capacity without sacrificing valuable workspace.

Just as impressive are the rack-and-pinion mechanisms for making fine adjustments of the bevel and miter angles. This provides an

unprecedented level of control over both settings.

Combine that with the same digital angle display that earned Hitachi Top 10 honors last year, and this saw has a level of accuracy that is unmatched by its competitors.

Hitachi even managed to improve the display for this model by mounting it on an articulating arm, so it can be adjusted for easy reading from a variety of positions. An adjustable laser cutline indicator is also standard. So, in short, if the cut's not accurate, don't blame the saw.

The saw will cut bevels at 45° either direction, and mitters up to 45° to the left and 57° to the right. The



The new saw also features the digital miter and bevel angle display that earned Hitachi a Top 10 Innovative Tool award last year.

maximum width of cut is 12¹/₄" with a maximum depth of cut of 4³/₁₆".

Expect to pay about \$650 for the C12LSH. For more information, visit HitachiPowerTools.com, or call 800-829-4752.



Along with enhanced control features, the Panasonic cordless impact driver also has built-in LED lighting.

TOP 10 INNOVATION
Digital Clutch

The digital clutch on the Panasonic offers three ways to customize the power and speed of the driver.



PANASONIC

Impact Driver With Digital Clutch

As more people discover the value of cordless impact drivers, they also find one problem: control.

The problem is that typical impact drivers have single-speed motors and no clutch, which makes them much more difficult to control than a conventional drill. So, for the uninitiated, all the speed and torque these drivers deliver can quickly become a liability that results in snapped-off bolts and stripped-out screw heads.

Panasonic puts a resounding end to those frustrations with their cordless impact driver with an electronic clutch. Just the addition of a clutch on an impact driver is noteworthy, but Panasonic went so far beyond conventional clutch design that they've altogether changed the nature of this tool. They've actually brought an impressive measure of finesse to a previously heavy-handed tool.

The clutch allows users to choose from 16 different torque settings to match the work. As soon as the selected torque is reached, the drill simply stops running. The settings are accurate and diverse enough to

ensure perfect control for any type of hardware.

There are also three levels of impact power to choose from (hard, medium, and soft). Once again, this allows users to select how aggressively they want to drive a certain fastener. This proves especially valuable with smaller fasteners that are more prone to breaking or stripping.

Finally, a "one-shot" impact function makes it possible to make one final turn of the hardware for the perfect set. In this mode, each time the trigger is pulled, the driver makes a half-rotation and then automatically stops. This feature eliminates over-sinking a bolt or screw because of an overzealous trigger finger.

Used in combination, these three features make the Panasonic EY7202 the most versatile and user-friendly cordless impact driver currently on the market.

Other features of the driver include an LED worklight and an adjustable belt hook.

Expect to pay around \$300 for the driver. For more information, visit Panasonic.com or call 800-405-0652.



FESTOOL

Brushless-Motor Drill

Festool's outstanding 12-volt cordless drill, the C12, was already established as one of the finest drills money can buy because of its versatility, capability, and compactness. Festool can now add "virtual immortality" to that list of qualities.

The C12's long life expectancy is the product of a revolutionary new brushless motor. This type of motor has long powered very large machines (like CNC routers) and very small machines (like computer printers). But this is the first time a toolmaker has been able to take advantage of the efficiency, increased power, and durability that this type of motor is known for.

Durability is the chief strength of a brushless motor, and at last count, one C12 had driven over 800,000 screws without

failing or even showing signs of decreased capacity. That makes Festool confident in saying these drills will drive 1 million screws before exhaustion. That's five times as many as competitive drills.

Equally impressive is that Festool was actually able to *reduce* the size and weight of the drill even while increasing its performance. The C12 is 25% smaller and a full pound lighter than most other 12-volt drills.

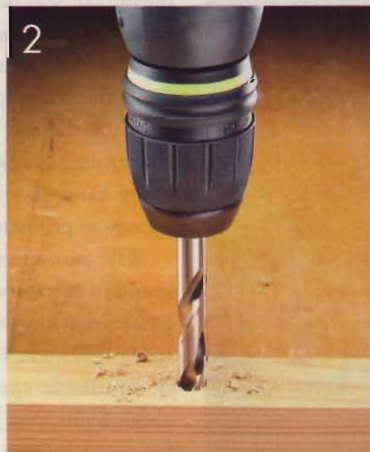
Of course, this new model still accepts the excellent accessories that made its predecessor so popular (Photos, below).

The C12 is available in a variety of kits, starting at just over \$300. Call 888-337-8600 or visit FestoolUSA.com for more information.

**TOP 10
INNOVATION**
Brushless
Motor



The incredible three-headed drill from Festool — 1) an offset chuck for tight spaces, 2) a standard 1/2" chuck for everyday drilling, 3) a right-angle attachment for close quarters.



MAKITA

Anti-Vibration Technology

Reciprocating saws have a well-earned reputation as aggressive tools designed primarily for destruction. Part of that comes from their unrivaled capacity to cut through nearly anything in their path. But it's also due in part to the abuse the tool inflicts on the unfortunate soul operating it.

Let's face it, a 15-amp motor powering a solid steel blade back and forth over a 1 1/4" stroke 2,800 times per minute is going to create a bit of recoil for the operator. And the more resistance offered by the material being cut, the greater the recoil. I'd almost rather go to the dentist.

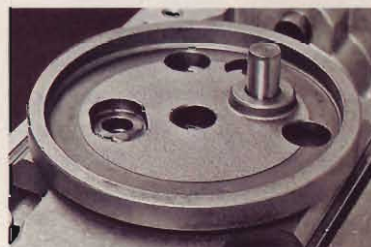
Makita, however, has a new saw that takes recip. sawing out of contention with root canal for my least favorite ways to spend an afternoon.

The new JR3070CT features a counterweight that dampens vibration and significantly reduces the recoil of the tool. The

counterweight is a rotating disc that's thicker and heavier on one edge than the other (*Photo, right*). As the blade is plunging forward, the weight of the disc is moving backward to counter it. Simple but effective.

The JR3070CT sells for around \$180 and also features four-position orbital action, electronic speed control, and tool-less blade changing.

For more information, visit Makita.com or call 800-462-5482.



This counterbalance provides offsetting weight to minimize vibration in Makita's reciprocating saw.

**TOP 10
INNOVATION**
2X Less
Vibration



RIKON JOINTER Micro-Adjusting Fence

Either one of two innovations found on the new Rikon 6" jointer would have qualified it for inclusion in this year's Top 10 list. Having both simply made it a no-brainer during our selection process. Those innovations are a micro-adjusting rack-and-pinion fence and a two-speed motor.

The fence is unlike anything offered on a jointer before. Both the fence position and angle are microadjustable, allowing the user to make precise changes in the setup of the jointer quickly and conveniently. It also keeps the fence from moving as you try and lock it down — a common problem on other jointers.

The two-speed motor allows you to better match the speed of the three-blade cutterhead to the type of stock you're working with. It's long been an important feature on planers, but Rikon was the first to see the value of adjustable speed on a jointer. The 20-110 sells for about \$550. Visit RikonTools.com or call 877-884-5167 for more information.

**TOP 10
INNOVATION**
Rack & Pinion
Fence



JET JOINTER

Auto-Indexing Knives

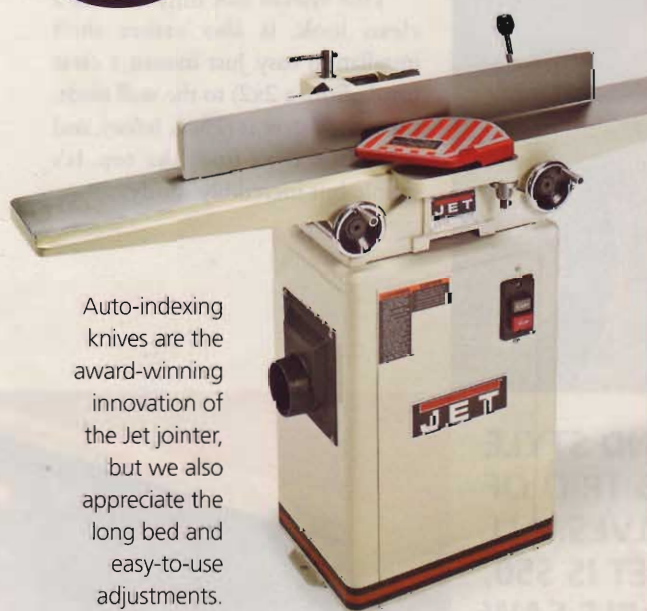
I've lost entire afternoons trying to install blades in a jointer, and I'm never anxious to give up that kind of productive shop time.

At long last, Jet has solved this age-old jointer weakness with an exclusive auto-set, quick-change knife system. In this system, all three knives register perfectly on pins. You simply can't misalign them.

Along with that innovation, this jointer features a 56"-long bed — one of the longest tables available in a 6" jointer. It also has front-mounted table adjustment handwheels and a built-in rabbeting ledge. The Jet JJ-6CSDX sells for around \$600. Visit JetTools.com or call 800-274-6848 for more information.



TOP 10 INNOVATION
Auto-Indexing
Knives



Auto-indexing knives are the award-winning innovation of the Jet jointer, but we also appreciate the long bed and easy-to-use adjustments.

BOSCH

BlueCore Batteries

Bosch's answer to maximizing cordless efficiency is to combat the number one enemy of any battery: heat.

Their new line of BlueCore nickel-cadmium batteries incorporate cooling rods and internal sensors to first dissipate the heat and then manage it.

These rods move heat away from the cells before it can speed the breakdown of the chemicals within them. The sensors more effectively measure heat within the battery and communicate with a microprocessor in the BlueCore charger, which then optimizes the charge rate. By mitigating heat in this way, Bosch has been able to extend battery life by 50%.

The BlueCore line includes batteries and chargers from 9.6- to 24-volt. For more information, visit BoschTools.com or call 877-267-2499.



TOP 10 INNOVATION
Internal Cooling
Rods & Sensors

MILWAUKEE

v28 Lithium Ion

The march of cordless power stalled at 18 volts. That's the point where consumers proved unwilling to pay the high price or endure the weight of 24- and 36-volt cordless tools, even if it did mean more torque or longer run time.

