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OLD-TIME WOODEN WAGON

Page 51
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EDITOR'S ANGLE

Even our ad sellers get into the woodworking act

Brenden Delaney showing off his heirloom cradle—a real hit at his house.

Our direct-response ad staff gathering pearls of woodworking wisdom from Jim Boelling.

I realized a long time ago that to be successful in the woodworking publication business, you've got to know the subject matter well. That's why at WOOD\textsuperscript{\textregistered} magazine, we have plenty of technical expertise on staff and a stableful of free-lance specialists at the ready when we don't have all the answers.

This same philosophy spills over into our ad-sales department as well. We know that advertisers like to work with people who at least understand the fundamentals of woodworking. Because of this, all of our ad sellers, several of whom work out of New York City offices, get to spend a day in the shop with Jim Boelling, WOOD magazine's project builder.

Recently, three of our sellers—Brenden Delaney, Victoria Peleyger, and Grace Chung—made the trek to Des Moines. This was a hands-on woodworking first for Victoria and Grace. But after a few hours of building a heart-shaped bandsaw box with Jim, Grace said, "Until today, I thought that woodworking was humanly impossible to do. My next project will be the tall clock" (from Issue 53). How's that for confidence! Victoria added, "I had a little trouble with the bandsaw at first, but by the day's end, I felt like a pro."

Brenden, the third member of the group, has had considerable hands-on experience remodeling his home in New Jersey. And as the photo above right shows, he isn't afraid to tackle a major woodworking project, either.

Hot off the press
Looking to build a few terrific projects for your deck, patio, or lawn? Or are you the type who wants to improve your woodworking with a ton of hardworking shop tips? With our latest two publications, we've got you covered. See our ad on page 87 for 300 Great Shop Tips, Volume II\textsuperscript{\textregistered}, a compilation of our best tips from issues 36-70, and our hot-off-the-press WOOD Magazine's Best Outdoor Projects\textsuperscript{\textregistered}.

Larry Clayton

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WOOD

THE WORLD’S LEADING WOODWORKING MAGAZINE

JUNE 1994

ISSUE NO. 70

CRAFTSMAN CLOSEUP

The detail master keeps them rolling ............. 31

When his area’s steel mill closed in 1986, Pennsylvanian Tom Rollison suddenly found himself out of work. Then, he discovered wood. He developed a line of model cars, trucks, and trains to sell and, in a few short years, ran a successful business. Today, Tom couldn’t be happier.

WHAT WOODWORKERS NEED TO KNOW

Bandsaw blades .................................. 36

Gather in our nuggets of bandsaw-blade wisdom as we look at blade selection, tooth differences, uses, and wear.

Ace-of-hearts triplane whirligig ..................... 38

What’s up? Try our clever World War I-era prop plane, complete with pilot and waving scarf. You’ll find the full-sized plans inside.

WOOD® magazine builds a solar kiln ............. 44

Dry your own lumber after building the hardworking 8×8×12’ kiln shown here. For the best results, order our blueprint plans.

Nine-issue index .................................. 47

Find the wood projects, techniques, features, and tool-buying stories of issues 59-67 quickly and easily with this handy reference.

The fun-time racer ............................... 51

Delight your child or grandchild with an heirloom project that’s based on an actual antique design. Our wooden wagon is tough, good-looking, and promises years of service to the lucky recipient.

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The LUB5 is a precision cut-off saw, ideal for your mitre saw or table saw, for the cutting of natural woods, low pressure laminates and mouldings.
Sourcuses for thin plywood
Can you recommend a vendor for the 1/4" oak veneer plywood required for the "Bowfront Table" in the November 1993 issue?

—George Tracy, Murfreesboro, Tenn.

We found 1/4" oak plywood, as well as other thin and bendable plywoods in the catalogs of these retailers:

Boulter Plywood Corp.
24 Broadway
Somerville, MA 02145
617/666-1340

Constantine's
2050 Eastchester Road
Bronx, NY 10461
800/223-8087

Too fast can be rough on the lathe
In the article "Low Cost Lathes," in the October 1993 issue, the comment "We found this low speed handy only for boring with large drill bits" concerning the AMT 4370 lathe missed the purpose of the speed changer. The low speed of 275 rpm allows rough turning of 10" and larger diameter pieces of wood with a minimum of vibration. An out-of-balance turning block of this size spinning at the 500-550 rpm the article found "handy for turning large, out-of-round workpieces" will cause intense vibration in any lathe, and poses a safety hazard with some lathes.

—Scott Yeagle, American Machine & Tool, Royersford, Pa

Address correction
The address for Alltor Products in the buying guide for "What a Show-off" display case in the January 1994 issue should be: 496 Danbury Road, Wilton, CT 06897. The phone number, 800/688-2693, is still the same. We apologize for any inconvenience this may have caused our readers.

Continued on page 8
RBI Woodplaners
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"RBI's 5 HP motor is capable of sustaining a continuous load for a longer period of time than the other motors on the other two models tested"
— Wood magazine product review of RBI, Woodmaster & Belsaw Planers—August 1993

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TALKING BACK

Continued from page 6

More on food-safe finishes

The article on food-safe finishes in the October 1993 issue was very informative, and I commend you on trying to make everyone more aware of toxic chemicals and finishes. As manufacturers of wooden furniture-related products, our opinion varies slightly from the article. On our products we use a finish called Block Oil, a completely safe, natural, and non-toxic combination of oils and waxes blended specifically for food surfaces. You can order a 12-oz bottle of this finish by sending $5.95 plus $2.00 shipping to: Laska Stuff, 3787 Broadway, American Canyon, CA 94509. Call 707/644-8303.

The fact that an oil does not dry completely is not bad for a food item, as it continues to protect the wood and prevent the absorption of moisture. We do not feel the introduction of a drying agent, either toxic or non-toxic, can be beneficial to the wood.

—Steve Sparks, Laska Stuff, Rochester, Mich.

I can still do it!

I'm 69. The article written by Larry Clayton about Bill Boian, age 101, leads me to believe I have more good years than I thought to pursue my woodworking hobby. I took my first manual art class in 1941, and I was the first girl to enroll.

—Pauline Groseclose, Gautier, Mo.

Tung oil is food-safe, too

There are several pieces of misinformation in the article "Food-Safe Finishes" in the October 1993 issue. I feel that comments about any food-safe finishes should be based on material from the Food and Drug Administration and not from manufacturers and vendors of competitive products.

The FDA approves tung oil for food-contact applications and as a binder for pills. In that second use, it is directly ingested. There are very few finishes that are safe for food contact, and it always troubles me when people are frightened away from one of the few finishes available.

—Leonard G. Lee, Lee Valley Tools, Ottawa, Ont.

In response to your letter, Leonard, we spoke with Marie Falcone of the FDA's Small Manufacturer Assistance Branch. She told us that tung oil (China wood oil) is indeed an FDA-approved finish for wooden items used with food.

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WOOD MAGAZINE JUNE 1994
Hunting the elusive 7474
Your February 1993 issue featured an article "Random-Orbit Sanders". I've tried to buy the Black & Decker 7474 sander, partially because of its pad-braking system, but have not been able to find one. Can you help me with this?
—David Cutsbail, Pittcairn, Pa.

For an answer, Dave, we contacted Anita Galloway of Image Dynamics, the public relations firm for Black & Decker. Anita said the 7474 Sanders are available on a limited basis, usually in hardware stores, but for the most part have been replaced by the Black & Decker Quantum line of Sanders. The Quantum models B5100 (single speed) and B5200 (variable speed) are similar to the 7474 sander, but are colored red instead of black. Both models include the pad-braking system that you found attractive in your test report.

Lumber sticking revisited
We received a number of letters concerning the article "A Lumber Stickler in the Family Tree," in the Ask WOOD magazine in our October 1993 issue. Our research showed that a lumber stickler is one who grades lumber using a scaling stick. Here's what two readers had to say:

The job described in your article is known as a lumber scaler here in the northeast. A lumber stickler's job is to stack lumber in the mill yard. The boards are stacked in layers with narrow strips of wood or "stickers" placed between the layers to allow air to circulate while the wood dries.
—Donley Goodridge, Craftsbury Common, Vt.

A "stickman" is a man that stacks lumber by layering the boards with narrow sticks placed between the layers. The lumber is stacked by species and grade, in piles up to twelve feet wide and as high as can be reached. Assure Jimmy Smith that his great-grandad had to be good at his job or he would not have had it. It was a job that called for a lot of skill and judgment.
—Carl Mowrey, Wardsboro, Vt.

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We try not to use shop tips that have appeared in other magazines, so please send yours to only one. We do not return shop tips. Mail your tip(s), address, and daytime phone number to:

Top Shop Tip
WOOD Magazine
1912 Grand Ave.
Des Moines, IA 50309-3379

Bottom's-up solution for sliding shelves
Flat shelf supports keep your shelves from falling down, but they don't always stop them from sliding forward.

TIP: Turn one of your shelf supports upside down and cut a saw kerf in the shelf that will accept the angled brace on the bottom of the support. Slip the kerf over the inverted brace and the shelf will stay put. To avoid overloading the inverted shelf support, use these only on shelves that are lightly weighted.

—Alan Wolke, Phillipsburg, N.J.

Boom provides power right above your bench
Electrical cords that get draped across a benchtop are ripe for damage, and such a situation could easily result in a serious electrical shock.

TIP: If you plug in your tools above the bench instead of behind it, you won't have to drag cords across the work surface. For an overhead outlet that goes where you need it, fashion a boom, like the one shown, from 1x4" and 1x2" boards. It should be long enough to extend from the back of the bench to slightly past the bench front. Attach a power strip to one end, and hinge the other end to the wall behind the bench. For a long boom, add a guy wire from the free end of the boom to a point on the wall above the hinge. Rout a groove for the power cord, to avoid damage. Add a clamp-on reflector lamp for a simple, adjustable worklight.

—G. E. Wadlau, Painesville, Ohio.

Shims steady tools on a wavy workshop floor
You rarely find a garage or basement with a perfectly smooth and flat concrete floor. And for most of us, that's the workshop floor. If you move your equipment around at all, you can spend a lot of time trying to steady it in each new location.

TIP: Buy a package of pine shims, the kind lumberyards and home-center stores sell for installing windows and door jambs. Drill a hole in the thicker end of each shim and tie a loop of twine through it. Hang one of these modified shims on each piece of equipment. Now, when you move a tool, you can steady it instantly by sliding the shim under the wobbly leg.


For his terrific tip, G. E. will receive a Black & Decker Quantum variable-speed random-orbit sander, shown above.

Continued on page 12
CRAFTSMAN! The Standard In Radial Saws... For Generations

The radial saws that helped make Craftsman a household name are now more accurate and easier to align than ever before.

We built our first radial arm saw in 1956. And we've been building on that design ever since. Our newest radials incorporate improvements such as our revolutionary new blade guard that will make Craftsman an industry leader for generations to come.

You can crosscut, rip, miter, or bevel cut, and with easy to install accessories, you can create dados and decorative molding, route, drill, sand or plane. No other tool lets you accomplish so much with such ease or accuracy.

The new Craftsman radials are on display at your nearby Sears store.

CRAFTSMAN® Only at Sears
Magnetic guide points way to better bandsaw cutting
Setting up and adjusting the fence is a lot of bother when you just want to make one quick cut with your bandsaw.

TIP: Make a handheld guide like the one shown for fast, accurate bandsawing parallel to an edge. Cut the guide body from hardwood stock 1 1/8 - 1 1/2" thick. Bore a hole into the bottom where shown to receive a strong magnet—one salvaged from a 10 - 12" speaker, for instance. Bore deep enough that the magnet will stand out from the bottom surface about 1/2". Add a knob or handle, if desired. Epoxy the magnet into place. If your bandsaw has an aluminum table, leave the bottom of the guide flat and adhere a piece of non-skid router mat to it.
To use, start bandsawing on your cutting line. Then hold the point of the guide against the stock adjacent to the blade to maintain a constant cutting width.

**A broomstick collet holds small carvings**

The main problem in carving small pieces, such as the head of a two-part figure, is hanging onto the workpiece.

**TIP:** Start by carving a round tenon on the workpiece (this can be the tenon that joins the carving parts or a temporary one). Next center a hole the size of the tenon and about 1½" deep on the end of a 6-8" length of broomstick or 1-1½" dowel rod. With a bandsaw or scroll saw, cut two kerfs across the broomstick's diameter, 90° apart and as deep as the hole. Slide the tenon into the hole and tighten a hose clamp around the end to secure the carving. Now, you can hold the broomstick collet in a vise or in your hand.

—Albert Heaton, Granite City, Ill.

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**Shop-made wooden scraper won't mar refinishing job**

Using a steel putty knife to scrape off stripper-softened paint or other finishes can scar the furniture you're trying to refinish.

**TIP:** Make a scraper like the one shown below from ¾" pine or some other soft-textured wood. Cut the tool to shape with your scrollsaw or bandsaw and then taper it to an edge by sanding. Round over the handle edges for comfort. The wooden scraper won't nick the wood you're stripping, and the corners won't dig in as you lift off the old finish.

—Sam Stucki, St. George, Utah

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Continued on page 14

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“**A good, strong way to join corners is with a finger or box joint.**”

Tune in to The New Yankee Workshop on PBS to see what Norm's up to this week. Nationally funded by THE POWER OF THE PROS PORTER CABLE DELTA WOODWORKING MACHINERY

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Continued from page 13

Old sabersaw makes quick work of filing
Your old sabersaw still runs, but you'll probably never saw with it again because you enjoy your new one so much. It seems a shame to throw it away, though.

**TIP:** If you frequently file fretwork or other inside cutouts, that old sabersaw can help. Drill the blade holder to accept the tang of a small jeweler's file. Then, mount the saw in a simple stand built from scrapwood. Drill ¼" mounting holes in the saw's base to attach the saw to the stand with ¼" flathead machine screws. Countersink the mounting screws on the stand's top surface. Clamp the unit securely to the workbench, then make quick work of that tedious filing.

—Elliot Bogart, Tampa, Fla.

### Protective pads stay put and support clamps, too
Pipe clamps will dig right into the wood unless you put some protection between the jaws and the wood. Trouble is, you can't hold the pads in place, align the workpieces, and tighten the clamps with just two hands.

**TIP:** If you attach the clamp pads to the jaws, you won't have to fuss with them when your hands are full. Cut pads similar to those shown to fit your particular clamps. You want the large hole to fit the pipes yet allow free movement. Drill holes for #6 or #8 sheet-metal screws where indicated, and attach the pads to the clamp jaws. For further protection, glue a leather facing to the clamping area on the pad. The pad design shown offers a bonus, too: The wide bottom allows you to stand the clamps on a bench or sawhorses for easier clamping.

—Hayden C. Jones, Shenandoah, Iowa

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Keep cuts under control with a two-legged pushstick
A pushstick keeps your fingers way from harm, but sometimes you'd feel more in control if you had better contact with the wood. Bandsawing is one of those times.

**TIP:** Make a two-legged pushstick like the one shown at right for better bandsawing. Cut it from 3/4" plywood. In use, push the workpiece with the short leg; hold it down and control its movement with the longer one.

—Clarence G. Searles, San Francisco

Extra holes help Workmate grab short, narrow work
Workmate portable workbenches can hold almost anything. But they have a hard time holding on to a short, overhanging piece of 1x2 or 1x4.

**TIP:** Drill an extra pair of holes, one in each Workmate jaw. Locate the new holes (C) in relation to existing holes A and B, where shown. Insert the standard Workmate dogs into holes A and C to take firm hold of stock that's short and narrow.

—Michael Corington, Athens, Ga.
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TIPS FROM YOUR SHOP
(AND OURS)
Continued from page 15

Flashing and sandpaper team up in the tight spots
Sanding blocks and most portable power sanders don’t reach into small spaces well, and band sanding in tight spots can wear out your fingers.

TIP: Create your own custom-shaped sanding plates from flashing material. With a pair of tin snips, cut the shapes you need from the 28-gauge aluminum roof flashing you find at most hardware stores. Attach adhesive-backed sandpaper to the flashing and trim to size. The rigidity of the flashing enables you to maintain firm pressure, especially when you’re sanding in areas where your fingers can’t reach.

—William J. Carroll, Dallas, Pa.

A FEW MORE TIPS FROM OUR WOODWORKING PROS

* With a piece of scrapwood, you can build a doweling jig that automatically aligns rails and stiles. See our door-building article on page 64 for this technique.

* If crafting a perfectly round wooden circle seems difficult, check out our circle-sanding jig on page 86.

* Drilling into dowels just got a whole lot easier. With our two easy-to-build V-block dowel holders on page 84, you can securely and accurately drill into the side of a dowel, or even into the end. ♦

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Tune in to the New Yankee Workshop on PBS to see what Norm’s up to this week. Nationally funded by

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Be sure to watch the PBS television show “The American Woodshop” during April when host Scott Phillips pays a visit to the WOOD magazine IDEA SHOP.

Phillips spent a day early last November in Des Moines, Iowa, talking with the editors of WOOD magazine on the topic of workshop design. Then, Design Editor Jim Downing guided him through the many innovations of the IDEA SHOP that will be seen on the program.

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The program, titled “Designing the Ultimate Woodshop”, will discuss workshop design considering safety, workflow, dust collection, storage, plus tool layout and placement, using the IDEA SHOP as a model.

The American Woodshop program blends traditional methods of woodworking with the latest techniques to show viewers how to complete projects safely at home. Phillips also travels the country to meet other artisans at work in their shops.

To discover exactly what he found out at the IDEA SHOP, check the listings for your local PBS station in April to catch the program.

YESTERDAY’S TOOLS

A stand-up plane for flattening floors

THIS TOOL WAS MADE FOR WALKING

Players in the old-tool collecting game often have to figure out a few things when they spot a newly uncovered treasure. What does this do? How does it do it? Who would have used it, and when?

Sometimes, the answers come easily. Consider, for instance, the plane shown below. It weighs in at more than 20 pounds and has a pole almost four feet long for a handle. Even at first glance, you know it has to be for floors.

This Stanley 74 floor plane was designed to do one thing—to plane flush the uneven joints of wooden-plank floors. Like so many specialized tools, this one represents a simple variation on a standard workshop implement.

When the 74 first appeared around 1886, all America stood on wood. Practically every home featured wooden-plank floors. Wood was underfoot in skating rinks and ballrooms, classrooms and gymnasiums, saloons and butcher shops, trams and train cars. Ships had wooden decks. All those plankedy floors needed to be planed.

With the pole-handled Stanley 74, a craftsman could stand up to do the job rather than get down on his hands and knees. A tapered end on the 1 1/4-inch-diameter wooden pole slips into a socket on the plane body. The socket pivots up and down at a point right behind the plane’s frog. A pair of hand grips can be positioned anywhere on the pole.

The plane itself is a heavy iron casting (later models weigh about 21 pounds, early ones half that). Less than 10 1/2" long by 4 1/2" wide, the slightly coffin-shaped body looks decidedly chunky. It carries an iron 2 1/2" wide.

Last manufactured in 1923, the Stanley 74 commands a price today that floors many people—$800-900 for one complete with handle and grips. A plane without the handle brings $200 or less, depending on condition.


Photograph: John Hetherington

Stanley's no. 74 floor plane lets workers stand up, making it easier to put more oomph into the job.
Say you've always wanted a good band saw. Or you've about given up trying to make precision cuts with your hand-held circular saw. Or perfect holes with a portable drill.

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Whether your woodworker's license reads "Beginner," "Intermediate," or "Advanced," you're bound to have a few questions about your favorite hobby. We can help by consulting our staff and outside experts. Send questions to: Ask WOOD®, Better Homes and Gardens® WOOD Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379

Miter saw markings seem backwards
Please explain why miter saw manufacturers mark their tables 0° to 45°, when in relation to the standard fence, it should be 90° to 45°. With the current markings, cutting a 22½° angle as marked on the saw results in a 67½° angle on the board, measured from the fence.

—Perry C. Benton, Vacaville, Calif.

We had to shake the rust off of our our geometry skills on this question, Perry. When cutting miters, we're concerned with the degrees of angle measured from the line perpendicular (or square) to the fence. (See drawing right.) These traditional markings on miter saws (including hand miter boxes) correspond to the formula for calculating the miter angles needed to cut the joints of a case or a molding.

This formula is:

\[(360° \div \text{number of sides}) + 2 = \text{angle of cut}\]

Using the example of 22½° (for 8 sides):

\[
(360 \div 8 \text{ sides}) = 45° \div 2 = 22½°
\]

Setting the miter saw at 22½° off the perpendicular will give you the proper angle for an eight-sided box or molding.

The 67½° you mentioned, measured from the fence, is the complementary angle to the 22½° miter angle we want to cut for an eight-sided box. To figure miter angles measured from the fence would require a whole new set of formulas to calculate the angles for cutting miters. We have enough fun dealing with the one that exists.

Continued on page 22

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ASK WOOD

Continued from page 20

Mothballs and cedar don’t mix

We recently inherited the cedar chest my father-in-law built in 1937. Is there any way I can get the smell of mothballs out of it?

—Kathie Riedl, LaCrosse, Kan.

For an answer, Kathie, we contacted John West of West Metro, an odor-control company in Altoona, Iowa. He told us: “Use a water-soluble odor counteractant to remove the smell of the mothballs. Mix this with water, and spray a fine mist on the inside of the cedar chest.” John recommended that you contact a chemical-supply business in your area for the odor counteractant.

We located a supplier for a water-soluble odor counteractant called “Eliminator,” available for $9.95 per quart from:

Heartland Chemical
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You can restore the original fragrance of the Eastern red cedar by lightly sanding the surface. This will allow inner oils to return to the surface of the wood, complete with a pleasant, cedar aroma.

The board flew apart

I was ripping a piece of parana pine, when the strip I was cutting started to curve. I used a wedge to keep the kerf open. When I was about 12” from the end of the board, the board exploded into two pieces. Why did this happen?

—James T. Rucker, Houston

We suspect, Jim, that you found a board that contained “internal stress.” This develops in trees grown on steep slopes, or any other situation where one side of the tree has more stress on it than the other side as the tree grows.

Apparently, this particular board had been cured and flat-planed, and the internal stresses were balanced enough for the board to remain straight. When you started to rip the piece, you changed the balance of stress, and the wood came apart.

You can detect this internal stress in soft woods by a dark streak or an abrupt color change in the board. The compressed grain makes this wood harder to work, more brittle to use, and this wood requires extra caution while machining.

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A nifty thread-making attachment for lathes

I've always enjoyed turning small wooden vessels, and have long dreamed about producing such vessels with threaded lids. Recently, I tried a product that makes my wish a reality.

The Threadmaster system consists of a thread-cutting bit that mounts to a drill chuck on the headstock of your lathe, and a feed mechanism that mounts to the lathe bed and holds your workpiece. (Chuck shown in the photos at right is not included with the product.)

To produce a lidded vessel, you need to first turn the vessel and its lid in the usual fashion. Then, remove your workpieces from the lathe and put the Threadmaster components into place. By rotating two cranks on the feed mechanism, you control the cutting depth and rate of thread cutting.

To test the product, I turned numerous vessels and lids ranging from 2" to 8" in diameter, in maple, cherry, and walnut. I quickly discovered that I got the smoothest possible cuts with my lathe set to its highest speed. I further reduced chip-out by making my cuts in three passes.

After practicing with the product for a few days, I produced vessels that fit together perfectly, with near-flawless threads. Because I used the product on my self-sized lathe, I needed an optional extendor bolt ($10 from Penn State Industries). This allowed me to place the feed mechanism on a wooden block so that I could raise smaller vessels up to the cutting bit. The standard Threadmaster cuts 10 threads per inch, which seemed fine for the projects I produced. You also can buy optional threaders that produce four or 16 threads per inch ($59 each).

—Tested by Lee Gatzke

Threadmaster, $242.95 ppd. from Penn State Industries, 2850 Comly Road, Philadelphia, PA 19154. Call 800/377-7297 to order, or 215/676-7609 for more product information.
Save your back: ramp kit eases loading and unloading
Most home woodworkers encounter some heavy lifting, whether it be bringing home a new stationary tool or delivering a large furniture piece. A dolly helps on flat ground, but what do you do when you've got to hoist something up two or three feet? The Insta-Ramp Combination kit tackles this problem by enabling you to convert a pair of 2x8's into a stable ramp that can handle loads up to 1,400 pounds.

The kit consists of two sturdy steel ramp tops, two rubber ramp feet, and the necessary hardware. The tops bolt to 2x8's that you supply, and the rubber feet slip over the lower ends. Using these ramps I easily loaded and unloaded a boxed-up bandsaw weighing 150 pounds. Heavier loads also tracked steadily up the ramps, but I did need a helper pushing from below.

If you've got a vehicle with a tailgate, these ramps will come in handy. They make loading and unloading much safer, and they'll keep your back out of the chiropractor's office too.

—Tested by Bob McFarlin

Insta-Ramp Kit, about $35, at hardware and homecenter stores or call Universal Industrial Products at 800/922-6957.

Continued on page 26

The Dremel Moto-Tool® is the compact, high-speed rotary tool that's extremely versatile. With speeds from 5,000 to 30,000 rpm and more than 150 available bits, it lets you handle almost any job. Use it on wood, metals, ceramic tile, glass, fine silver, plastics, laminates and more. Look for our book 175 + USES in specially marked Moto-Tool packages where power tools are sold. Or write: Dremel, Dept. W, R.O. Box 1468, Racine, WI 53406-1468 for a free copy.
Big clamps take a bite out of tricky setups

Traditional pipe clamps work great on the edges of glue-ups, but what do you do when you need clamping pressure in the center of a wide project? The Mastodon Jaw Extenders solve this problem with 8" deep clamping jaws. These lightweight aluminum attachments slide onto regular ¾"-pipe clamps.