Milwaukee, however, is the first to breach the cordless power line by incorporating lithium-ion batteries, which have longer run times and cooler operating temperatures than nickel-cadmium or nickel-metal-hydride batteries. And at 28 volts, these pack a lot more power than competitor's batteries, at about the same weight as a conventional 18-volt battery.

That solves the weight problem. Time will tell if cost is still an issue, since a four-piece combo set of V28 tools sells for around \$700. For more information, visit V28Power.com or call 800-729-3878.



TOP 10 INNOVATION
Lithium-Ion
Batteries

FLOATING DISPLAY SHELVES



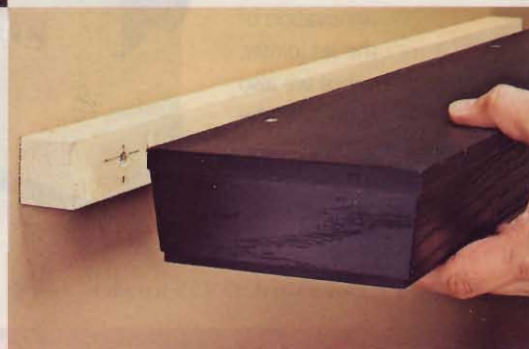
Take a look at these shelves, and you'll immediately notice the clean lines that make them look great without detracting from the items they display. Look closer, and you'll appreciate how the wood grain shows through the satin-black finish. This is a subtle detail that adds a lot of style.

It's what you *don't* see, though, that makes these shelves truly unique. The shelves appear to just "float" on the wall with no brackets or other visible means of support.

The Inside Scoop — The secret to this illusion lies inside the shelves. As the *Construction View* at right shows, the shelves aren't made from thick slabs, as it might appear. Instead, they're hollow. The top and bottom face are made from $\frac{1}{2}$ " plywood, and shop-made molding wraps around the faces, leaving a hollow cavity in between.

This system not only creates a clean look, it also makes shelf installation easy. Just mount a cleat (made from a 2x2) to the wall studs, slip a shelf over it (*Photo, below*), and drive in screws from the top. It's simple but incredibly sturdy.

ADD DISPLAY SPACE AND STYLE
TO ANY WALL WITH THIS TRIO OF
EASY-TO-BUILD WALL SHELVES. ALL
YOU NEED TO MAKE A SET IS \$50,
ONE DAY, AND A TABLE SAW

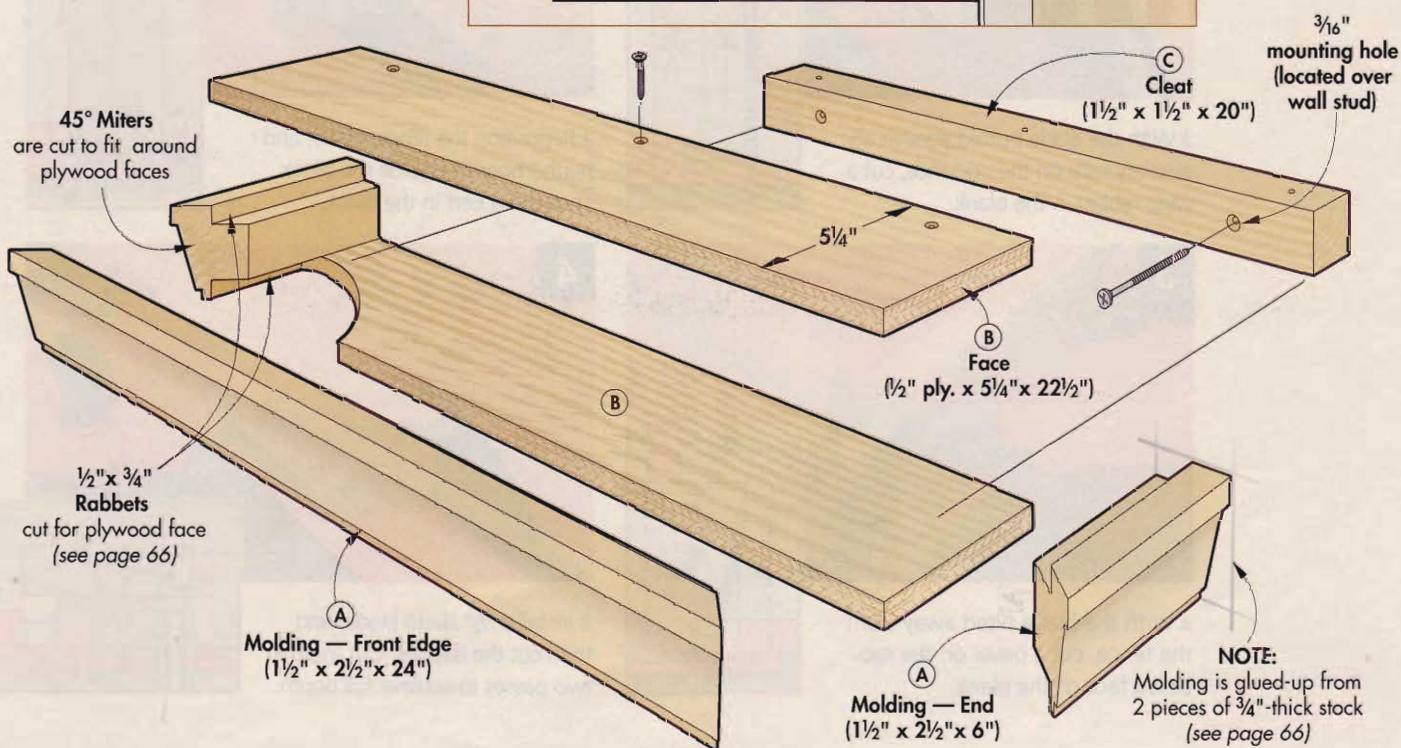


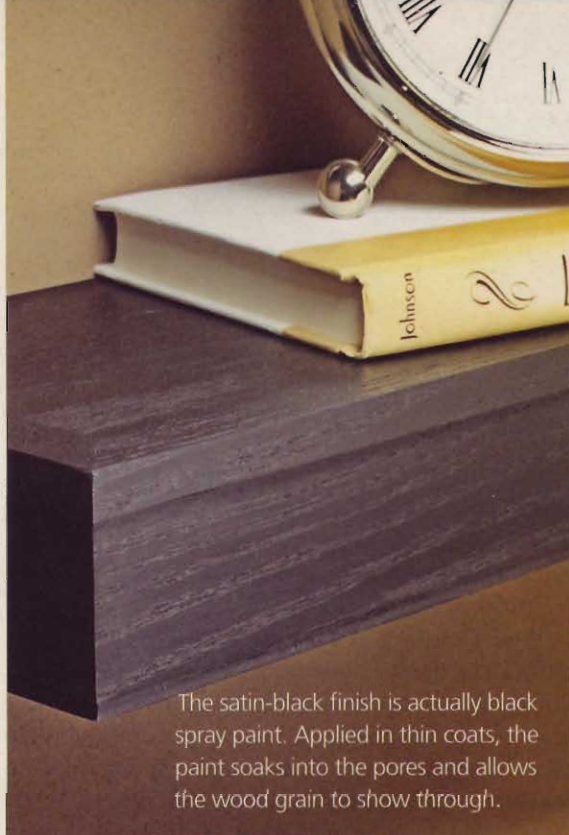
A Fine Finish Fast — To finish the shelves, I wanted a black “ebonized” look. This is often done using dyes, but I didn’t want that much hassle. So I made finishing

Any Length You Like — I made the shelves 6" wide. This narrow, wall-hugging design means the shelves don't protrude too far into the room. But they still offer ample space for displaying small items. I let the space where the shelves hang dictate their length. Mine measure 2-ft., 3-ft., and 4-ft. long. That meant I could cut all the faces from a half-sheet of plywood.

NOTE: Dimensions shown are for the 2-ft. shelf. For the 3-ft. and 4-ft. versions, cut the faces (B) as follows:

- 3-ft. shelf: (B) is $\frac{1}{2}$ " ply. x $5\frac{1}{4}$ " x $34\frac{1}{2}$ "
- 4-ft. shelf: (B) is $\frac{1}{2}$ " ply. x $5\frac{1}{4}$ " x $46\frac{1}{2}$ "





The satin-black finish is actually black spray paint. Applied in thin coats, the paint soaks into the pores and allows the wood grain to show through.

simple steps for making MOLDING & MITERS

To build the shelves, start by preparing stock for the molding (A). Each piece starts out as a $1\frac{1}{2}$ " x $2\frac{1}{2}$ " rectangular blank that is 2-ft. longer than the length of the shelf. That gives you enough to wrap around the ends of the shelf, plus extra in case you have to make several cuts to get tight-fitting miters. Cut a short length of extra stock, as well, to use for making test cuts.

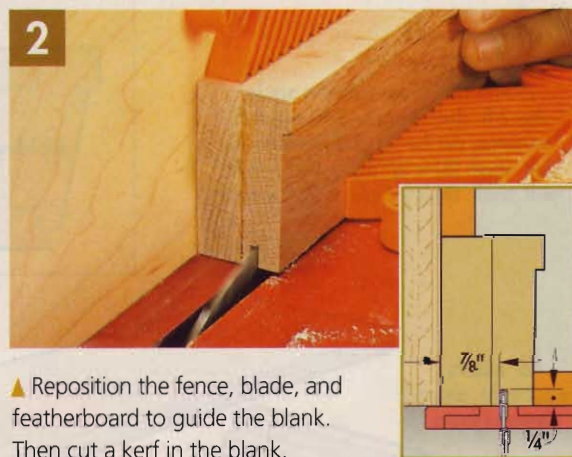
I used flatsawn red oak (hardwood and plywood) for my shelves. Even though they would be painted later, I chose oak because it has large, open pores that show up well after the paint is applied.