Building your own deep-clamping fixtures eats up a lot of time, and these clamp extenders give you all the long-arm clamping you need in just seconds. I used these extenders to glue up a 24" deep bookcase and they created plenty of pressure at the center of the shelf dadoes. I recommend the Mastodon Jaws for anyone who puts together bookshelves, bowl laminations, or other projects that require clamping pressure in the middle of a wide workpiece.

—Tested by Dave Henderson

Mastodon 8" Jaw Extenders, model JE-1 about $30 a pair, from Wade Manufacturing Co., P.O. Box 2366, Portland, OR. Call 503/692-9027.

Drill-press clamp sets up fast, holds material safely

Most woodworkers don’t realize how dangerous a drill press can be until they’ve had a loose workpiece take wing at whatever spindle speed they’re using. In the past, I’ve used C-clamps to hold material, but they eat up a lot of time and effort. Now, American Tool Companies has tackled this problem by reconfiguring its Vise-Grip locking pliers with a stud bolt and a new clamping jaw.

The stud bolt fits into any drill press (or any kind of tool table) with a ¼" slot, and attaches with a wing nut. It took me less than 30 seconds to install and remove the clamp. To adjust for material thickness and clamping pressure, simply tighten the knob at the end of the handles as you do with the regular locking pliers.

I tested this clamp with a variety of woods and drill bits including a Forstner bit, and it held everything fast. The jaw pads protected the wood surfaces well, and I also liked how quickly I could reposition the work and reclamp.

For an especially tough test, I loaned the clamp to a friend who works in a machine shop. After a week, he reported that it held everything he could throw at it.

In my opinion, if you own a drill press, you should own one of these clamps. With it you’ll be able to work faster than with any other type of clamp, and greatly improve your safety.

—Tested by Bob McFarlin

Vise-Grip Locking Hold Down Clamp, about $28, from American Tool Companies Incorporated, P. O. Box 337, DeWitt, NE 68341. Call 402/683-2315.

26 WOOD MAGAZINE JUNE 1994
Here's What Our Customers Say!

Attention: Customer Relations
Re: Woodworker I & II Blades

gentlemen:

1. I recently ordered and received Woodworker I & II saw blades for my radial and table saws. I used the blades received.
2. I originally asked for your blades because of the cost in comparison with other models on the market. I saw some chips missing in my old blades, and it was time to toss and replace with new blades. I sighed and ate the additional cost and purchased your blades and cutters.
3. I find your blades of the highest quality. They produce a velvet cut with a polished finish which is not surpassed by any other manufacturer on the market. The wood passes through the saw like a hot knife through butter: smooth with little effort. I see a similar glide whether it is maple, oak, pine, or whether it is thick or thin. Really fine stuff.
4. Your production staff can be proud of their work. The production quality is not just good, or to specification, it is exceptional.
5. In retrospect, the minor difference in cost is well worth the final result. Besides, it is the blade that produces the cut for a piece to outlast the maker. Glad to make acquaintance with your staff and their work.

Sincerely,

Dennis R. Schule
Owatonna, MN

(From Another Customer)

In closing I would like to add that the Woodworker II blade is by far the finest saw blade that I have ever used. I also have the Forrest dado set which is without a doubt, the king of all dado sets. I work exclusively with red oak and oak veneer plywood and the dado set performs splitter free cuts as advertised.

It is a pleasure to purchase a product that does what it is advertised to do. Thanks for making such a fine product.

Respectfully yours,

David Haeres, Esq.
Attorney, St. Louis, MO
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Address

City

State Zip

---

If you’ve had problems with liquid stains, the claims for gel stains might sound too good to be true. They’re billed as easier and less messy to apply, and you don’t have to stir them up first. They also promise better color control, with no lapsing hassles. What’s more, you don’t need to seal softwoods before you apply gels.

Drips and runs on vertical surfaces pose no problems with thicker, easy-to-apply gel stains.

**Taking aim at lofty claims**

Because all of the manufacturers’ hype about gel stains, we decided to give them a close, hands-on look. In fact, we tried out seven brands to see if they lived up to their lofty claims.

- Most of these were solvent-based, but two were one-step gels that combined a solvent-based stain with a varnish topcoat. Just about all had the same gloppy consistency as soft pudding. And altogether, we counted a total of 37 color choices.

Though you can apply gels with a brush, roller, or sponge, we used a clean cotton cloth. That’s because you must rub the gel into the wood to liquefy it.

After that, you have several choices. You can wipe the gel off right away, wait up to five minutes before wiping, or continue rubbing it in until it looks shiny. In all cases, try to make final color adjustments before the manufacturer’s full drying time.

**Made to please**

We found plenty of flexibility when applying gel stains. We tried two things you’d never attempt with liquid stains—staining unfinished wood next to an area that we stained and let dry, and removing stain completely.

As promised, lap marks were no problem when we went back to an area we’d already stained. The trick is to go over both the unfinished and the previously stained areas together. But don’t worry. As long as the first area hasn’t completely cured, applying more gel stain won’t darken it.

When you do want to darken the color, just allow the full drying time between applications. Another plus: you don’t have to sand between coats—you’ve already rubbed the stain smooth.

We also were pretty successful when we tried to remove the gel stains. We waited 30 to 60 minutes, and then rubbed a small stained area with a cloth dampened with paint thinner. Most of the stain came off every time.

Just need to lighten an area? We got good results by rubbing in a little paint thinner, or even more of the gel itself, which softened the previous coat and let us rub it down to a lighter color.

**Costs and compromises**

Ounce for ounce, gel stains cost a little more than liquid stains ($4 to $7 for eight ounces). But, they’ll cover two to three times the area.

What about disadvantages? Because you have to rub them in, they’re not the best for large areas, such as floors. And, as with all stains, read label directions and test the color on scrap first.

Photograph: Wm. Hopkins
CARBIDE TIPPED ROUTER BITS • PROFESSIONAL PRODUCTION QUALITY GUARANTEED

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FREE — NEW 40 PAGE CATALOG • While in the Philadelphia Area Visit our Fully Stocked Showroom (call for easy directions)
Tom Rolison can’t help referring to vehicles he long ago sold as if they were still in his inventory of wooden cars, trucks, trains, planes, and steam engines. That’s because he pours so much of himself into his work he can’t forget them. “I have this ’32 Chevy roadster, made with white ash fenders and a black walnut cowl....” he’ll say as he fondly recalls detail after detail. But if it wasn’t for a near financial catastrophe a number of years ago, his woodworking memories might not be quite so pleasant.

Tom, 50, was born, reared, married, and raised a family in Scottsdale, Pennsylvania. That’s a town of about 12,000 situated square in the middle of the nation’s once prosperous steel industry region. For 23 years he had held down a job at a nearby mill—a job that started with laying track for the company’s railroad and that ended in the yard as a car shop repairman when the mill suddenly closed down. There wasn’t much warning, but as Tom says, “You could pretty well see the handwriting on the wall.” For a career replacement, he promoted his woodworking hobby to full-time status.

A future found in a magazine
“...It was in one of the very first issues of WOOD,” recalls Tom, flipp-
other common items in his vehicles. On his steam engine, for example, you'll find small brass fittings normally more at home as gas-line couplings. Compression rings, the type used in connecting faucets to water lines under the kitchen sink, find a new home in a steam-whistle assembly. The same applies to brass brads, tiny brazing rods, wire, and even drawer-pull plates (check out the ornate faceplate on the steam engine's boiler in the photo below). Tom admits that he never throws anything out before thoroughly examining it for another potential use.

Yet, the steelworker-turned-woodworker doesn't hesitate to mail-order parts that seem perfect. He points to the wheels on the Mack trailer truck he's perfecting. "I've got $30 worth of tiny bolts that serve as lug nuts on this one project alone."

**Anything with wheels is fair game**

Tom's list of cars and trucks that he's crafted over the years reads like the inventory of an antique car collector. On it you'll find Ford pickups, roadsters, and woodies from the 1920s and 1930s, Chevies (including a '57 convertible) and GMGs of the same vintage, a Pontiac or two, a Stutz Bearcat, a Duesenberg, even a Mercedes and a Bugatti. There are 18-wheelers, too—Peterbilts and Freighliners, not to mention the Mack shown on page 34.

Tom also likes the intricacies of old-time steam engines. He has built a model of The General, a

---

*Above:* At his Shopsmith bandsaw, Tom cuts the fenders for a vintage vehicle from white oak that he saved especially for that role.

*Right:* Tom even built the tracks on which his 1856 Tiger steam engine and tender ride. See if you can find familiar fittings—such as the drawer-pull plate—that Tom used as trim on the engine.
Civil War era steamer, one of The Denver Express, and the 1896 Tiger, an engine right out of Pennsylvania history.

He even looks skyward on occasion. “I carved a P-51 Mustang awhile back, and I mean carved it,” says Tom as he starts to describe the process. “To taper the wings just right, I took the wood off with a spokeshave. And that was a lot of work. But that’s the only way I know how to do it.” Tom’s photo album also reveals a beautiful B-17 bomber, executed in walnut and ash, a Cobra helicopter, and a P-40 Flying Tiger.

Tom admits that he orders plans for many of his vehicle models, but they prove to be only a starting point. Because from there, he relies on photographs he takes, old advertising brochures, calendars, and even close, personal inspections of vehicles. “I was working on a semi-trailer truck—maybe the Mack—and I saw one at a truck stop,” he recalls. “So, I was out there poking around the cab, seeing what details I could pick up, and out of nowhere the driver appears. He was huge, and a little concerned with what I was doing. But,” Tom chuckles, “when I showed him pictures of my models, he just grinned and told me to go ahead and photograph all that I wanted to. You know, it’s all those little details, the personal ones, that make my work special.” And it’s Tom’s attention to those special details that often leads to good commissions.

“A lady from Illinois came by my booth at a big show,” Tom says as he begins another story. “She had a grown son with a birthday coming up and wanted to give him one of my trucks, but a special one. Apparently, he had worked his way through college doing odd jobs with the help of an old pickup truck, a 1949 International Model K. She had a photo of it. I had to combine parts I was familiar with to make it—a little bit of Chevy body and a little Ford cab—but I did it, out of cherry, complete with the signage he had had on it! Was she ever thrilled!”

Detailing, it seems, could go on forever. So how does he know when to quit? “It’s really hard,” says Tom, with somewhat of a grimace. “I think I’m finished with a vehicle, and then I see one going down the road with another detail that I’d like to put on. But I have to draw the line.”

**Here a collector, there a collector**

At $275 to $400 for a car or pick-up truck, up to $700 for an airplane, $2,000 for a semitrailer truck like the Mack shown, and as much as $2,500 for a train, how many buyers can there be? According to Tom, the number of folks who want his trucks and other models would surprise you.
“There are some of my models in Florida, New York, Ohio, Maryland, Kentucky—they’re just about all over,” says Tom. “And some people have really turned to collecting them.”

With righteous pride, Tom tells how he sold his first Peterbilt semi to the owner of the company that makes the transmission parts used on the real truck. That was five years ago. Now, the buyer has about five of his vehicles. Then there’s the collector who lives in the Florida Keys. An ex-pilot, he owns many of Tom’s aircraft and always asks for more. And at one particular show, a certain buyer couldn’t get enough of Tom’s work, all the while trying the craftsman’s patience.

“This older fellow was looking at my work and talking about this and that. Eventually, he tried to talk my prices down,” Tom remembers. “So I told him my motto, ‘B.S. walks, money talks.’ Guess what? He pulled a wad of bills out of his pocket and peeled off enough of them for all the cars I had with me—and that was at least seven!”

**It pays to be particular**

Tom and his wife, Edna, work arts and crafts shows from June through October. During that time, they might be gone as much as every weekend selling Tom’s work—without ever leaving the state of Pennsylvania. Such a grueling schedule means that when Tom is at home, his focus must be strictly woodworking.

“I get so absorbed with what I’m doing in the shop that I don’t even know when people come and go,” Tom comments with a glance out to the road. “I’m really enjoying myself, though.” It wasn’t always like that.

“There was a time after I was laid off when if a project wasn’t going just right, I’d lose my temper and the project would generally suffer,” the craftsman continues. “Now, if I get frustrated with a project, I just put it in a box and set it aside for awhile and work on something else.”

Edna knows her husband well, and understands why he sometimes gets annoyed with himself. “He’s real particular about what he’s making,” she says. “But that’s what makes his vehicles so popular.” By “particular” Edna refers to everything from Tom’s selection of wood to the finishing.

In Tom’s shop, a separate building that adjoins the garage behind his house, wood lines the walls. “I buy most of my wood from a mill just a few miles away. But knowing that I like unusual wood, folks bring me some from time to time, and I do cut my own right around here,” says Tom as he picks through an assortment of boards. “Here’s some purple plum—that looks good for radiators. There’s a piece of nicely grained white ash that I’ve saved for fenders.” Tom could go on and on because there’s yet another building—a storage shed—brimming with more odds and ends of wood. And no matter what species, where it’s been stored, or for how long, Tom won’t use it for a project if it

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Right: After shaping a wind wing from a tiny piece of brass, Tom carefully fits it in place on the ‘30 Packard.