Thick Stock From Thin — To get stock thick enough for the molding, you have two choices. You can use $1\frac{1}{2}$ "-thick stock, or glue two $\frac{3}{4}$ "-thick pieces face-to-face like I did. Getting the edges perfectly aligned when gluing long pieces like this is a hassle, though, so

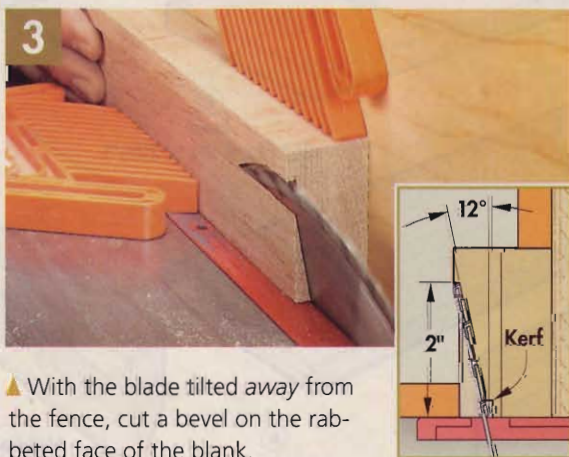
FOUR CUTS MAKE THE MOLDING



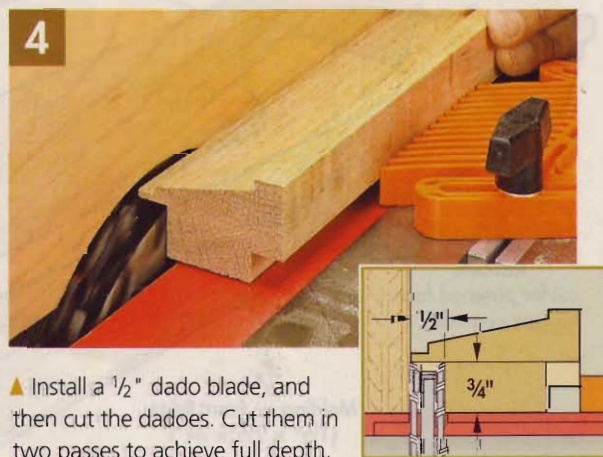
▲ With the blade butted against an auxiliary face on the rip fence, cut a wide rabbet in the blank.



▲ Reposition the fence, blade, and featherboard to guide the blank. Then cut a kerf in the blank.



▲ With the blade tilted away from the fence, cut a bevel on the rabbeted face of the blank.



▲ Install a $\frac{1}{2}$ " dado blade, and then cut the dados. Cut them in two passes to achieve full depth.

I started with extra-wide pieces and trimmed them to width *after* gluing. See page 32 to learn how.

Four Steps to Success — Once you have each molding blank trimmed to thickness and width, you can cut the profiles. Though there are several profiles, including a wide bevel, the process is easy. To ensure consistent, accurate profiles, use featherboards to keep the blank pressed firmly against the table saw fence.

The first cut to make is a wide rabbet. This is done by raising the blade high and making a single pass, as shown in *Step 1* on page 66. Don't worry if the saw blade leaves scoring marks on the wood. Those will get trimmed off later.

Next, you need to cut a kerf in the bottom edge of the molding blank as shown in *Step 2*. This kerf will later become a subtle "step" at the base of the shelf.

Now cut the wide bevel, as shown in *Step 3*. Set the bevel angle of the blade at 12°, and then raise the blade 2" above the saw table. The blade should enter the workpiece alongside the kerf you just cut in *Step 2*, and exit at the top of the rabbet cut in *Step 1*.

After cutting the bevel, be sure to sand any saw blade marks smooth using a flat sanding block.

With that done, you can complete the molding by cutting the two large rabbets that the plywood faces will fit into. This is done with a dado blade, as shown in *Step 4*. When cutting, the back face of the molding rides against the saw table to keep the piece from rocking. It's a good idea to cut the rabbets in two passes. First, raise the blade 1/2", and make a pass along each edge of the blank. Then raise the blade to 3/4", and complete the rabbets.

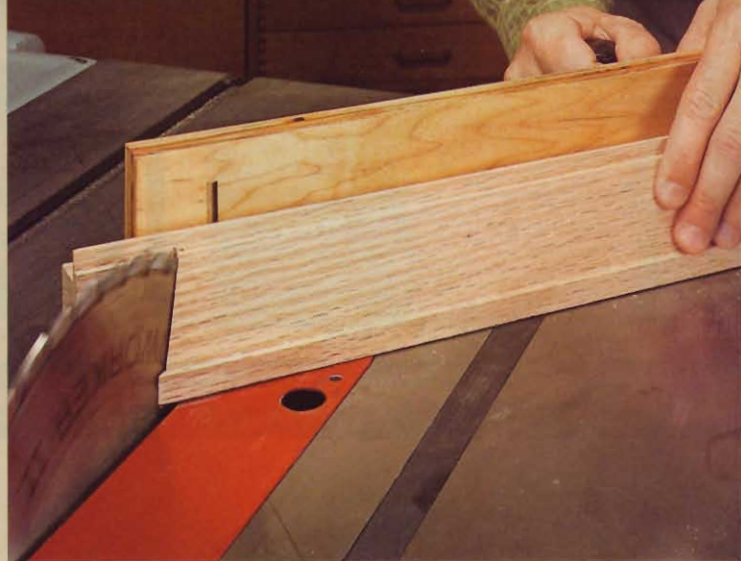
Faces — Now cut the plywood faces (B) to size for each shelf. The face dimensions for each shelf length are noted in the *Construction View* on page 65.

Work Around For Tighter Miters — All that's left to do now is miter the molding pieces to length. To get the tightest-fitting miters possible, I like to start at one end and work my way around, fitting one corner at a time, as shown in the *Illustrations* at right.

Once both mitered corners fit tightly, you can glue up the shelves. If you're shy on clamps, secure the molding to the faces with a few small finish nails. You can fill the holes, and they'll never show after the shelf is painted.

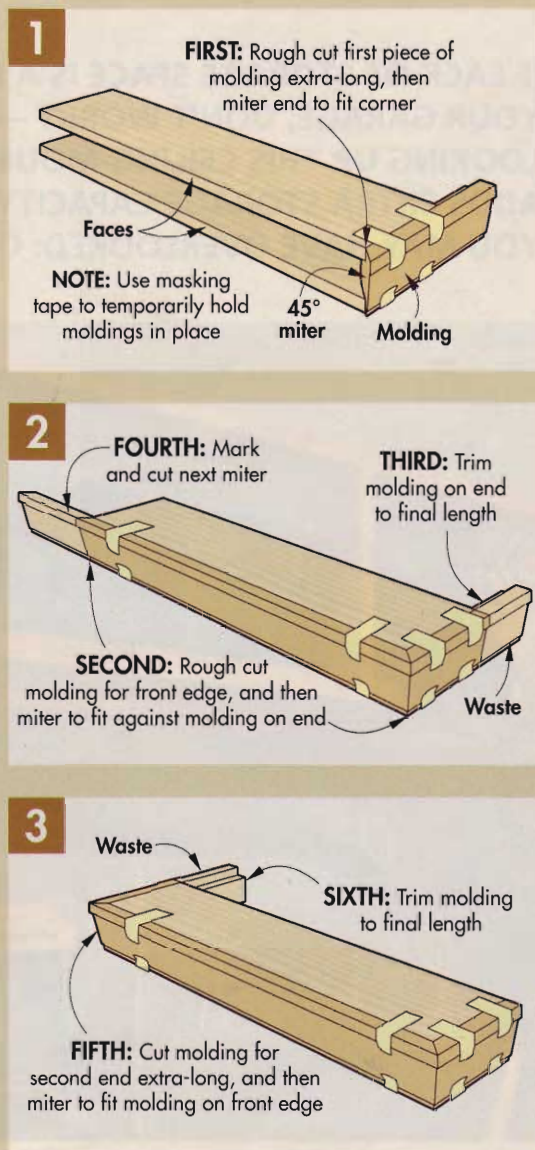
On to the Finish — This entire project is pretty easy, but the finish is downright simple. All you need is spray paint and the techniques shown on page 26.

Set Your Shelves Afloat — To mount the shelves, start by cutting cleats (C) to length from 2x2s. Then mount them to the wall, making sure they are level. Use two screws in the 2-ft. cleat, and three or four in the longer cleats. Make sure at least one mounting screw will hit a wall stud for the 2-ft. shelf, and two in the longer shelves. If you can't hit a stud with the other screws, use wall anchors. Slip the shelves on, and attach them with black trim-head or drywall screws (*Shelf Mounting Detail*, page 65). 



3-STEP MITERED CORNERS

A long miter-gauge extension fence holds the molding as you miter each piece to length. Position the molding with its top edge against the saw table for a stable cut.





STURDY STOWAWAY STORAGE LOFT

IF LACK OF STORAGE SPACE IS A PROBLEM IN YOUR GARAGE, DON'T WORRY — THINGS ARE LOOKING UP. THIS CEILING-MOUNTED LOFT ADDS EXTRA STORAGE CAPACITY IN A PLACE YOU MAY HAVE OVERLOOKED: OVERHEAD.

Looking for more storage space in your garage? Look up. Even though the walls and floor may be jam-packed with stuff, there's often room up above that can be used for storage.

One way to take advantage of that space is to build this ceiling-mounted storage loft. As you can see in the *Photo* above, the loft is a suspended platform that's used to hold bulky or lightweight items that don't fit elsewhere.

Seasonal and other special items are stored in plastic containers with lids to seal out dust. The loft is designed so that each storage bay holds two 17-gallon Rubbermaid containers, which is a commonly available size (*Lower Photo, page 69*).

Or you can use smaller containers. I set three 19-quart containers side by side in one bay and then stacked 12-quart containers on top of them.

Whatever combination of containers you choose, you'll want to get them in the planning phase *before* you build the loft.

Planning & Sizing — When planning your storage loft, the first thing to consider is the last thing you'll actually have to do — installation. Even though the loft is intended for lightweight items, it





still needs to be mounted securely to the ceiling. So make sure to locate the loft so it runs perpendicular to the joists or rafters overhead (*Planning Details*). That way, you'll have a solid mounting surface at each joist.