Below: Tom just loves 18-wheelers. Working on it off and on, this 48’ long Mack took a year to build and has a $2,000 price tag.
has more than eight percent moisture content.

Tom is real particular about veneer, too. He uses that for the panels that appear on the sides of some cars' cowels, and prefers to resaw it himself. That's because the typical veneer available commercially is just a little too thin and it buckles when glued up. "So to get thicker stock, I just run boards through my the tablesaw—easy as pie, no problem," he says with confidence.

Then, of course, there's the finishing. "Because we haul those vehicles around from fair to fair, the finish has to take a beating from the packing and unpacking and the handling, and still look good. So everything gets a coat of tung oil. Then it dries for a week or so before getting two coats of polyurethane varnish with sanding in between. Last, I rub on paste wax. You can bet that they'll take handling after that."*

---

Fascinated by detail?
For more information on Tom's vehicles, send a self-addressed, stamped envelope to:
Rolison Woodcrafts
R.D. 1, Box 219
Scottsdale, PA 15683

Written by Peter J. Stephano
Photographs: Steve Uzzell
BANDSAW BLADES

The versatile bandsaw fits into the picture virtually everywhere in woodworking. From carving to furniture-making, you'll find tasks that a bandsaw does best. But, to get the most out of your machine, you're going to have to pick the best blade for the job. Here's how.

You need to know

You'll commonly find three tooth configurations: regular, skip-tooth, and hook-tooth.

A regular-tooth (or standard) blade makes the smoothest cut, and is the best bet for sawing thin material. But in thick cuts and resawing, it cuts slowly and clogs

The rule for bandsaw blades

Make the blade fit your machine and your job

Bandsaw blades, like suits, boots, and deli sandwiches, come in a wide variety, either off-the-rack or made-to-order. Many tool dealers, homecenters, and hardware stores sell ready-made blades to fit popular saws. But some custom-make them, cutting a length from a roll of bandsaw-blade stock and welding the ends together, often while you wait.

In either case, you first need to know your saw's blade length.

Install a wrong-length blade and you may not be able to tension it properly, which could be hazardous to you, your saw, or your project—maybe all three.

Check your saw's instruction manual for the recommended length, or measure the factory-installed blade. Many dealers can find the right blade just by knowing your saw's make and model.

The type of cutting you'll be doing determines blade width, which may be from \( \frac{3}{16} '' \) up to \( 3/4 '' \) or even larger, depending on the machine. Your saw's manual specifies the narrowest and widest blades recommended.

For crosscutting, ripping, and resawing stock, install the widest blade your saw can take. You'll cut straighter, and be less likely to break the blade.

Curved cuts call for a narrower blade. The illustration below shows the minimum cutting radius for various blade widths. Pick the widest blade that will cut the smallest radius in the pattern you're sawing.
If you want one general rule for choosing the correct bandsaw blade, remember this: Use the widest blade with the coarsest teeth that will make an acceptably smooth cut in your material. Here’s the information you need to apply this simple rule effectively.

**The Tooth**

With chips, making it a poor choice for such operations. A skip-tooth blade, as the name suggests, has teeth slightly farther apart and larger gaps for carrying chips away. This blade can handle faster feed rates than the regular blade. Turn to a skip-tooth blade for general cutting and resawing.

The teeth on a hook-tooth blade angle forward (in the direction of rotation) at the cutting tip. That is, they have a positive rake angle. This enables the hook-tooth blade to cut more aggressively than the others. This blade is well suited to straight and curved cutting in dense or hard woods.

**You’ll Strike Out with the Wrong Pitch**

For woodcutting blades, the pitch, or the number of teeth per inch (TPI), falls between 3 and 24 TPI. Which pitch you need depends on the thickness of the material you’re cutting.

The fewer the teeth in the wood, the faster (and rougher) the cut, generally. To lessen the chances of blade or tooth breakage, saw with a blade that keeps at least three teeth in the wood. More will yield a smoother cut, but a blade with too many teeth in the wood will cut slowly and dull rapidly. For the best balance between cutting speed and smoothness, pick a blade that keeps 6–12 teeth in the wood (see chart at right).

As on other saws, bandsaw teeth are set—bent to the sides—to saw a kerf slightly wider than the thickness of the blade body. The most common sets for woodworking bandsaw blades are alternate and raker, shown below.

The raker-set blade has a repeating pattern of one tooth set to the right, one to the left, and then one, the raker, left unset. The set teeth cut the wood, and the rakers help clean away chips.

With an alternate-set blade, every tooth is set either left or right. Alternate-set blades cut faster, and some bandsaw users maintain that spreading the cutting load over all the teeth helps the blade stay sharp longer.

**Blades for Big-Time Sawyers**

Bi-metal blades, becoming more readily available to home woodworkers, offer a high-performance alternative to standard blades. High-speed steel (HSS) electron-welded to the edge gives each tooth a tough tip, shown right. These blades stand up to abrasion and heat that would dull a carbon-steel blade fast.

A bi-metal blade will set you back about three times the cost of a same-size standard blade ($30 vs. $11 in one comparison). But, it can save money (and time) in the long run by staying sharp longer than a standard blade. That’s why we use bi-metal blades on the 14” Delta bandsaw in the WOOD® magazine shop.

Tougher yet is the carbide-tipped resaw blade, at about $100. Only if you resaw hard, abrasive woods in production quantities would you need one of these.

*Continued on page 81*
Ace-of-Hearts

TRIPLANE WHIRLIGIG

Modeled after the Fokker triplane flown by the Red Baron in World War I, our whimsical version features a rotating propeller and flapping pilot's scarf. Sturdy construction guarantees that our trusty airplane can fly through years of stormy weather. And its brightly painted surface makes it a pleasure to look at, too.

Note: For joints that will stand up to the extremes of Mother Nature, use Titebond II or Weather-Tite water-resistant glues, slow-set epoxy, or resorcinol glue. Although we used clear pine for our model, Honduras mahogany is an excellent exterior alternative.

Start with the laminated fuselage
1. Cut a piece of ¼" stock to 2x20" long for the fuselage (A).
2. Cut a ¼" groove ½" deep ¾" from the bottom edge of the piece where shown on the Fuselage drawing. Crosscut two 9½"-long fuselage pieces (A) from the 20"-long piece. Next, cut a ¾" dado ½" deep in each piece where shown on the Fuselage drawing.
3. Cut a piece of pine to ½x½x4½" to plug the crankshaft-tube groove behind the crank opening where shown on the Fuselage drawing.
4. With the edges and ends flush, the filler block in place, and dadoes and grooves aligned, glue and clamp the two ¾" fuselage pieces together.
5. Make a photocopy of the full-sized Side and Top View Patterns. Cut the rectangular paper patterns, and adhere
them to the fuselage with spray adhesive, aligning the edges and ends of the paper patterns with those of the laminated fuselage. See the Fuselage drawing for reference.

6 Using a square, transfer the landing-gear strut centerlines to the bottom of the fuselage. Using your drill press, drill a pair of \( \frac{1}{4} \)" holes \( \frac{9}{16} \)" deep into the bottom of the fuselage for the struts. Drill a \( \frac{3}{8} \)" hole \( \frac{3}{4} \)" deep for the pivot tube.

7 Mount a dado blade to your tablesaw, and cut a \( \frac{2}{16} \)" notch \( \frac{1}{8} \)" deep across the bottom of the fuselage for the bottom

Continued
wing. Cut a 1¼" notch to the depth shown on the full-sized pattern across the top of the fuselage for the middle wing.
8 Bandsaw the rudder notch in the tail section of the fuselage to size. Drill a ¼" hole in the cockpit. Next, bandsaw the cockpit outline to shape.
9 Following the cutlines on the Top View Pattern, cut the fuselage profile to shape. Save the scraps and use double-faced tape to adhere them back in position onto the fuselage. Follow the cutlines on the Side View Pattern to cut the top and bottom fuselage profiles to shape.

Cut the wings, wing struts, tail wing, and rudder
1 Plane or resaw and then cut three pieces of straight-grained stock to ¼×2½×15" for the wing blanks (B, C, D). With the edges and ends flush, stick the three pieces together face-to-face with double-faced tape.
2 Draw a centerline across the top blank. Twice (once for each full-sized trio of half patterns), transfer the wing patterns to the top wing blank, aligning the centerline on the paper pattern to that marked on the top blank. Using a bandsaw or scrollsaw, cut scallops along the back edge of the three taped-together wing blanks.
3 Drill blade start holes, and use a scrollsaw or coping saw to cut the strut slots through all three wing blanks to shape.
4 Separate the wing blanks, transfer the cutlines, and finish cutting the three wings to shape.
5 Transfer the patterns and cut the wing struts (E), tail wing (F), and rudder (G) to shape from the thickness of stock listed in the Bill of Materials.
6 To cut the pilot pieces (H) to shape, stack and tape three 1×4" pieces of ½" stock face-to-face. Transfer the pilot outline to the taped-together pieces, and cut the stack to shape. Separate the three pieces and cut the center section to final shape. See the Propeller Shaft detail for reference when cutting the pilot center to shape.
7 Cut the ⅝"-thick scarf (I) to shape. Drill the ⅛" connecting rod hole in the scarf where marked. Angle the drill bit up and down slightly when drilling the hole to allow the connecting rod to operate freely when installed later.

Let the assembly begin
1 Glue and nail the bottom wing into its respective notch in the bottom of the fuselage.
2 Insert the struts through the slots in the middle wing. Glue the middle wing struts assembly to the fuselage. Glue and insert the bottom end of the struts into the slots in the lower wing. Glue the top wing to the top of the struts. Putty any imperfections and sand smooth.
3 Glue the tail wing (F) and rudder (G) in place.
4 Glue the three pilot pieces together with the edges flush. Sand bottom of pilot to fit into ¼" hole. Drill a ⅛" hole through the lamination.
5 Cut a piece of ¼"-diameter brass rod to ½" long. Insert the rod through the ⅛" holes in the head and scarf. On a hard metal surface, use a ball peen hammer to lightly tap both ends of the brass rod to rivet (mushroom) each end.

Add the axle, struts, and wheels for a smooth landing
1 Transfer the outline and the hole centerpoints for the spreader bar (I) to ⅛"-thick stock. Drill the ¼" holes, and cut the spreader bar to shape.
2 Crosscut two pieces of ⅛" dowel stock to 2" for the landing gear struts. Glue the dowels into the holes in the spreader bar, and into the holes in the bottom of the fuselage.
3 To form the wheels (K), use a compass to mark two 1½"-diameter (3½" radius) circles on ⅛"-thick stock. Using a 1½" Forstner bit, bore a ½"-deep depression at each centerpoint. Then, drill a ¼" hole through the center of each
wheel. Cut the wheels to shape. Sand the tenoned ends of the spreader bar until they fit into the holes in the wheels. Glue the wheels in place.

**Machine the propeller for maximum power**

1. To form the propeller hub (L), start by cutting a 1 1/4"-diameter disc from a piece of 1/2" pine. Next, drill a 9/16" hole through the hub at the centerpoint.
2. Attach a wood extension to your mitre gauge, and follow the 5 steps on Notching the Propeller Hub drawing at right and shown in the photo below right to cut the kers.
3. Cut the propeller blades (M) to shape. Next, glue or epoxy them to the propeller hub (L).

**The metal parts convert wind energy to motion**

1. Using the Propeller Shaft detail accompanying the Exploded View drawing and the Section View drawing for reference, cut all the brass parts except the crank to length. Drill the holes in one end of the crank blank (see the Parts View drawing for reference). It’s safer drilling the holes in a long piece rather than the 9/16"-long finished piece. Crosscut the crank to length and file to shape.
2. Slide and epoxy the 7/16" (I.D.) brass tubing 4 1/2" long (crankshaft tube) into the fuselage until it protrudes into the crank opening where shown on the Section View drawing. Slide the #10-32 brass threaded rod (crankshaft) into the brass crankshaft tube.
3. Using needle-nosed pliers, bend the 1/16" brass rod (connecting rod) to shape. See both the Parts View and Propeller Shaft detail for reference. Note that the bend on one end is 90° from that on the other end. Both ends need bending.
4. Working inside the crank opening, slip the crank onto the end of the connecting rod, then slide the crank onto the crankshaft where shown on the Section View drawing. Apply flux. Next, use a soldering gun to solder the crank onto the crankshaft (threaded brass rod) where shown on the Section View drawing, being careful not to solder the crank to the crankshaft tube.
5. Slide the top end of the connecting rod (attached to the crank in the previous step), into the hole in the pilot's scarf. Now, insert the pilot/scarf assembly into the hole in the cockpit.
6. Attach the propeller to the front end of the threaded rod. Adjust as necessary for smooth movement. Shorten the rod if needed. Remove the propeller assembly.