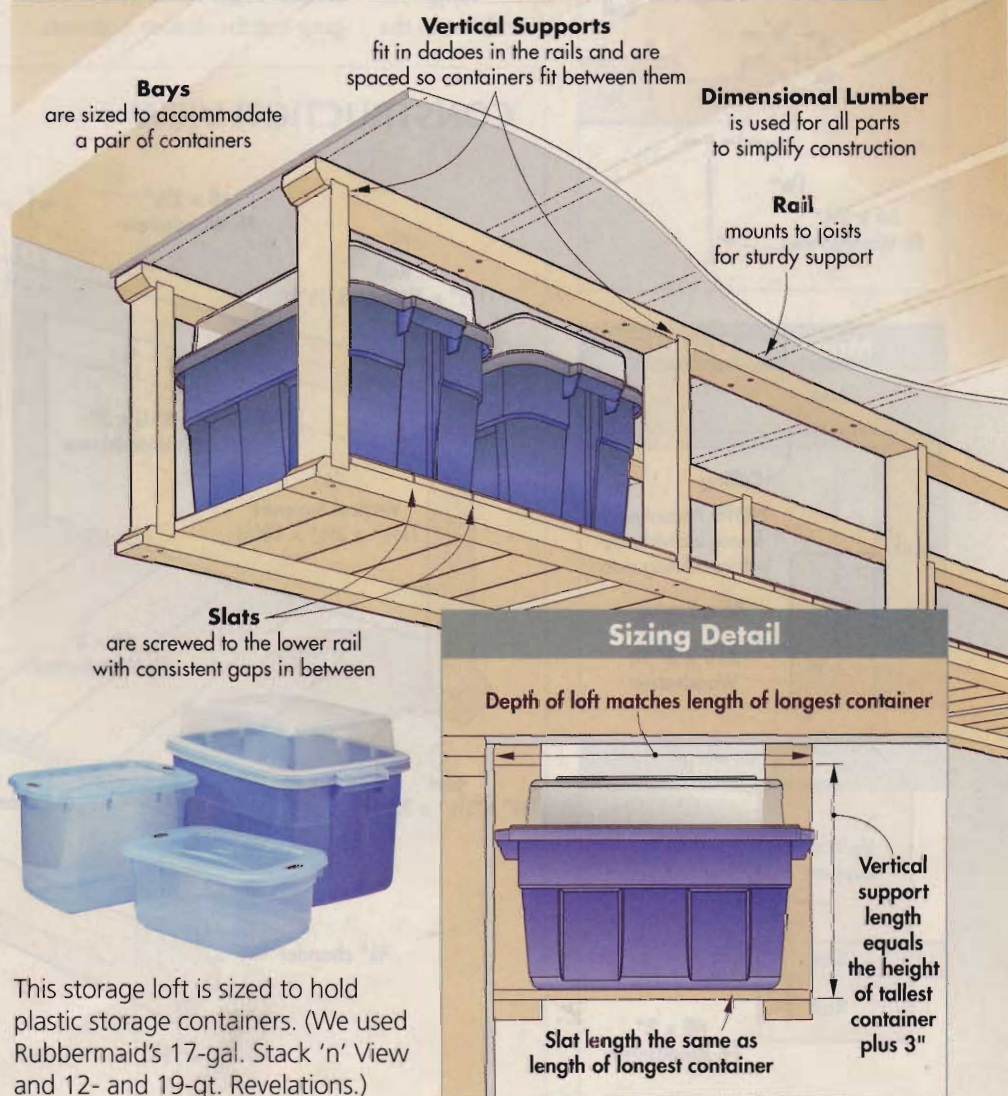
Once you've planned where you're going to install the loft, you can decide how long to make the frame rails. I cut my rails from 16' 2x4s, so my first step to building the loft took place in the lumberyard, rather than the workshop. I started there by choosing the straightest boards available. You could also rip the rails from wider stock.

After determining rail length, divide the loft into bays (defined by the placement of the vertical supports). I made my bays about 2" wider than two of the 17-gallon containers.

The length of the vertical supports establishes the height of the bay. So make your vertical supports the height of the container plus 3" (*Sizing Detail*). The extra 3" allows for the dadoes in the rails that the vertical supports fit into, the thickness of the slats, plus a little leeway to tip the container a bit when sliding it in and out of the loft.

As for the length of the slats, just measure your containers at their longest point, and make the slats the same length.

PLANNING DETAILS



straightforward
LOFT CONSTRUCTION

Loft construction starts with the ceiling-mounted frames. Each frame is made up of two rails (A) connected by vertical supports (B). All of the frame pieces are cut from 2x4 stock.

Rails — The first step is cutting the frame rails to length. Then the rails need dados cut in them to receive the vertical supports (*Dado Detail*). The key here is that the dados in one rail have to align with those in its mate.

In my case, these rails were too long to wrestle onto the

table saw. So I ganged the rails together and used a circular saw to cut the dadoes (*Sidebar, right*). Cutting the dadoes in all four rails at once ensures that they'll align and also saves time.

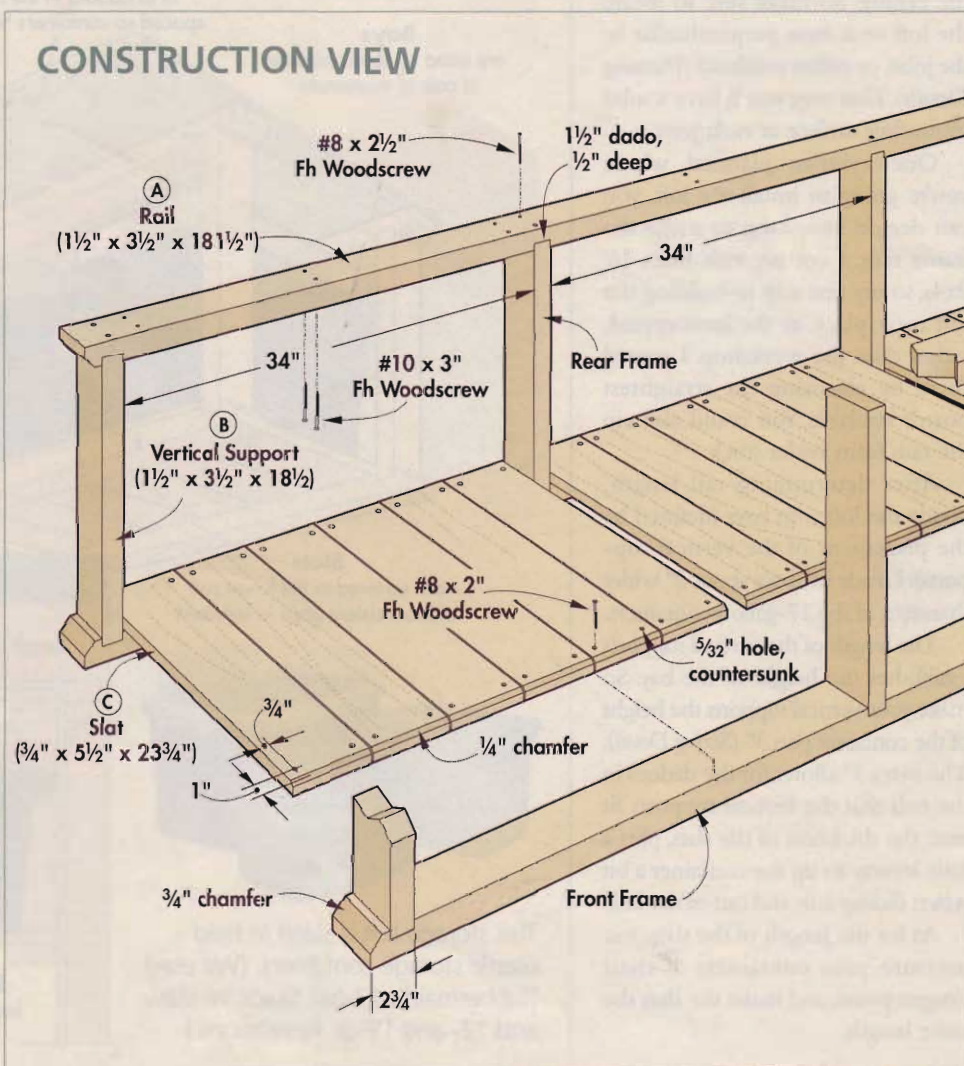
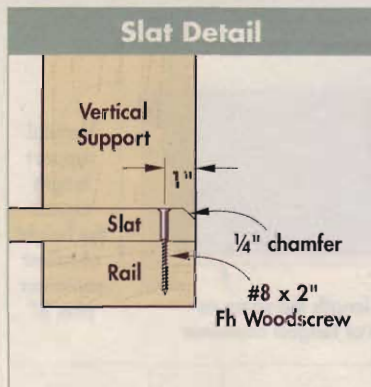
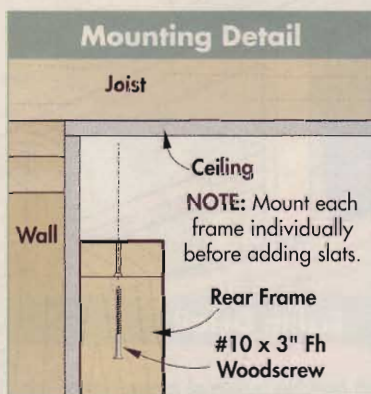
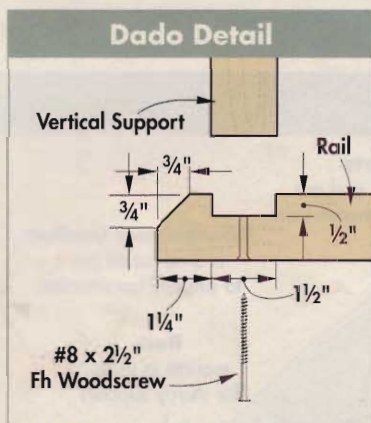
Dado Jig — A shop-made jig helped me make the straight cuts I needed for square-shouldered dados (*Jig Assembly*, page 71). This simple jig has three parts: a base that serves as a platform for the saw, a fence to guide the saw, and a cleat that squares the jig to the edge of the boards.

After assembling the jig, trim the waste from one edge to create a reference edge. Then you're ready to gang-cut the dados as shown.

With the dados cut, the next step is to cut a chamfer on the ends of each rail. You can leave the rails clamped together for this operation (you won't need the jig, though). Tilt the base of the saw to 45°, and cut the chamfer across all the rails at once.

Vertical Supports — When you've finished with the rails, you're ready for the vertical supports that join them (I used six in each frame). The supports are cut to length from 2x4 stock. Screwing the supports in place between the rails completes the frame construction.

Installation — It's best to install the frames now, *before* you have the



weight of the slats to contend with. Though the frames aren't particularly heavy, they are awkward to handle. So you'll need to round up a friend to help with this part of the project.