**Finishing touches before takeoff**

1. Epoxy a 1/4"-long piece of 1/4" brass rod into the end of a 4"-long piece of 9/16" (I.D.) brass tubing (pivot tube) where shown on the Section View drawing. Now, epoxy the brass pivot tube into the hole in the bottom of the fuselage. Grind or file one end of a piece of 1/4" brass rod 7" long (pivot pin) to the shape shown on the Section View drawing.
2. Finish-sand the wood parts. Mask the protruding ends of the brass tubing and threaded rod.
3. Apply a clear exterior finish to the propeller (we used spar varnish), and paint the propeller hub with an exterior enamel.
4. Apply two coats of aerosol primer to the plane. Follow up with two coats of red paint (we used Chinese red aerosol).
5. Detail-paint the pilot and scarf.
6. To make the emblem designs, either paint them onto the wings and fuselage, or transfer the patterns to colored tape. Apply the tape "decals" where shown on the opening photo.
7. Drill a 1/4" hole in the top end of a post, and insert the 1/4 x 7" brass pivot pin into the hole. Slide the whirligig onto the pivot pin.

Written by Marken Kemnet
Project Design: James R. Downing
Photographs: John Hetherington
Illustrations: Kim Downing
In our December 1993 issue, we relayed the staff's experience with logging and sawing our very own pile of wood-working stock. And we promised you that we would follow up with a kiln design to dry that sawn-on-site stack of ash, cherry, and walnut.

Since then, we've consulted with experts, worked with a designer and a builder, and constructed the nifty 8×8×12' passive-solar building you see here. And boy does it work, not to mention save money! Better still, we developed a plan for our kiln so you can build one just like it.

Unless you live in a desert, you'll never air-dry green wood down to six to eight percent moisture content, the preferred dryness for stock destined to become furniture or other indoor projects. That's because the average outdoor relative humidity for most of the U.S. hovers at about 65 percent—equivalent to 12 percent moisture content in a board. But, indoor humidity runs a lot less, so projects for use there must be built from kiln-dried stock in the lower moisture-content range or you'll see lots of wood movement. (For outdoor projects, such as porch furniture, the appropriate wood with a higher moisture content is okay.)

To most woodworkers, though, the technique of do-it-yourself kiln-drying is a mystery. Then there's the cost, and the maintenance involved. Who has the money or the time? That's how we thought, at first.

Above: According to the thermometer, it was 95° inside WOOD magazine's solar kiln one day last November when editor Pete Stephano checked moisture content. The kiln was newly built, and the air-dried wood had just been stacked. Note the overhead baffle that directs air flow delivered by the fans.

Left: The solar panel, made of clear, corrugated fiberglass panels, faces south at a 45° angle.

Dry wood in six weeks!
The lumber industry has kiln-drying down pat. Over the decades, they've learned how to tame even the most stubborn woods and turn them into useful stock. Heavy-duty commercial kilns rely on heat from a furnace or other fueled source. And they often introduce steam to relieve stress in the drying boards. It's all pretty technical and complicated.

Yet, we found that on the do-it-yourself level, it doesn't have to be that way.

In searching for answers, one source often leads to another. And that's how it was when we were looking for some kiln-drying know-how.

At the U.S. Forest Service's Forest Products Laboratory in Madison, Wisconsin, wood-drying expert Sid Boone was most helpful. Besides tips, he handed over rough drawings for two basic solar kilns. One seemed much too involved. The other, a design concept originally created by University of Wisconsin-Extension forester Eugene Wengert in 1978, was a lot sim-
Kiln-construction guidelines

According to Wengert and his associate, Dan Meyer, in their guidelines for a solar kiln of this type, you determine the size of the kiln with the following rule of thumb: Consider the maximum capacity in board feet you want the kiln to hold to be roughly 10 times the solar panel roof area in square feet. We wanted our kiln, for instance, to dry 1,000 board feet per load (no sense drying more than you can use). So the solar panel had to contain 100 square feet. Our solar panel measures 8'6"x12' (102 square feet).

Here's another important guideline. For maximum year-round performance, the kiln's roof (the solar panel) angle should be equal to the latitude of where you live in degrees north of the equator.

In Iowa, with a latitude ranging from about 40°-45°, an angle of 45° works fine, and from a construction point of view, that angle was easier to contend with. In Austin, Texas, though, an angle of 30° will suffice. In North Dakota, a steeper angle, of say 50°, would perform better. There's more, too.

• Use pressure-treated (CCA) lumber for all framing.
• Select exterior-grade plywood for the interior as well as the exterior.
• Insulate the floor with non-water soluble, solid-foam (rigid) insulation. Use blanket-type insulation without a foil facing in the walls and door.
• Seal interior surfaces against moisture while allowing them to absorb the maximum amount of solar heat by applying a base-coat of aluminum- or oil-based paint to
the walls and floor. Add a final coat of flat-black paint. (To trap even more solar heat, it wouldn’t hurt to stain the exterior a dark color, too.)

- Kiln-ventilation fans should not contain plastic parts. Inside temperatures can reach 150°F.

To those guidelines we incorporated the following goals:

- Keep construction simple and as maintenance-free as possible.
- Since the kiln won’t operate all the time, it should do double-duty as an attractive storage shed, or a greenhouse, or even a flower-and-fruit dryer.
- For cost-savings and minimum waste, the design uses standard-dimension sheet goods.
- Inside dimensions allow for boards 10' long as well as the stacking and removal of stock by one person. At least 12' of space on all sides of the stack provides for air flow.

**Editor’s note:** The solar-kiln design we used has been built all over the world, in many ways. Our adaptation is admittedly more elaborate than actually needed. A simple version might just have plywood walls and floor and a solar panel made from clear plastic sheeting. It wouldn’t be as permanent, but it would still work.

We have also discovered that winter drying is aided by installing clear plastic sheeting inside the solar panel to help retain heat. See page 80 for more informative tips on drying lumber.

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**Build Your Own Kiln**

For complete plans and a materials’ list for the 1,000-board-foot-capacity solar kiln shown in this article, send your check or money order for $9.95 ppd. (U.S.) to: Kiln Plans, WOOD® magazine, 1912 Grand Ave., Des Moines, IA 50309-3379.

Note: Solar-drying isn’t the only way to get kiln-dried wood. For manufacturers of other types of drying kilns and kiln kits, see advertisers elsewhere in this issue.

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**Want to learn more about wood drying?**

For a free list of available texts and handbooks covering lumber drying and kiln operation, send a stamped, self-addressed, business-sized envelope to: Wood Drying, Dept. of Forestry, University of Wisconsin-Extension, 1630 Linden Dr., Madison, WI 53706.

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The next time you're looking for a project or feature story in issues 59 through 67, use this handy reference to help you find it fast.
We kept it simple. For instance, when searching alphabetically for the story on butternut, you'll find "Butternut, 65:16." To locate the story, go to issue 65, page 16. If you're looking for a like reference for issues 1 through 60, order our WOOD Cumulative Index. To do this, send $6.95 (price includes shipping and handling) and your name and address to:
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AN ADVENTURE JUST WAITING TO HAPPEN
THE FUN-TIME RACER

Have you ever stumbled onto a woodworking project whose looks and styling stopped you cold? Well, that's what happened to WOOD® magazine design editor Jim Downing and me not long ago. We were passing by a local antique store, and there it was—the neatest old kid's wagon in creation. We looked at each other and decided right then that we wanted to design a version of it just for you.

We were careful to retain its classic lines, and to make sure this beauty will stand up to lots of outdoor use. We built the deck and box out of white oak and the wheels from exterior birch plywood. To find the hardware for the wagon, buy the parts at a local hardware store, or use our handy Buying Guide kit. We tell you how to machine these parts to fit.

Marlen Kemmet
How-To Editor

Continued
**FUN-TIME RACER**

Note: To receive full-sized patterns, send $3 and a 10×13" self-addressed envelope with $1.25 postage to Fun-Time Racer, WOOD Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. You'll need thin stock for this project. You can resaw or plane thicker stock, or see the Buying Guide with the Bill of Materials for our source of white oak and exterior birch plywood. Also listed is a supplier for all the hardware and strap iron needed.

Let's start with the deck
1. From white oak (one of the heaviest and strongest of all the oaks), cut the deck boards (A) and the cleats (B) to the sizes listed in the Bill of Materials. (We planed ½" stock to ⅛" for the deck boards.) Sand a slight round-over on all edges to avoid splintering.

2. Dry-clamp (no glue) the deck boards edge-to-edge, with the ends flush. Lay out and clamp the cleats to the deck bottom. Turn the assembly over, and mark the four screw-hole centerlines across the surface of the clamped-together deck boards. See the Exploded View for reference.

3. Position and clamp the cleats (B) on the deck assembly. Drill countersunk screw holes through the deck boards 1" from the edges and ⅛" into the cleats. Use #6×⅝" screws to secure the cleats to the deck boards. Remove the clamps.

4. Using the dimensions on the Rear Axle Supports drawing below, lay out the shape, notch, and hole centerpoints on the top piece.

5. Drill the countersunk screw and axle holes through the taped-together pieces. Bandsaw the pieces to shape. Check the fit of the notch against the rear cleat on the wagon deck, and trim if necessary. Separate the parts, remove the tape, and sand smooth.

6. Cut a piece of ⅝" stock to 3½"×10⅝" for the spreader (D). Transfer the full-sized half pattern twice to the spreader blank, and cut it to shape.

7. Glue and screw the rear axle assembly (C, D) together where shown on the Rear Axle Assembly drawing. (We inserted the axle rod in the holes in C to keep the pieces aligned when assembling.)

**Construct the rear axle assembly next**
1. From ¾" white oak, cut two pieces to 2½×6½" for the rear axle supports (C). Using double-faced tape, stick the two pieces together, with the edges and ends flush.

**FULL-SIZED HALF PATTERN**

**SPREADER (D)**

**REAR AXLE ASSEMBLY**
Add the front steering assembly
1 Cut a pair of 3/4"-thick front axle support blanks (E) to 23/8"x123/4". Using the Steering Assembly and Front Axle Supports drawings for reference, drill the 3/8" and 3/6" holes in the top support blank. Drill a 3/8" hole centered in the bottom blank. Next, cut a 3/8" groove 3/6" deep along the bottom edge of the bottom blank (E).
2 Transfer the cutlines from the Front Axle Supports drawing to the top E, cut it to shape, and use it as a template to mark the shape on the bottom E. Cut it to shape.
3 To make the universal-joint discs (F), cut a piece of 1/2" stock to 4x12". Mount a dado blade to your tablesaw, and cut a 3/4" dado 3/8" deep centered along one face of the 12"-long piece. Using a compass, mark a pair of 3/8"-diameter circles on the surface opposite the dado and centered over the dado. Drill a 3/16" hole at the centerpoint used to mark the circles. Bandsaw and sand the universal-joint discs to shape.
4 Glue and clamp one universal joint disc (F) to each front-axle support (E), using a 3/8"x4 1/2" hex-head bolt to align the holes.
5 Cut a 3/8"-dia. disc from a plastic milk jug for use as a slip joint between the universal-joint discs.

Now, construct the yoke and handle assembly
1 Cut the yoke block (G) to size.
2 Mark the hole centerpoints on the yoke. Clamp the yoke in a handscrew clamp, and drill the holes where marked. (We used a brad-point bit to eliminate bit wander.) Sand 1/4"
round-overs along the front edges of the yoke.
3 Cut the tongue (H) to size.
4 To form the handle (I), cut a piece of 3/4" stock to 3/4 x 12". Cut a 3/16" groove 1 1/2 deep centered along one face of the handle blank. Next, rout 1/4" round-overs along the edges, opposite the groove. Trim two pieces to 3 1/2" long from the 12" long strip. With the edges and grooves aligned, glue and clamp the two pieces together to form the handle.

**Form the wagon box and top frame assemblies**

1 From 3/4" stock, cut the wagon sides (J) and ends (K) to size.
2 Cut a 3/4" dado 3/16" deep 1 1/2" from the ends in each side piece (J). See the Exploded View drawing for reference.
3 Sand the interior faces of the wagon sides and ends. Glue and clamp the four pieces, checking that the mating edges are flush and that the assembly is square.
4 Cut the top frame members (L, M) to size. Mark a radius on the front and rear pieces (L) where shown on the Top Frame Assembly drawing. Cut the curved sections to shape.
5 Clamp the top frame in the configuration shown on the Top Frame Assembly drawing. Mark the dowel-hole alignment marks across each joint. Remove the clamps, and use a doweling jig to drill 3/16" holes 3/16" deep in the mating pieces. Glue, dowel, and clamp the top frame together, checking for square.
6 Center and glue the top frame assembly (L, M) on the wagon box (J, K). (We placed masking tape on the areas next to the glued areas to catch glue squeeze-out.)
7 Sand the inside surfaces where part M meets part J. Rout a 3/8" round-over along the top edges of the top frame.
8 Carefully position and clamp the wagon box to the deck. Drill countersunk mounting holes, and screw the box to the deck.
For a smooth ride, add the wheels and tires

1. Cut four pieces of 3/8" exterior plywood to 9" square for the wheel blanks (N). (Because of its smoothness and paintability, we used 3/8" exterior birch plywood. See the Buying Guide for our source.) Draw diagonal lines to locate the center of each wheel blank. Use a compass to mark an 8"-diameter circle (4" radius) from each marked centerpoint.