To make it easier to attach the rails to the joists, pre-drill mounting holes in the rails. Start with the rear frame, and screw it in place flush against the wall (*Mounting Detail*).

To install the front frame parallel to the rear one, first measure out from the wall the length of a slat ($23\frac{3}{4}$ ", in my case) at both ends of the rear frame. Mark these locations, then snap a chalkline to connect them. Now screw the front frame in position.

Slats — With the frames installed, you can turn your attention to the slats (C) that make up the platform. These slats are cut to length from 1x6 stock. To keep items from snagging on the platform, cut or sand a chamfer on the front end of each slat.

Next, drill the pilot holes for connecting the slats to the frames. Rather than lay out each hole, use the tip shown in the *Photo* below.

Finally, space the slats evenly between the vertical supports (the gap between my slats was about $\frac{1}{8}$ "), and screw them to the frames. 



A framing square clamped to the drill press table lets you quickly and accurately position slats to drill the mounting holes.

GANG-CUTTING DADOES



1] Align the jig's reference edge with a layout line running across all four rails, and clamp the jig in place. Adjust the saw to make a $\frac{3}{4}$ "-deep cut ($\frac{1}{4}$ " extra, to compensate for the thickness of the base). Run the saw along the fence to cut one shoulder of the dado. Reposition the jig, and cut the other shoulder of the dado the same way.



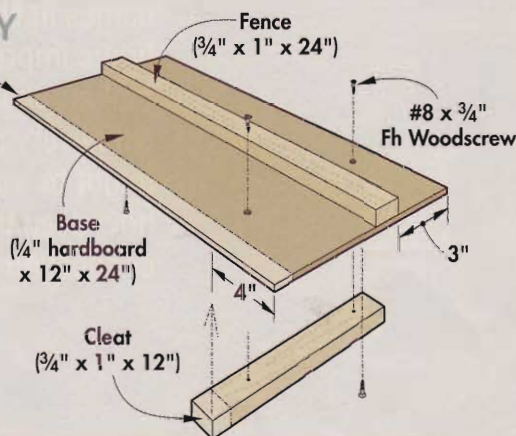
2] With both shoulders of the dado defined, remove the waste material between them. A good way to start is by reducing the amount of material that's there. To do this, make a series of cuts between the shoulders, moving the jig over slightly between each one (there's no need to clamp the jig during this step).



3] Now it's cleanup time. Set the jig and the saw aside for this, and use a chisel and mallet to knock out the comb-like waste you created in the previous step. When you get that done, there'll still be some kerf tracks in the bottom of the dado. Just use the chisel to pare off those ridges and flatten the bottom of the dado.

JIG ASSEMBLY

NOTE: Use your circular saw to trim the base (and cleat) to final width and create a reference edge





NASCAR SPECIAL: 800HP TOOLS

Some of the biggest names in NASCAR are the home improvement and tool companies you deal with every day. But you might be surprised by just how deep the DIY/NASCAR connection goes.



Race fans expect much more than just a race when they attend a NASCAR event. Sponsors are anxious to provide the best possible show, both on and off the track.

DeWalt and Irwin don't build cars. Lowe's and Home Depot don't sell auto parts. Stanley and Hitachi offer nothing to boost horsepower. And yet these are some of the biggest names in the most popular motorsport (or any sport, for that matter) in the world — NASCAR.

Despite little or no obvious connection to the automotive industry or racing, these companies invest enormous amounts of money (millions of dollars, in many cases) to have their corporate logo painted on a car and a matching patch sewn onto a driver's uniform.

Honestly, I didn't give much thought to the NASCAR/DIY connection until I noticed that the companies involved in the sport are just as anxious to talk about their NASCAR sponsorship as their new tools. And when the DeWalt folks seemed even *more* eager to talk about Matt Kenseth (driver of the number 17 DeWalt Racing Ford) than their latest miter saw, I had to know more.

It didn't take long to see some compelling reasons why NASCAR is *exactly* where these companies should be promoting their wares.

The obvious reasons are the overwhelming popularity of the sport — 75 million devoted fans is an enviable audience for any message. And the length of season — nearly 10 full months of racing — offers ample opportunity to reach even the casual fan. And let's face it, having your corporate logo emblazoned on the front of a 180-mph, 800-hp hot rod is pretty cool.

But there are other sports with long seasons, large fan bases, and an endless supply of flashy advertising space. So what is it about NASCAR in particular that draws tool companies to the track like magazine editors to a free buffet?

In a word, it's access. Access to you, the race fan. And access to the races. Because as it turns out, NASCAR, more than any other sport in the world, has the right fans, the right events, and the right celebrities for promoting tools.

THE RIGHT FANS

Certainly part of the reason that tool and home improvement companies support NASCAR is the sheer size of the crowd (of the 20 most-attended sporting events in 2003, 17 were NASCAR races). But more important than the *number* of race fans is the *nature* of race fans that makes them such an appealing audience.

Besides their passion for the sport, race fans share some other qualities that make these companies stand up and take notice.

The *Table* at right offers at least a statistical glimpse of those qualities, such as a greater tendency to own and work on their own homes, shop in home improvement stores, and even work in the construction industry. But once again, this only tells part of the story.

NASCAR Fan Facts

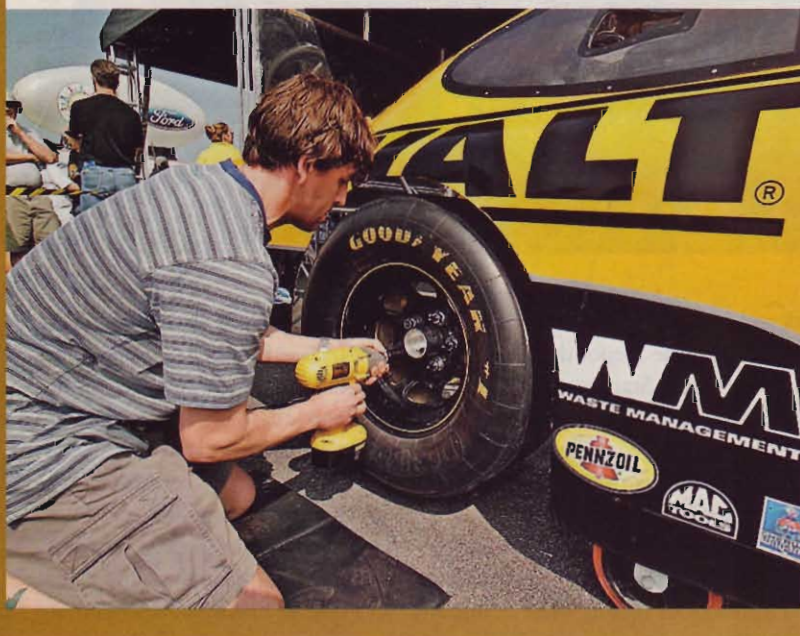
	NASCAR Fans	Non-Fans
Own their own home	68.5%	62.9%
Completed a home improvement project in the past year	53.5%	46.3%
Did the work themselves	71.0%	66.3%
Shopped in home improvement warehouse in the past month	55.6%	41.3%
Plan to do a home improvement project in the coming year	13.3%	9.9%
Work in construction industry	17.2%	11.7%

SOURCE: NASCAR

The rest of the story unfolds every weekend between February and November, when the fans attend the races. They arrive not mere hours before the flag drops, but often *days* ahead of time. After all, a NASCAR weekend often includes three races

over as many days: Friday is the Craftsman Truck Series race, Saturday it's the Busch Series, and Sunday is The Nextel Cup race.

In between races, well, that's where the real action is ... at least as far as the sponsors are concerned.



Above, Matt Kenseth autographs hats, Koozies, and anything else the fans hand him. Left, one fan lives out his pit crew fantasy with a DeWalt impact driver.

Sponsoring NASCAR offers tool and home improvement companies a unique opportunity to interact with the fans in the "fan experience." The DeWalt truck is just one example of the displays that travel the racing circuit week after week. And for those fans that can't attend a race, most sponsors have a whole fleet of "traveling experience" trucks to bring the race to them.



THE FAN EXPERIENCE

Somewhere just outside every NASCAR track in the country is an area — nothing more than an open field on most days — that is transformed into what is unofficially known as the “fan experience” each time a major NASCAR race comes through town.

This is where sponsors really get their money's worth, because this is where they get to meet face-to-face with the fans. And this is how sponsoring NASCAR can convert directly into tool sales.

The sponsors park semi-trucks, raise tents, and generally create a carnival-like atmosphere, complete with blaring music, bellowing airhorns, and barking pitch men. But instead of questionable carnival rides and bad fair food, the main attraction here is tools.

Under any given tent, you can drive screws, pound nails, or change lug nuts for your chance to win free tools, tickets to future races, a weekend at a fantasy racing camp, or a frighteningly large truck that will never fit into your garage.

You might even be lucky enough to get an autograph from one of the drivers. They make regular appearances in support of their sponsors.

And don't worry if you can't make it to a race. The sponsors will bring the experience to you. Most sponsors have traveling displays that visit points of interest all across the country. You can find schedules for most “traveling experiences” on sponsors' websites.

RACE-DRIVEN SALES

So how does all this fanfare help sell tools? Well, just ask yourself which company you'd rather do business with: The one that gave you a free autographed Koozie at the Daytona 500, or the one you've never seen anywhere other than the store shelves. For my part, I'll take the Koozie every time.

Of course, it's a little more involved than that, but the point can



Speed is a constant theme at any NASCAR event, and the fan experience is no exception. Here, fans drive screws in a race against each other and the clock for a chance to win tools and NASCAR prizes.



The fan experience is an extreme experience, to be sure. This custom-painted International CXT is one example of the over-the-top prizes that fans compete for.



Most fan experience displays are family-friendly with hands-on opportunities for all ages. Here, some younger fans get to try out some “non-power” tools in the Irwin Industrial Tools exhibit.

be made with some simple math. Just consider that 89 percent of race fans believe that a product featuring a NASCAR logo will be a quality product. Then factor in that fans are three times as likely to purchase products made by NASCAR sponsors.

So by simply supporting the sport, sponsors earn enormous credibility with fans who are anxious to buy their products. And, of course, they get to meet those fans and demonstrate their products once a week as part of the fans' favorite pastime.

THE RIGHT CELEBRITIES

The success of any major sport hinges largely on the popularity of its athletes. And in no other sport is that more true than NASCAR, where there is little in the way of hometown allegiance or team spirit. Generally, fans and sponsors choose their loyalties on how they feel about one person — the driver.

Winning races, of course, generates a lot of good feelings. But no driver can win *every* race. So a driver's role in strengthening the sponsor/fan relationship that is the lifeblood of the sport goes way beyond their skills in the car.

Sponsors expect the drivers they support to be model spokespeople —

THE DRIVING FORCE OF DIY

The tool and DIY industries are a dominant force in NASCAR.

Just consider that by week 32 of the 2005 NASCAR Nextel Cup Series, tool and DIY sponsors had enjoyed the following results from their drivers.

Wins	17
Top 10 Finishes	96
Pole Positions	10
Nextel Cup Contenders	5 of 10

well-behaved, well-spoken, and accessible to the public.

To live up to these expectations, many drivers attend a finishing school, of sorts, where they are instructed on everything from public speaking to signing autographs.

Of course, no amount of schooling would do any good if the drivers weren't decent people to begin with. And in talking to several of them for this article, I found each one to be courteous and interesting. Most seem to relish their role as ambassador for the sport and their sponsors.

Even while preparing for a race, the drivers sign countless autographs, pose for photos, and graciously accept encouragement from their fans.

That the fans can even get this close to the drivers is one more way that NASCAR differs from other major sports. Can you imagine walking onto the field or into the clubhouse at the World Series and asking a player to sign an autograph? Well, for a NASCAR driver, it's just part of the workday. It's not at all difficult for fans to get access to the garage area and pit row before, during, and after a race. And that puts them right in the mix with the drivers who are simply going about their jobs.

Away from the track, the drivers film commercials, make cameo appearances in movies, attend special events for their sponsors, and are the focus of endless media coverage.



Jonathan Ferrey/Getty Images Sport/Getty Images

Leaders in the tool and home improvement industries are often leaders on the track, as well. Here, Kurt Busch takes the number 97 Irwin Ford into a corner with Tony Stewart in close pursuit in his number 20 Home Depot Chevrolet.

CHAD KNAUS & HIS "NASCAR SHOVEL"



Chad Knaus (crew chief for Jimmie Johnson's number 48 Lowe's Chevrolet) admitted to having little experience in home improvement. Nonetheless, he told me an interesting story about applying a little DIY ingenuity to solve a problem.

As Chad recalls, Charlotte, North Carolina, (which averages about 5" of snow a year) was hit with an

unusually large snowstorm, and he was caught without a snow shovel. "I went to Lowe's, but they were sold out," Chad says. "And I couldn't very well go anywhere else."

Chad's solution was to drive to work and use his years of chassis fabricating experience to build his own shovel.

"I started with some aluminum tubing to make the handle," he explains. "Then I went to the [metal] brake and bent some ninety-thousandths sheet aluminum to make the scoop. I welded the whole thing together, went home, and shoveled my driveway. Best shovel I've ever used."

Streeter Luck/Getty Images Sport/Getty Images

All of this exposure and one-on-one interaction gives fans the feeling that they know the drivers personally. It's not unusual for a fan to know the names, ages, and birthdates of a driver's entire family.

In short, NASCAR drivers are more accessible and approachable than probably any other professional athlete. The fans get to know them as people who, apart from having the coolest job in the world, are just like the rest of us. And that goes a long way toward building loyalty among fans, not only to the driver, but also to the sport *and* the sponsors.

DIY DRIVERS

One more area where fans can connect with drivers, as it turns out, is their shared DIY spirit.

In speaking with several drivers, it came to light that many of them have interests in woodworking and home improvement that go beyond just a name on their car. For many, the DIY spirit was as much a part of their upbringing as racing.

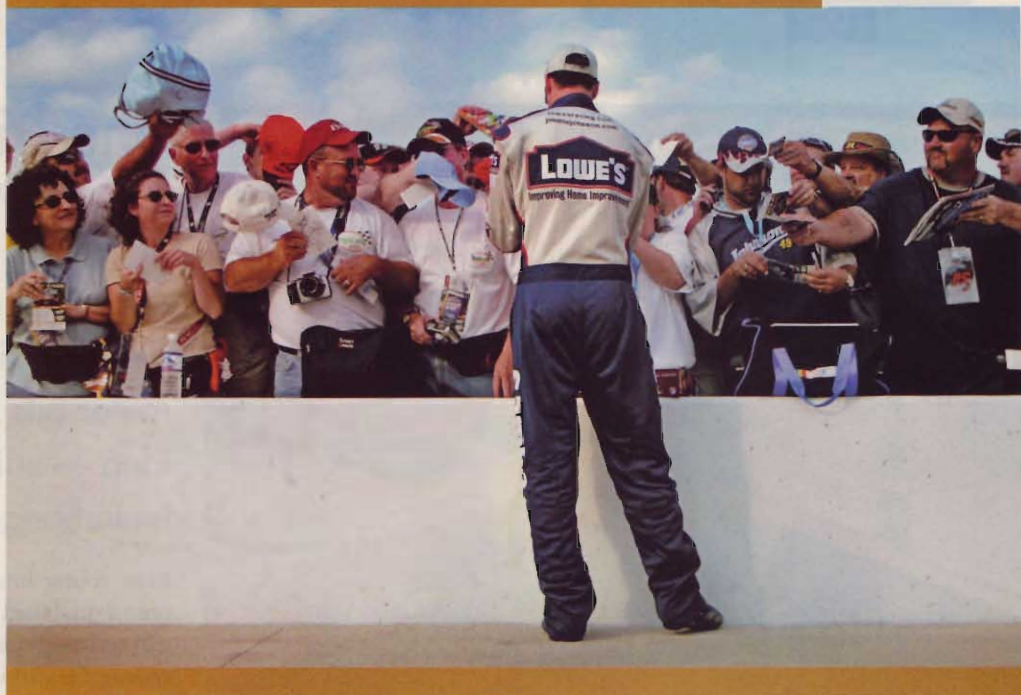
Tony Stewart, driver of the number 20 Home Depot Chevrolet, recalls being about 8 or 9 years old and helping his father build an addition on the family home.

"He wouldn't let me touch any of the power tools," Tony says, "but I sure bent a lot of nails. In fact, I probably bent more than I drove."

These days, Tony's demanding career makes it difficult to

work on projects, but he still gets his fill of the DIY lifestyle. "Being sponsored by Home Depot and making appearances at the stores ... it's like being a kid in a candy store," he says.

Kasey Kahne, whose number 9 Dodge Charger carries an associate sponsorship from Stanley (Dodge Dealers/UAW is the primary sponsor) also has fond memories of a hands-on youth. "My grandpa was a carpenter," Kahne recalls. "I built a few decks and barns with him, and I always really enjoyed the work."



Accessible, approachable drivers are an important part of NASCAR's popularity with fans and sponsors. Here, Jimmie Johnson signs autographs and greets fans at the pit wall during a practice session.

Kahne enjoyed it enough, in fact, that when asked what he might be doing if he wasn't a race car driver, his standard response is "carpenter."

Today, Kahne is an apartment dweller with little reason or opportunity for projects of his own, but

stainless-steel handrail that he welded together along an outdoor walkway. Oftentimes, Mayfield is content to withdraw to his personal shop and get away from the fast-paced racing life by building small woodworking projects like bird houses.

Even Chad Knaus (crew chief for the number 48 Lowe's Chevrolet that's driven by Jimmie Johnson), who admits to having absolutely no woodworking or home-improvement

experience, showed his DIY spirit to dig out of a freak snowstorm (see *Chad Knaus and His "NASCAR Shovel," left*).

CAN-DO CONNECTION

Whether it's a barn, a room addition, or a shovel, it's clear that the DIY, can-do connection to NASCAR is a strong one. It's a connection that runs from the sponsors to the cars, drivers, crew chiefs, and all the way to the fans. All indications are that it's a connection that's here to stay. 

I get asked a lot what I'd be doing if I wasn't a race car driver. All I can ever think of is "carpenter."

- Kasey Kahne

he's looking forward to buying some property and building a home. "I won't build it myself," he explains, "but I definitely want to be part of the process."

Kahne's teammate, Jeremy Mayfield, who also has Stanley as an associate sponsor on his number 19 Dodge Dealers/UAW Dodge Charger, is another died-in-the-wool DIY'er. In fact, Mayfield was featured on the cover of another DIY magazine for the work he's done on his current home, including a unique



one bit: MANY PROFILES

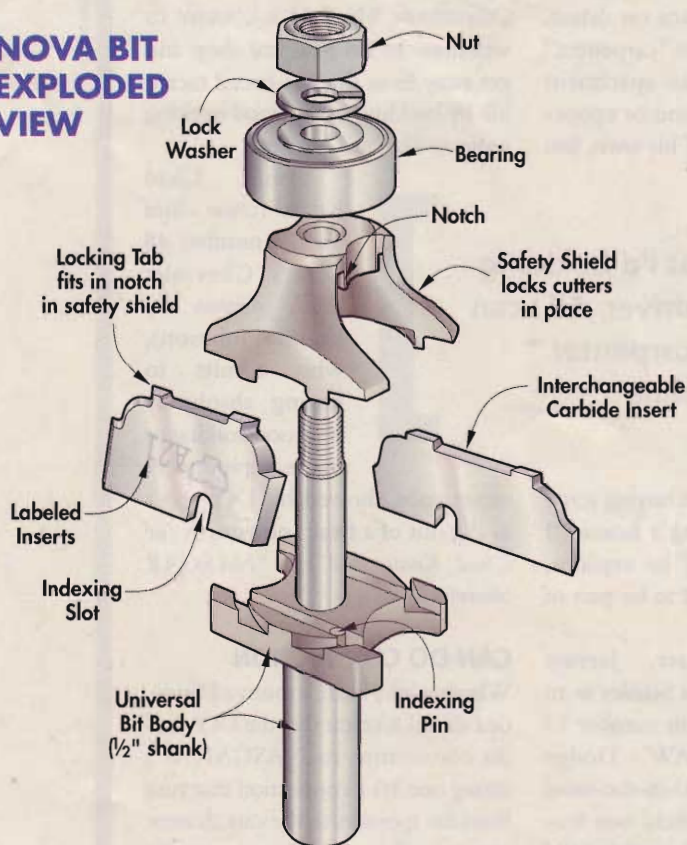
A handful of tool manufacturers are changing the way you look at router bits with a bold new idea — universal bit bodies with interchangeable carbide inserts.