2. To lay out ten 1 1/8" hole centerpoints on each wheel blank (N), reset the compass, and swing a 2 3/16" radius to create a 4 7/8" smaller circle within the 8" circle. See the Wheels drawing for reference. Reset the compass to 1 1/2", start on the 4 7/8" circle, and step off the ten centerpoints. You may have to adjust the compass slightly for exact spacing.

3. Drill a 3/16" hole at each centerpoint. Switch to a 1 1/8" Forstner bit. One at a time, center the bit over 3/16" pilot holes, and bore halfway through the wheel. Turn the wheel over, center the bit over the pilot hole, and finish boring the hole. This greatly reduces the chip-out at each hole.

4. Using a 1/2" Brad-point bit (it eliminates bit wander), drill an axle hole centered in each wheel.

5. Cutting just outside the marked line, bandsaw each wheel to shape. Move to the disc sander, and sand the wheels to finished shape. For near perfect-round wheels, see our disc-sanding jig on page 86.

6. Fit a 3/8" rabbeting bit into your table-mounted router, and adjust it to cut 3/8" deep. Rout a 3/8" rabbet 3/8" deep along each edge of the four wheels. See the Section View detail accompanying the Wheel Assembly drawing for reference.

7. Switch to a 1/8" round-over bit, and rout along the edges of the 1 1/8" holes in the wheels where shown on the Wheel Assembly drawing above.

8. To make the rims (O), start by cutting 8 pieces of 1/4" exterior birch plywood to 10" square. Using double-faced tape, stick the rim blanks together in pairs. Locate center and use a compass to swing a 3 3/8" radius to create a 7 1/8"-diameter circle on each taped-together pair of blanks. Reset the compass to 4 1/4", and swing an 8 1/2"-diameter circle on the same four rim blanks.

9. To fit the rims onto the wheels, drill a blade start hole inside each marked inner circle, and use a scrollsaw to cut the rims to shape. Then, use a drum sander to sand the inside edge until the rims fit snugly onto the rabbeted wheels (N). Work slowly to achieve a gap-free fit.

10. Bandsaw and then sand the outside edge of the four sets of rims to shape. With the rims still taped together, rout 1/8" roundovers along the inside edge on one surface of each rim where shown on the Wheel Assembly drawing. Separate the rims and remove the tape.

11. Glue the rims into the rabbets on each wheel. (We wrapped masking tape around the rims and through the 1 1/8" holes in the wheels to hold the rims in place until the glue dried.)

12. Using the disc-sanding jig shown on page 86, carefully sand the wheel/rim assemblies to 8 1/2" diameter. Verify all are the same diameter when you're done.

13. Mark the cutlines and then bandsaw and sand the hubs (P) to shape. Drill a 1 1/2" hole at the cen-
terpoint of each. Rout a ¼” round-over along the outside edge of each hub. Glue the hubs in place, aligning the holes.
14 Using a hacksaw, cut the head off a ½” bolt 3” long. Chuck the bolt into your drill press, and use two nuts to secure a wheel to it. Using the lowest speed on your drill press, use a rat-tail file to contour the inside edges of the rims to the shape shown on the Section View detail accompanying the Wheel Assembly drawing and as shown in Photo A. The coves allow the rubber hose (tire) to fit snugly around the outside of the plywood wheel.

Next, shape and drill the braces and brackets
1 To form the rear braces and steering braces, start by cutting four pieces of ½x1/4” strap iron to 12¼” long. Place two pieces of the strapping edge-to-edge (not face-to-face), and adhere duct tape to the back surface to hold them together. Apply masking tape to the opposite surface on the ends. The masking tape makes it easy to mark visible bend lines and radii.
2 Lay out the hole centerpoints and bend lines for the braces on the masking tape where shown on the Braces and Brackets Parts View drawing. Dimple each centerpoint with a center punch. Drill ¼” holes at each dimpled centerpoint, except for the steering braces. They have a 3/8” hole.
3 To bend the ends to the angles shown, clamp the taped-together parts in a machinist’s or woodworker’s vise so that the marked bend line is flush with the top surface of the vise jaws. As shown in Photo B, use a hammer to strike the steel straps until they conform to the angle shown on the Parts View drawing. Check your bend against the drawing, and continue bending and checking until they match. Repeat for the opposite end of the braces. Then, repeat for the other set of braces.
4 Remove the tape to separate the pieces. Trace around a dime to mark the radius on each end of each brace. Grind the radii to shape and file or sand to remove the burrs.
5 Repeat steps 1 through 4 above to form the handle brackets, tongue brackets, upper and lower steering braces, and axle support retainers. See the Braces and Brackets Parts View drawing for shape and hole sizes.

Assemble the rear-axle and steering assemblies
1 Using a hacksaw, crosscut two pieces of ½”-diameter steel rod to 16” long for the axles.
2 Assemble and glue the rear axle assembly (C, D) in the configuration shown on the Rear Axle Assembly and Exploded View drawings. Repeat for the Steering Assembly and Handle. Check that the parts fit correctly.

Add the finish, and let the good times roll
1 Remove the metal parts from the wood parts. Seal the plywood wheels and oak pieces with a clear exterior finish (we used Minwax exterior polyurethane).
2 Sand the metal parts to remove any burrs or sharp edges. Buff the surfaces of the metal parts with 00 steel wool to rough it up, and then wipe the parts clean with acetone to remove any residue.
3 Apply a coat of primer and two coats of satin black exterior paint to all the metal strapping.
4 Reassemble the metal parts to the finished wagon. Slide a ¾” (I.D.) by 1” bronze bearing onto each axle where shown on the Wheel Assembly drawing.
5 Apply a bead of epoxy to the wheel coves, and stretch the tires onto the wheels.
6 Slip the wheels and washers onto the axles in the configuration shown on the Exploded View drawing. Secure the axles with 3/8” friction caps. For an added bit of flare, apply a decal to each side of the wagon. See the Buying Guide for our source.

Homemade tires for a soft, inexpensive ride
1 To make a tire, cut ½” O.D. (9/16” I.D.) fuel-vapor hose to 27¼” long. Then, cut four pieces of ½” O.D. (¼” I.D.) hose to 3” long.
2 Insert half of the smaller hose into one end of the larger hose where shown on the Wheel Assembly drawing. Slide the opposite end of the larger hose onto the protruding end of the smaller hose. Check for a tight fit of the tire onto the wheel. Trim the hose if necessary. Use instant glue (cyanoacrylate) to adhere the mating ends, striving for a tight joint. Repeat Steps 1 and 2 for each tire.
3 Lightly sand the tires to remove any visible lettering or exposed instant glue. Set the tires aside for now; you’ll epoxy them to the wheels after finishing.

Use a round file to shape and smooth the inside edge of the wheel rims for a flush fit against the tire.

Align marked bend line on masking tape with top edge of vise jaws, and bend steel strap to correct angle.

Produced by Marien Kemmer
Photographs John Hetherington
Illustrations: Kim Downing
We all recognize a great carving when we see one. But we can't always put a finger on what makes it so. Here, champion carver Rick Beyer explains what separates top-rank carvings from also-rans. His advice could help you carve your masterpiece.

Sometimes as I wander up and down the aisles of a carving show, a piece will stop me dead in my tracks. “What makes this one such a grabber?” I'll wonder. “Is it some skill or technique, or was the carver just lucky?”

To find out, I went to Racine, Wisconsin, to visit Rick Beyer, a carver whose name often appears on those eye-catching works. Here’s what he told me.

Research starts you right
“Research is the key element in making a really good piece,” Rick says. Before starting a carving, he assembles a mass of reference material about his subject. He haunts libraries, museums, zoos, aquariums—any place he can find photographs, illustrations, and mounted or live examples of the fish or bird he will be carving. He keeps a reference library in his studio, too.

He sometimes shoots his own study photos. “I’ll run off rolls of film of a bird or fish so I’ll know not only what the whole thing looks like and how it moves, but what each part of it looks like,” Rick explains. Commissioned recently by a racing-pigeon fancier to carve a favorite flier, Rick snapped some shots of the very bird he’ll be modeling. “I took a lot of tight close-up pictures,” he says, “especially of important features like the eyes and primary flight feathers.”

Overall photos along with material gleaned from

“Artistry makes the difference.” That’s how championship carver Rick Beyer sums up what sets a great carving apart from the crowd. Now artistry might sound mystical, maybe even a little bit hoity-toity, but it boils down to some basic, commonsense

Form, color, and realistic rendering of the fish emerging from the wave give this carving a sense of motion. Arrested motion always adds interest to a carving.
books and magazines will answer questions about proportion. Illustrations or photographs of a bird's skeleton and photos of pigeons in flight and roosting will help when it comes time to create a realistic pose.

Always resist the temptation to feel that you're so familiar with the subject that you don't need to do any research. "Chances are," says Rick, "you have never studied anything as intently as you'll have to for a top-rank carving project. You just can't work out of your head with nothing to look at," he says. When he carves, the reference materials may outnumber the tools on his bench.

**Plan for perfection**

Once you gather your reference material, you're ready to design the project. "Sketch your carving, first," Rick suggests. You don't need to draw detailed plans, just some loose sketches. These will help you decide such basic questions as whether the subject will be sitting or standing; looking up, down, left, or right; in action, or at rest.

And while you're designing the carving, consider how you will display the finished piece. Will it be on a base? If so, design the base to complement the carving. You don't want it to look like an afterthought. The base for the turtle carving on pages 60-61, for instance, helps depict motion and instantly places the turtle in a natural location—underwater.

During the design stage, Rick asks himself a lot of questions. Does the pose look stiff and unnatural? Does that joint really bend that way? Is this a distrac-

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**Carefully planned stems show water movement around the fish. The natural-finish carvings achieve great realism even though they aren't fully detailed.**
CARVING BY DESIGN

The bird's position is critical at this stage.

Rick suggests making a magazine from a desk drawer. The cover photo shows a heron standing on one leg, the other raised up beside its head. He is been commissioned to model a carving on that photo.

"I'll put it on a brass base, cast to look like a shoreline puddle," Rick says. "The long, skinny legs will have to be made separately from the body," he comments. "I could carve them from wood, but it would be better to cast them in metal, like the base. Then," he says, "I could cast the one leg [the one the bird stands on] as part of the base, rather than making it separate and trying to fasten it to the base later."

Sometimes, the best solution to a carving problem comes by working it out in three dimensions. "Lots of carvers make mock-ups first," Rick notes. "I don't like working with clay, so I don't. Sometimes, I will make a wooden model before I start, just so I can see how things are going to work out." Often, the wooden model is no less than a full-sized rendition of the proposed carving.

You might even need to consider the sequence for your work. For example, take a carving Rick recently started, a mythical figure holding a dove on an outstretched hand. "I haven't done the main figure yet, but I've carved the dove," he remarks, pushing the basswood bird across his desk.

"This way, I can model the hand to hold the bird properly. With the dove in place, I can carve the figure's eyes to focus on the dove," he explains.

Trying to place the bird in front of already-carved eyes could result in an arm and hand position more suited to a carving of a contortionist, Rick adds.

**Find your style**

"Whenever someone comes to me for carving advice," Rick says, "I tell them one thing: Develop your own style." Having your own style simply means that there's something about your work that enables viewers to recognize it as yours.

"Style can be anything that sets your work apart—a look, the wood you use, a certain carving technique, a way of painting. Even specializing in a certain subject could become your style," Rick explains. "I've carved a lot of fish in cherry wood with a natural finish; it came to be recognized as my style."

"Most carvers just need to set their minds to being different," Rick adds. "Now, you don't have to be bizarre or strange; just don't make your carving look like everyone else's."

To accomplish that, Rick says, "loosen up, enjoy the carving, get some feeling into the piece." But, what if you're set on carving painstakingly accurate waterfowl, for instance?

Wouldn't loosening up and being different make your carving a less-accurate rendition of nature? Probably, Rick agrees. But to him, that's no problem.

Again he stresses design. "Carvers should set their minds into design rather than reproduction," Rick maintains. "I mean, God makes ducks; carvers should make art."

"Get away from feather-counting somewhat and look at the total design. Every part needs to be pretty realistic, but how you put them together determines the carving's success as art," he says.

"If you feel like giving the head a quirky twist, go ahead," Rick counsels. "Big
deal, so someone doesn’t like it. There are probably ten other people who do.”

Couldn’t that shoot your chances of winning a show ribbon? “Not necessarily,” Rick replies. “And, anyway, carving for a judge or show juror can backfire. If you go to a competition trying to please the judges rather than yourself, odds are that what you think the judges want isn’t what they’re looking for at all.”

Rick’s best advice on shows? “Enter work that shows your best effort. And realize that competition is not a good way to judge artwork; it dictates how a person is supposed to create, which contradicts art.”

In other words, when it comes down to passing judgment on your work, you have the final say. “There are no set rules,” Rick says. “That’s why so many of the top carving artists have totally different carving styles. They all have their own ideas.”

**What about workmanship?**

With the planning and designing done—the largest part of the project, Rick says—it’s time to carve. And, according to this award-winner, you may already have the skills of a big-time carver and not even realize it. “Most people who know how to carve can meet the technical demands of the show circuit,” he declares.

Good craftsmanship—clean cuts, well-executed details, fine finishing or painting—always wins a lot of admirers. But following the path of artistry can lead you and your work to the winners’ table more often. “There are a zillion good craftsmen, but only about one out of 20 pays any attention to artistry,” Rick comments. “Those who combine artistry with craftsmanship win the prizes, and win them consistently.”

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**A carver’s accounting of his path to the pros**

Making a living from woodcarving wasn’t Rick Beyer’s original plan. Oh, he’s enjoyed woodworking and carving for quite a while (he took up carving at age 16). But, armed with a degree in accounting, Rick left college destined for a career in business management. He worked as a restaurant manager, then as a shipping manager for a furniture manufacturer. All the while, he worked on perfecting his carving. “I was working 40 hours at my job, and spending another 40 hours a week carving,” he recalls. He entered shows, took on some commissions, and generally pursued his art as a hobby that paid its own way. Pretty soon, he opened R.J. Beyer Galleries in Racine as a part-time business, a place to display (and sell) his carvings and other artwork.

About the time he was opening the gallery, the company he worked for pulled up stakes to move to another state. Though offered a transfer, Rick and his family opted to stay in Racine. For work, he decided to take a chance on art. “Between the job and carving, I was putting in 80 hours a week. I figured if I just carved a little more, we could make it,” he says.

That was nearly a decade ago. Today, Rick’s carvings reside in private, public, and corporate collections around the nation. He teaches carving classes, carves for shows and exhibitions, sells work through his gallery, and takes on commissions. He’s no longer just taking a chance on carving.
Few projects can showcase your woodworking skills better than a handsome set of interior doors. But if the seeming complexity of door construction has kept you from building your own, take note. We teamed up with master craftsman Chuck Hedlund and developed a set of straightforward procedures that enable you to build one, or a whole house-full, of these elegant rail-and-stile doors.

The job's not begun until the paperwork's done
You must first calculate and draw all the dimensions of the door on paper. Start with the measurements of your door opening, side jamb to side jamb for width, and top jamb to finished floor for the height. Then subtract the dimensions of the various parts to develop your bill of materials. Don't be tempted to build the door slightly smaller than the opening. You trim the door to fit after you've built it.

For four-panel doors such as ours, tradition and practicality dictate a few standard widths for the rails, stiles, and Mullions as listed below. These proportions allow you to center a door knob with a 2 3/8" backset on the stile.

Top rail: 4 3/4"  
Stiles: 4 3/4"  
Lock rail: 8"  
Mullions 4 3/4"  
Bottom rail: 9 3/8"

Feel free to vary these sizes for a different style or look. To calculate the rest of the dimensions, refer to the box at right.

Good wood for a good door
We used oak for our door, but any kiln-dried, straight-grained wood will do. Poplar makes an excellent paint-grade door. If you use a clear finish, select evenly colored pieces with complementary grain pat-
STILE DOORS
Our step-by-step guide tells how

HOW TO SIZE UP A DOOR’S DIMENSIONS

STILES
Height equals the full length of the door opening, top jamb to finished floor.

RAILS
Length equals the width of the door opening between the side jambs, minus the width of the two stiles.

TOP MULLION
Length equals the height of the door minus the width of top rail, minus 36°, minus half the width of the lock rail. (36° is the recommended height from the floor to the middle of the doorknob and lock rail.)

BOTTOM MULLION
Height equals 36” (or the height of the center of your doorknob) minus the width of the bottom rail, minus half the width of the lock rail.

PANELS
The dimensions of the panels match the inside dimensions of the frame minus ¼” in length and width.

terns. You’ll need 8/4 stock for the rails, stiles, and mullions; and 5/4 stock for the panels.

Start by machining your rails and stiles
Using a jointer, flatten out any bow or twist that you find on the faces of the rails and stiles. Once these pieces are perfectly flat along their length, use a thickness planer (if necessary) to bring them down to 1¼”. This leaves an extra ½” on both faces for scraping and sanding. Then joint the edges of the boards to their final width. Finish by crosscutting the pieces to their final length, but cut your stiles 2” longer than the door height so that you have a 1” lug on both ends to protect the door until it’s hung. If you want wide bottom and lock rails like ours, glue them up from two or three narrower pieces.

To build up the panels, edge-glue two pieces of 5/4 stock for each panel, and then plane them down to their final 1” thickness. If you want a different panel style from on ones shown, see “Door Panel Options” on page 83 for a variety of styles and details.

Laying out the frame
To assemble the door you’ll need a clean, flat, layout table about 1’ longer and wider than the finished door. Start by laying out your pieces and face marking them with a colored lumber crayon so as not to get them mixed up or turned around later. Then lay out your rails and mullions as shown in Photo 1 on the next page.
RAIL-AND-STILE DOORS

For fast, foolproof alignment, try our doweling jig
You can use a standard doweling jig to bore your holes, but our scrapwood jig automatically aligns all your dowel holes, and eliminates the need to measure and mark a lot of pencil lines.

To build the jig, cut a scrap piece that’s exactly the same thickness as your frame, as shown in the illustration below. Put a ⅛” brad-point bit in your drill press, and attach a fence to the table. Use the fence to center the drill bit on the thickness of the scrap piece, with the brad point about 1¼” from one end.

Keep the motor off, but lower the drill bit until the brad makes a small dent in the wood. Raise the bit, turn the wood around, and lower the bit, again making a very slight indentation. By carefully nudging the fence you’ll get to the point where the brad makes an indentation in exactly the same place regardless of which side of the jig is against the fence.

At that point the bit is centered. Turn on the drill press and bore a ⅜” hole through the wood. To complete the jig, glue and nail guides to each side, as shown.

Here’s the secret to our self-aligning doweling jig
To bore perfectly matching dowel holes, simply clamp the jig on the end of a mullion, and flush with one edge. Bore the first hole as shown in Photo 2. Turn the jig around and bore the second hole. Clamp the jig flush with the pencil mark on the adjoining rail, as shown in Photo 3, and bore. Since the pencil mark represents one edge of the mullion, the hole you drill should align with the hole in the end of the mating mullion. Turn the jig around, align it with the other pencil mark, and bore the other hole. Bore all the holes 2¼” deep. See the Exploded View drawing for the location of all the dowels.

Put the squeeze on before marking the stiles
To mark where the rails join the stiles, lay the stiles flat on the table as shown in Photo 4. Clamp the mullions between the rail ends for the correct spacing, and lay this assembly on top of the stiles. Then, mark the position of...
the rails on the edges of the stiles.

Now, you need to locate the position of the middle dowel holes for the lock and bottom rails. To do this, place the jig over the end of the lock rail with the guide hole centered in the middle. Mark on the jig where the top edge of the rail meets the overhanging end of the jig and label that “point A,” as shown in Photo 5, then drill the hole. Position point A on the corresponding pencil mark on the stile, and drill the matching hole as in Photo 6. Follow the same procedure for the bottom rail, marking that (since it’s slightly wider) as “point B” on the jig. To avoid confusion, make sure that if you take your reference mark from the bottom edge of the rail, you transfer it to the bottom mark on the stile.

**Big projects need big dowels, so make your own**

We cut our own 4”-long dowels from ¼”-thick oak dowel rods to give the door frame the strength it needs. To provide an escape route for glue and air, cut two glue channels in each piece with the jig and a bandsaw as shown in the illustration at right. Bevel the dowel ends and check the fit in the holes.

If the dowels fit too tight, get a metal plate at least ¼” thick, bore a ¼” hole through it, and hammer the dowels through the hole to size them. If the dowels are still too tight, tap the top of the hole in the metal plate a few times with the round end of a ball peen hammer. That will close up the hole enough to remove more wood from the dowels.

**And now, the main event—glue-up number one**

Glue-up the rails and mullions by spreading glue in all the holes and inserting the dowels. Clamp the pieces together, and slip the stiles under the ends of the rails. Align the edges of the rails with the Continued
pencil lines on the stiles as shown in Photo 7. If your assembly is square, the rails will just touch the lines on the stiles in all four corners. If they’re not aligned, ease off the clamping pressure on one side and watch how that moves the rail in relation to the line. Adjust the pressure until the stiles are touching the pencil lines on all four corners.

**Glue-up number two**
After the glue has dried on the rails and mullions, you can glue, dowel, and clamp the stiles to the rails to complete the frame. Put one clamp over and one clamp under each rail. Then level the assembly. Shim the bottom of the clamps until the door lies level across each rail as in Photo 8. To check the stiles for flatness, place equal-height blocks on each rail near the stiles and lay a straightedge or long level on top of the blocks. Shim under the clamps if necessary to bring all the blocks up to the straightedge, as shown in Photo 9. This span does not need to be level, just straight.

**Let’s make the panels**
A good time to make the panels is while you’re waiting for the glue to dry on the door frame. Measure the openings in the frame, and then cut the panels $\frac{1}{4}$" smaller in height and width to get a $\frac{1}{4}$" gap around the perimeter of the panel. This gap compensates for the swelling and shrinkage caused by changes in humidity.

We used a panel-raising router bit (Freud Model 99-216) to cut the bevels, as shown in Photo 10. To minimize tearout when routing, cut the tops and bottoms first, and finish by routing the long edge. (You also can create a raised panel with a tablesaw. See our article on page 83 for this technique.) Leave a $\frac{3}{8}$"-thick tongue around the perimeter of the panel to slip into the channel created by the molding.

**Size the door to its opening**
The best time to size the door to the opening is before you put in the panels. The door frame weighs less and is easier to handle at this point. First, place the door in the opening and push it tight against the stops. Then scribe any irregularities in the jambs onto the edges of the door and leave $\frac{1}{8}$" clearance from the jambs and floor. Now remove the door from the opening and carefully plane the edges down to the scribe marks. Check the door fit in the opening again and if you have a good fit with the proper
clearance all the way around, remove the door again and plane a 5° bevel on the edges of both stiles, as shown in the drawing above. These bevels enable the door to clear the jambs when opening and closing.

At last, you're nearing the finish line
To hold in the panels we used oak base shoe molding ripped to ½" x ¾". Use a featherboard to control the molding during the cut and a zero-clearance insert to prevent the small pieces from falling inside your tablesaw.

After you've ripped the molding, prepare the door for finishing. Sand or scrape the intersecting parts flush, and sand everything with 150-grit sandpaper and then 220 grit. Stain all the pieces of the door—panels, frame, and molding—before you assemble them. This will prevent unstained edges from peaking out under the molding when the panels shrink during dry weather. (We used Minwax Golden Oak stain.)

After the stain dries, tack a stop to the inside edges of the door frame. Miter the moldings, and nail them in place with 3d finish nails using the stop as a guide. To avoid splitting the wood, drill pilot holes for all the nails.

Remove the stops, turn the door over, and drop in the panels. Insert short pieces of ¼" foam insulating rope between the panel edges and the door frame, as shown in Photo 11. Cut and nail the remaining moldings to the door. Then apply your final finish coat. (We used a clear Watco Danish Oil.) Hang the door and set the lock as you would with any other door, but use extra-sturdy hinges and extra-long hinge screws to support the weight.
Looking for new turning designs? Then, look to the past. Arizona turner Phil Brennion finds beautiful woodturnings in classic Native American pottery shapes from the Southwest.

Long before there was woodturning, there was pottery. As early as 3500 B.C., Sumerian potters threw jars, bowls, and other vessels on hand-powered potter's wheels. That was more than 3,000 years before Greeks invented the woodturning lathe.

By the time woodturners developed the equipment, tools, and techniques necessary for turning hollow forms, such as vases, urns, and bowls, the shapes and proportions for those forms had been defined by several thousand years of pottery-making. With few exceptions, woodturners today tend to follow classical design guidelines in creating new pieces. And they do it for a very good reason: Those ancient rules still lead to beautiful bowls.

**Time-honored designs**

Woodturner Phil Brennion of Chino Valley, Arizona, is one who recognizes and appreciates that design sense from the past. He draws inspiration for his stunning turned vessels from Native American pottery of the Southwest United States. In fact, it was his love of those shapes that led him to take up woodturning in the first place.

Like so many timeless designs, the Southwest native pottery Phil likes so much combines simplicity with practicality. The pots also show a unity of design he admires. "Tribal potters often throw their pots knowing what adornment—usually painted designs—will be put on them," Phil comments. By considering the ornamentation and the shape as a whole, the potters create pieces that embody beauty and harmony—no element of the whole seems out of place nor overwhelms any other element.