Most router bits are made by brazing carbide cutters onto a machined body and shank. But recently, a few tool makers have broken this mold by making bits with interchangeable carbide inserts that simply bolt to the body.

These new “multi-bits” offer two distinct advantages. First, it’s less expensive to buy another set of inserts when you need a new profile than it is to buy a new router bit. Second, inserts are made from harder carbide than the carbide cutters brazed onto standard bits, so they stay sharp longer. (Carbide that’s brazed onto a bit *has* to be softer, or it will crack during the brazing process.)

We had a chance to try out several of these new bits. See our impressions below and on page 80.

NOVA BIT EXPLODED VIEW



AMANA TOOL'S NOVA SYSTEM

Of all these bits, the inserts in Amana's Nova System offer the greatest range of profiles. With just two bit bodies, you can create 28 different profile types.

There are two body styles available in the Nova System. Type A is a bearing-guided bit for making edge profiles, and Type B is a plunge bit for creating decorative grooves (see *Photo, above*).

Quick Changes — One of the first things I noticed about the Nova System was how easy it is to switch inserts. Indexing pins on the bit body correspond with slots in the inserts, so alignment is precise and automatic. A safety shield locks in place over the inserts, and the bearing and a lock washer are secured in place with a nut (see *Illustration, left*).

The system made it so easy to switch inserts, in fact, that I found it was easiest to make the changes in the router, without even removing the bit body from the collet. This eliminated hassling with collet wrenches and greatly simplified router setup.

Kits are available for both body types that include the bit body and three types of inserts for \$90. Additional inserts cost \$30. For more information or to locate a dealer, visit AmanaTool.com or call 800-445-0077.



▲ When the edges of Freud's Insert-Trim bit get dull, don't throw it out. You can rotate the square-shaped cutters three times.

FREUD'S FOUR-EDGE FLUSH-TRIM BITS

When the cutters on most flush-trim bits get dull, you have two options: throw the bit out, or send it off to be resharpened.

That's not the case with Freud's Insert-Trim laminate-trimming bits, though. They have square inserts with four usable cutting edges. When one edge gets dull, you can remove, rotate, and remount the insert three times for a "fresh" edge. The inserts are secured in place with machine screws and washers, making cutter changes quick and easy (*Photo, left*).

Combine these features with the high-quality carbide used on the inserts, and you should have a flush-trim bit that will outlast your old one by a long shot. When you consider how tough laminate can be on a router bit, having one that's going to last awhile can be a real asset.

You can buy Freud's Insert-Trim bits in both flush-trim and bevel-

trim varieties (*see Photos, below*) for anywhere from \$60 to \$70. And if all four edges get dull, a pair of replacement inserts is just \$5 more. For more information or to locate a dealer, visit FreudTools.com or call 800-334-4107.



INSERT
FLUSH-
TRIM BIT



INSERT
BEVEL-
TRIM BIT

COST COMPARISON

NOVA ROUTER BITS VS. STANDARD BITS

NOVA SYSTEM (One 3-Insert Kit)	\$90
Each Additional Set of Inserts	\$30
STANDARD PROFILE BITS (3 Bits)	\$120

FREUD'S FLUSH-TRIM BITS VS. STANDARD TRIM BITS

FREUD INSERT-TRIM BIT (4 Cutting Edges) ..	\$70
2 Replacement Inserts	\$5
SINGLE FLUSH-TRIM BITS (4 Bits)	\$80

INFINITY'S INSERT-PRO VS. STANDARD BITS

INFINITY SYSTEM (3 Raised-Panel Profiles) ..	\$250
3 Rail & Stile Profiles	\$270
RAISED PANEL BITS (3 Bits)	\$300
3 Rail & Stile Sets	\$300

RAISED-PANEL BITS: INFINITY'S INSERT-PRO

Infinity Cutting Tools recently introduced the Insert-Pro, an interchangeable router bit system for making raised-panel doors. At the heart of the system is a bit body that accepts inserts for creating beveled, cove, or ogee raised-panel profiles (*see Photo, right*).

The inserts self-register on the body of the router bit, and they are held in place with heavy-duty set screws. While standard panel-raising bits usually cost \$100 or more apiece, this system provides one profile for \$140, or all three different profiles for around \$250 (*see the Cost Comparison Chart at left*).

As a complement to this panel-raising bit, Infinity Tools also makes a combination rail and stile bit that



accepts inserts for creating three different profiles on the door rails and stiles. For more information on either of the bits in the Insert-Pro system, visit InfinityTools.com or call 877-872-2487.

TOOL Close-Up



kreg k3 POCKET-HOLE JIG

Kreg jigs have become synonymous with pocket-hole joinery. The company didn't invent the technique (the ancient Egyptians get credit for that). But their simple, affordable jigs were the first to make pocket-hole joinery viable for the home woodshop. Kreg continues to build on that legacy with their latest jig, the K3.

This design brings four new functional enhancements that make pocket-hole joinery easier than ever (*page 84*). And new kit options give you more choices for getting started with pocket-hole joinery in your shop.

Jig Anatomy — The heart of the K3 is an interchangeable drill guide. The guide has three drilling positions to accommodate all widths of stock (*Photo, left*).

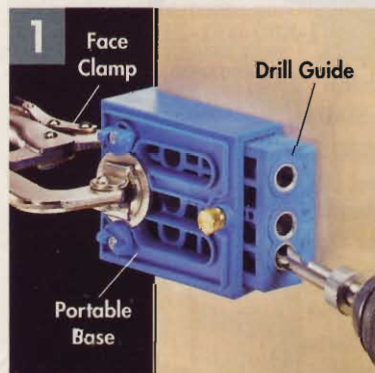
It's the interchangeability, however, that distinguishes the K3 from earlier models (*Box, below*).

New Kit Options — One of the best things about this new design is that there's no cost penalty for starting small and upgrading later. A standard K3 kit includes the drill guide, portable base, clamp, drill bit, and screws for about \$80. An upgrade kit includes a benchtop base, support stop, and dust collection shroud for about \$70. Or you can get all of that in a master system for \$150.

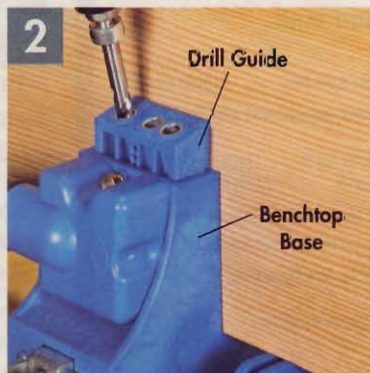


The K3 jig from Kreg Tools has several enhancements over previous models that make pocket-hole joinery easier and more accessible.

INTERCHANGABLE DRILL GUIDE ADDS VERSATILITY



The portable base is perfect for drilling pocket holes in large workpieces, such as cabinet sides.



For smaller workpieces that can be easily moved around, the benchtop base is the best choice.

The interchangeable drill guide that is at the heart of Kreg's new K3 pocket-hole jig transfers easily between a portable base (*Fig. 1*) and a benchtop base (*Fig. 2*).

The portable base functions much like Kreg's popular "Rocket" jig. To drill pocket holes, you attach the jig to the workpiece with a face clamp. This makes drilling large workpieces quite easy.

In the benchtop base, the K3 most closely resembles the K2 style of jig. In this case, the jig is attached to a benchtop or another sturdy work surface, and the workpiece gets secured in the jig for drilling.

In either case, the new jig is enhanced by three hardened steel drilling guides (rather than two on the K2 and Rocket models) that make it much simpler to position holes in workpieces of different widths.

KREG'S NEW K3 JIG ENHANCES FUNCTION

As easy as pocket-hole joinery is, the Kreg K3 simplifies it all the more with repeatable stock positioning, easier adjustments for varying stock widths, dust collection, and a better clamp design.

Repeatability — Drilling pocket holes in narrow stock requires careful positioning of the workpiece in the jig to avoid drilling too closely to an edge. Kreg addresses that challenge with a material support stop that makes it easy to mark the proper position of the workpiece, and then repeat it just as easily (Fig. 1).

Varying Thickness — Kreg also simplified setting up for different thicknesses of stock with an indexing system that properly positions the drill guide (Fig. 2). Other models require you to attach a spacer to the jig when working with stock thinner or thicker than $\frac{3}{4}$ ". Now you simply move the drill guide up or down in either the portable or benchtop base and secure it with a set screw.

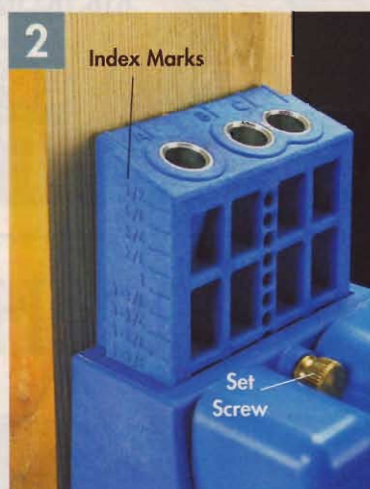
Dust Collection — Drilling pocket holes creates a surprising amount of wood chips. With previous models, most of that waste collected around the base of the tool. The rest of it wound up in the drill guides, which made drilling difficult. The K3 master system, however, includes a dust collection shroud that solves both problems (Fig. 3).

Front Clamping — The final improvement on the K3 is a front-mounted clamp (Fig. 4). This simple alteration eliminates having to reach around large workpieces to reach the clamp lever.



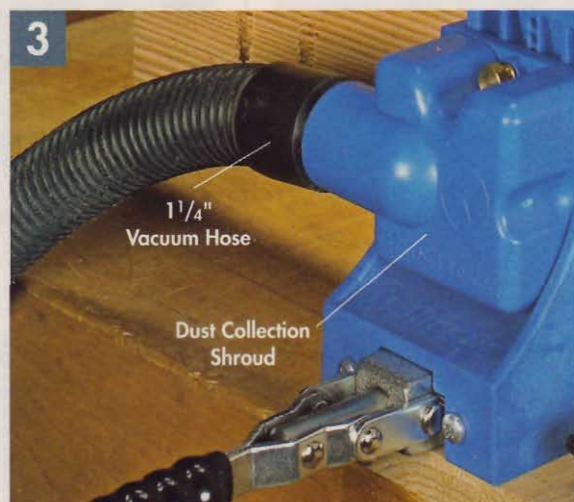
MATERIAL SUPPORT STOP

registers narrow pieces in the jig and simplifies repetitive drilling.



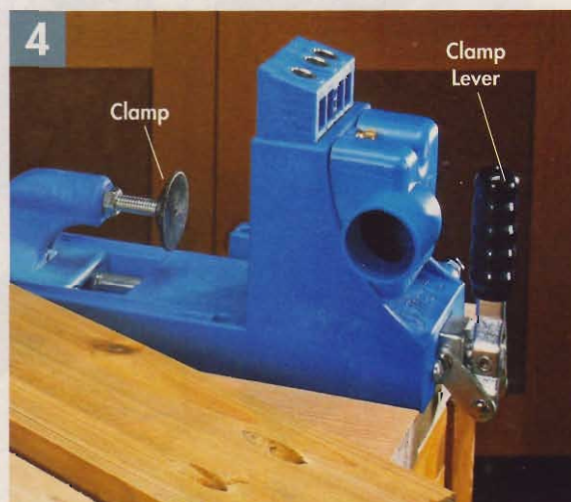
INDEX MARKS FOR STOCK THICKNESS

let you quickly adjust the drill guide to accommodate different stock thicknesses.



DUST COLLECTION SHROUD

accepts a standard $1\frac{1}{4}$ " vacuum hose, keeps the mess down, and prevents guides from clogging.



FRONT-MOUNTED CLAMP LEVER

eliminates the hassle of reaching around large workpieces to secure them in the jig body.

Tools & PRODUCTS

WORKBENCH
APPROVED

ridgid PIVOTING DRIVER

Ridgid's new 9.6-volt pivoting screwdriver is a good tool to have when you're in a tight spot or need a little extra reach. The cordless driver features a pivoting head that lets you choose between a conventional right-angle configuration or an inline setup (*Photo, left*).

I've found this tool to be just the ticket for working overhead. The inline configuration makes it easier to apply pressure in a straight line. And the slim profile of the driver when it's in the inline position means it will reach into tight spaces a regular drill never could.

Additionally, a two-finger trigger helps you keep a solid grip on the tool in any orientation. The 9.6-volt battery also provides a very workable balance of power and light weight that's important when working in awkward positions.



▲ Working overhead isn't quite the "stretch" it used to be thanks to Ridgid's pivoting driver.

Other impressive features of the R81030 include a durable die-cast gear box, a 1/4" quick coupler for rapid bit changes, variable speeds from 0 to 525 rpm, and 100 in. lbs. of torque. The kit includes the driver, two batteries, a 30-minute charger, and a soft-sided bag.

Look for the Ridgid R81030 at Home Depot for about \$100. Visit Ridgid.com or call 800-474-3443.

DRILL DOCTOR EXPANDS SHARPENING SKILLS

Drill Doctor recently upgraded their flagship drill bit sharpener, the model 750, to sharpen a wider range of bit sizes and types, as well as to enhance precision and ease of use.

The new DD750X will now sharpen high-speed steel, black oxide, carbide, TiN-coated, cobalt, and masonry bits from 3/32" to 3/4" with a single chuck (previous models require two chucks to sharpen the same range of bits).

The tool also allows users to set sharpening angles between 115° and 140°. This makes it possible to match the existing angle of twist or split-

point bits or create custom angles for specific drilling applications.

Longer jaws on the chuck, a one-piece alignment system, and tool-free wheel changes make the sharpener much more user-friendly than previous models.

The DD750X sells for about \$200. Visit DrillDr.com, or call 800-597-6170 for more information on the entire line of Drill Doctor sharpeners and accessories.

► The Drill Doctor DD750X is a "one-size-fits-all" sharpener for just about any imaginable type of twist bit.



BLACK & DECKER ALLIGATOR SAW



Black & Decker's new Alligator Lopper is the must-have yard-and-garden tool for the coming spring. This ingenious lopper/chain saw hybrid offers outstanding cutting capacity in a safe, simple-to-use tool.

The Alligator works like an enormous pair of scissors. Simply open the jaws, and place the lower jaw against the branch or stump to be cut. Depress both triggers (one on each handle for safety), and close the scissors to let the chain do its work.

The cutting is virtually effortless, and there's little chance of the kickback often experienced with a conventional chain saw. We had no problem taking down branches up to 4" in diameter.

The Alligator Lopper (LP1000) sells for around \$100. For more information, visit BlackAndDecker.com or call 800-544-6986



▲ The simplicity of scissors, the power of a chain saw — Black & Decker's Alligator Loppers are the perfect tool for cutting branches up to 4" in diameter.

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Product Information Number 186

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- ▶ Mounts almost anywhere.
- ▶ Switch lights up when powered.

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- ▶ Includes top, fence, miter track, predrilled router insert plate and cabinet.



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www.benchdog.com

Product Information Number 219

GLASS TEXTILE WALLCOVERING

TURN PROBLEM WALLS INTO PERFECT WALLS USING THIS REINFORCED WALLCOVERING. IT HIDES IMPERFECTIONS, HAS A UNIQUE TEXTURE, AND CAN BE PAINTED TO MATCH ANY DÉCOR.

While working on the staircase project (page 44), we ran into damaged drywall around the treads. We taped and plastered, but still didn't end up with a surface that would transition gracefully to the new wood stairs.

Then I remembered hearing about a wallcovering product made of fiberglass that's long been used for restoration projects in Europe. This "textile" wallcovering is designed to cover less-than-perfect walls, so it seemed worth looking into as a possible solution to our drywall problem.

A Different Wallcovering — Right off the roll, the texture of this wallcovering stood out — literally. It felt like a stiffer version of fiberglass drywall joint tape. Like joint tape, this wallcovering is made from strands of glass that are woven together. The result is a very durable material with a three-dimensional, cloth-like texture that ranges from a subtle linen weave to more pronounced patterns.

A Problem-Solving Product — The stiff surface and substantial texture of the wallcovering made it great for bridging the gaps between the torn-up drywall and the stair risers (Before Photo, above). The glass fibers don't stretch or shrink, so the wallcovering keeps its shape. And it retains that stiffness once it's applied,

so the weave hides cracks and irregularities in the wall (After Photo, right). You can even cover paneling or concrete block with it.

Easy Application — Applying the wallcovering also turned out to be a pretty simple matter. Because it's intended to cover imperfections, you don't need to spend as much time on surface preparation. And hanging this wallcovering doesn't require any fancy tools or skills — only what you would normally use for a standard wallpapering job. You just roll the adhesive onto the wall, and then smooth on the wallcovering. There's very little mess this way. The wallcovering cuts cleanly, too, with no tendency to tear (Photo, top right).

Paintability & Versatility — Glass textile wallcovering is only available in white — but it isn't meant to stay that way. Once it's on the walls, you paint it any color you like. And you can repaint it up to eight times before the pattern loses definition. So you're not stuck with a particular color scheme, and the walls can change with your décor.

Considering its durability and versatility, glass textile wallcovering is priced competitively with other high-end wallcoverings — around 50 cents per square foot. This is particularly reasonable when you factor in all the prep time you'll save patching and plastering. 



BEFORE



AFTER

▲ Glass textile wallcovering cuts easily (Upper Photo) and is very rigid, making it ideal for the problem walls of this staircase.

Sources:

JOHNS MANVILLE
JM.com/Textra
800-654-3103

ROOS INTERNATIONAL
Texturglas.com
800-888-2776

NEWTEX
Newtex.com
800-836-1001

► The wallcovering is available in a wide variety of patterns. Three examples are (from top to bottom): Victorian Lace, Textured Twill, and Biscayne Berber.

small houses that LIVE LARGE

When it comes to home size, designer and builder Jay Shafer believes that less — a lot less — is really more.

Today's home builders and buyers seem to agree that a bigger house is a better house. If you need proof, just drive through any new housing development. Or look to the National Association of Homebuilders. Their research shows that the *average* home in the U.S. has doubled in size over the last 50 years, to more than 2,300 square feet.

But some builders are bucking this trend. They believe that a better house is one that's smaller, with fewer rooms that work harder. On the extreme end of this philosophy is California builder Jay Shafer. He believes that if smaller is better, then tiny is better still.

Living Small — To prove his point, Jay built and began living in a 100-square-foot house in 1997. Today, he designs and builds these very small homes through his Tumbleweed Tiny House Company. All of the homes are built with the same philosophy: A well-designed small house is like a big house with the unnecessary space stripped away.

Fitting It All In — Of course, there's no way to fit every amenity into a tiny house, but you might be surprised to find out just what Jay can manage to pack in. The house he lives in today (he sold the first one in 2004) has just 70 square feet of space (Photo, top right).

But in the living area of this tiny house, you'll find a retractable table and vanity, a desk, and a built-in couch. A steep roofline provides space for a cathedral ceiling and a sleeping loft large enough for two.

The kitchen has everything a person needs for cooking (Photo, below). And the bathroom includes what you'd expect: a shower, sink, and toilet. Plus, the home offers 100 cubic feet of storage space.

Options for Tiny Homes — If you think you'd fit into a tiny house, Jay offers several "stock" home plans (most bigger than this one) as well as custom designs. You can order the structure ready to move into, buy a shell that you finish yourself, or just get a set of detailed plans. To learn more, visit TumbleweedHouses.com.



As the Photo, above, and floor plan at right show, a tiny house can still have all the amenities. In this kitchen, the stainless-steel counter and sink sit above a refrigerator and storage for a double-burner stove. A toaster oven takes care of baking, while a wall-hung propane heater keeps the house toasty warm.



The "XS" house (for extra-small) is one of several designs by the Tumbleweed Tiny House Company. This home features an amazing array of amenities in just 70 square feet. The house is so small it can be carried by trailer to your site and set in place. Or leave it on the trailer, as owner Jay Shafer does, to limit building-code battles.

"XS" FLOOR PLAN