"The same should hold true for woodturning," Phil maintains. The wood grain and the vessel shape should complement each other, not fight each other for attention. "You often can show off the best grain features in a piece of wood" he says, "by choosing a shape that accentuates it. Also, use simple shapes for highly figured wood.”

**Principles of proportion**

Numerous formulas, mathematical proportions, and rules-of-thumb have been handed down through the centuries in attempts to quantify good design. Phil considers three of these guidelines above all others when turning his Southwest containers:

- Make the base smaller than the mouth of the vessel.
Native American pottery shapes make great turnings

- Place the major diameter above or below the middle of the pot, not right on it.
- Curve the sides from the neck out to the major diameter and back in to the base. Don't make straight-sided forms.

Phil often sketches an outline—or a template—for a piece before turning it. But he doesn't like to lean too heavily on preplanned shapes. He finds enjoyment in watching the vessel emerge from the piece of wood on the lathe. "Don't be a slave to a template," Phil cautions. "Use it as a guide."

Phil's turning technique

The Arizona turner begins a bowl by bandsawing a blank a little larger than the diameter of the finished piece. The extra diameter allows him some leeway in the turning's final shape—to accommodate wood features, for instance.

After bandsawing his blank, Phil mounts a faceplate on the side that will be the bottom of the bowl. Usually, he attaches the faceplate directly to the blank with #10 x 1 1/2" sheet metal screws. When he's dealing with a burl or a thin piece of stock (or one he wants to get the biggest possible turning from), he glues a scrap-wood waste block to the blank with yellow woodworker's glue. Then, he screws the lathe's faceplate to the waste block.

Unlike many bowl turners, Phil always uses the tailstock as he turns the outside profile. The tailstock lends extra support to the turning and keeps it running true, helping prevent breakout at the small base.

With the lathe running at 1,000 rpm or less, Phil rounds the blank and establishes the top of the rim and the bottom of the base with parting-tool cuts. Then, he turns the blank to the major diameter and forms the profile with a 3/8" or 1/2" bowl gouge.

He leaves the neck and base somewhat larger than finished size for extra strength while he cleans out the inside. "To start the inside, I bore through the neck with a Forstner bit, to within about 1/2" of the base," Phil explains. A drill chuck mounted on the tailstock holds the bit.

After boring the starting hole, Phil cleans out the inside with a 1/4" round-nose scraper or an angled boring-bar tool, depending on the design. (He used the round-nose scraper for all of the bowls shown in this article.)

With the bowl cleaned out, Phil completes turning the outside. As for wall thickness, "it isn't necessary to go for ultimate thinness—"
**Bowls with a Past**

¾" is good," the turner says. "Shapes are most important to me; I don't get lost trying to turn down to microwalls."

He then turns the neck and base to final outside size, and sands to 320 grit. He usually doesn't sand the inside of a bowl. When he parts off the turning, he forms a slightly concave base for stability.

**Some finishing tricks**

Phil favors semigloss finishes for his work. "Southwest designs generally don't work well with high-gloss finishes," he says. He typically applies three coats of Defy semigloss lacquer, sanding between them. He goes over the last coat with steel wool, applies Trewax, and buffs the piece. The amount of buffing he does allows him to control the gloss.

Phil finishes some turnings with Waterlox, a tung-oil product. A few, such as the hackberry seed jar shown far right and on page 68, receive no finish at all. To emphasize the shape or add depth to a pot, Phil sometimes paints the inside flat black.

*Written by Larry Johnston*  
*Photographs: John Hetherington*  
*Illustrations: Kim Downing*
Bead pot
This style could have held beads, or practically anything else. Potters made these general storage jars in a variety of sizes.
**Wood shown:** hackberry, lacquer and wax finish.

Seed jar
Tall vessels like this could have served as large seed jars. Native American potters most often produced this style as a vase to sell to tourists, however.
**Wood shown:** hackberry, no finish.

Dinner bowl
This open design represents the shallow eating bowl found in most Southwest cultures. Sand and finish both the inside and outside when you make this one.
**Wood shown:** mesquite burl, Waterlox finish.

Olla
The olla, or large jar, was for water storage. The mouth needed to be large enough to dip from, but small enough to reduce losses to evaporation in the arid American desert.
**Wood shown:** juniper, lacquer and wax finish.

Sikyatki
Native Americans once carried these jars on their heads, hauling water long distances. The flat shape was easy to carry, and the small opening minimized loss of water from splashing out.
**Wood shown:** juniper, Waterlox finish.
LUMBERYARD
A rose for those who prefer

Note: Cut the rose parts from two blocks of softwood stock 1½x3¼x6” (scraps of standard 2x4 fir or pine work great). You'll need a ¼” dowel 14” long for the stem and two short lengths of ⅛” dowel for the leaf stems.

Trace the Full-Sized Petal and Leaf Blank Side View pattern opposite page onto one face of one 2x4 block. Butt the bottom of the pattern against one edge of the stock near the end, where shown in the Petal and Leaf Blanks drawing.

Bandsaw or scroll saw along the pattern line. A bandsaw fitted with a ¼” blade works great, but you also could use a scroll saw with a heavy blade, such as a no. 9 (.055x.018” with 11.5 teeth per inch). Saw one line from the edge to the tip, back out, and saw in along the other line.

Now, cut nine more blanks. Rather than tracing the paper pattern repeatedly, simply stand the first cut piece on edge on the stock and draw around it with a sharp pencil or utility knife for each remaining part. You'll need a total of 10 blanks.

Trace the full-sized petal pattern onto eight of the blanks, the leaf pattern onto the other two. Place the patterns on the side of the blank that curves upward from the thick end, with the pattern's bottom at the thick end.

Cut out the petals and leaves. The blank’s curvature prevents full contact with the saw table, so saw carefully, particularly in the unsupported area. Rock each blank on its curve as you cut to keep as much of it on the table as possible.

To make the rosebud, rip the remaining 2x4 block to 1½x1½”. Trace the pattern onto two adjoin-
LONG-STEM
saws to spades

ing faces, as shown in the Rosebud Blank drawing. Scrollsaw or bandsaw one face, then tape the waste back onto the block to saw the other face.

Sand the parts, rounding over the curved edges slightly. Then, select four petals that are approximately the same thickness at the thick end. Refer to the Exploded View drawing, and glue two of the petals together, end to end. Trim the thick ends of the other two to fit against the sides of the glued pair where shown.

Glue the remaining four petals to the sides of the rosebud where shown. Then, glue the rosebud assembly onto the lower petal assembly. When dry, drill a 9/16" hole at about a 45° angle into the bottom of the rose.

Drill 1/8" holes where shown in the two leaves and the stem. Assemble the leaves to the stem with 1/8" dowels. Glue the top of the stem into the hole in the rose.

Paint the bloom with acrylic paint in your favorite rose color (we used metallic pink). Paint the stem and leaves dark green.

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Project Design: Danny Barr
Photograph: John Hethington
Illustrations: Kim Downing

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ROSEBUD BLANK

1 1/2 x 1 1/2 x 2 3/4" stock

STEP 1
Cut out pattern on one side of blank.

STEP 2
Tape parts cut from previous step back together. Cut out adjoining side.

STEP 3
Sand top of rosebud to pattern line on both sides.

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PETAL AND LEAF BLANKS

2x4 stock 6" long

Cut ten petal and leaf blanks out of block.
A REEL DEAL

Here’s all the gear a young angler needs to lure the big ones out of the playroom fishin’ hole. Building it? Well, that’s not much more work than tossing a hook into a cool, clear lake on a sunny Sunday afternoon.

Note: Dowel diameters may vary from the nominal size, so select drill bits to match the diameter of your $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$ dowels. Use those bits wherever the instructions call for $\frac{1}{8}$, $\frac{1}{4}$, or $\frac{1}{2}$ holes.

To build the fishing pole, you’ll have to drill into the side of a few dowels (crosswise) and into the end of some (lengthwise). To make those tasks easier and safer, start by building the two jigs shown on page 84 to use with your drill press.

For the rod, cut parts A, B, and C to length. (We cut the short pieces of dowel by hand, holding them in the V-block and cutting them with a fine-tooth backsaw.) Drill the holes in parts A and B where shown. To drill lengthwise, position the dowel in the V-groove of the drilling fixture. Secure the dowel with a clamp. Now, locate the center of the dowel, and place it under the bit. Clamp the base of the jig to the drill-press table, and drill the hole.

For the crosswise hole, clamp the V-block to your drill-press table with the center of the groove under the bit. Lay the dowel in the jig, and drill. After drilling part B, cut the end nearest the cross hole at a 45° angle. Glue parts A, B, and C together.

Drill four equally spaced holes in a pair of 2" wheels where shown by the Reel Side detail. Cut parts D, E, and F to length. Glue part D into one wheel, extending out from the back of the wheel (the flat side). Slide one part D through the hole in part B, install the other wheel, and center the reel on the rod. Glue the assembly in place in part B.

Refer to the Crank Hub and Shaft Retainer drawing, and follow the three steps shown to make parts G and H. Cut parts I, J, and K to size. Drill parts E, I, and K where shown, and assemble the reel. Enlarge the wheel center holes to allow part E to rotate freely. Slide E into position, and glue parts G and H to it, leaving E free to turn.

Glue parts F and I together, then slide a spandrel ball (a $\frac{1}{4}$" ball with a $\frac{1}{8}$ hole through it) over I. Secure the ball with part J. Grip a $\frac{1}{4}$"-diameter ball in a handscrew clamp, and drill a $\frac{1}{4}$" hole through it. Glue the ball onto the end of the fishing rod.

Continued on page 82.
FOR KIDS

Land a whopping “Gee, thanks!” with this tackle

REEL SIDE DETAIL

EXPLODED VIEW

Buying Guide

Parts kit. Wheels, spandrel balls, 3/4" balls, magnets, screw eyes, and twine for two fishing rods. Order no. 1355 Toy Fishing Rod Hardware Package, $4.95 per kit plus $3.50 per order shipping and handling (MN residents add 6.5% sales tax) from Meisel Hardware Specialties, P.O. Box 70W, Mound, MN 55364-0070. For telephone orders call 800/441-9870

Dowel Sizes

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<td>I* Crank Handle</td>
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<td>K Bobber Core</td>
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*Start with longer stock, and cut to finished length in accordance with how-to instructions.
Get great results at minimal cost

VACUUM-VENEERING AND CLAMPING

Check valve (Prevents air from bleeding into bag)
Compressed-air supply hose
On/off valve
1/8" plywood caul (obscures view of veneer)
Open end of bag wrapped around slotted PVC pipe and clamped
Clear plastic vacuum bag
Stem connector
Vacuum gauge
Baseboard
Substrate
Vacuum pump (venturi)

It's easier than you might think

Above: This simple vacuum-veneering setup costs about $200 and yields perfect results, even with curved workpieces such as this bowed drawer front.

Left: Former WOOD magazine photographer Bill Hopkins used vacuum-veneering to produce this Hepplewhite-style sideboard.

Like a lot of other people, we used to think that only professional woodworkers could reap the benefits of vacuum-veneering. Were we ever wrong! After trying it for ourselves, and after making the clamping jigs on the following pages, we found the procedures and equipment remarkably simple, and surprisingly affordable. And the results? Fantastic!
Working in a vacuum: how it's done

Vacuum-veneering and clamping systems work on a simple principle: At sea level, the atmosphere applies more than 2,000 pounds of pressure per square foot in all directions. By removing air from one side of a workpiece, the atmosphere places all of its pressure on the opposite side of the workpiece. (The drawing right shows this principle in action.)

To remove the air, you can choose between electric- and air-powered vacuum pumps. For this article we experimented with an economically priced air-powered version. These units cost as little as $100, including a vacuum pump (often called a venturi), on/off valve, hose, and other basic accessories. They do require a compressor, though, that produces at least two cubic feet per minute (cfm) of air. By contrast, electric-powered pumps cost upwards of $500.

To use a vacuum pump for veneering you'll also need a special vacuum bag. Inside this large, clear-plastic bag you place veneer, adhesive, and a substrate stacked on top of a baseboard with criss-crossing kerfs. When you seal the bag and draw the air out of it, atmospheric pressure forces the veneer perfectly flat.

You'll find veneer bags in these approximate sizes: 4x4", 4x8", 4x10", 4x12", and 6x6". You can buy them in vinyl (.020" or .030" thick) or polyurethane (.020" thick) in prices ranging from $85 to $675 each. A .020" thick vinyl bag, your least expensive option, suits the needs of occasional users.

As you draw air out of the bag, the vacuum gauge acts like a barometer and measures the pressure according to inches of mercury (Hg). The pump will easily pull 25 Hg (about 1,800 pounds per square foot of pressure). Since a small amount of air leaks into the bag on its closed end and through any small pinholes, you need to check the pressure gauge every now and then. When it drops to 15 Hg, you need to bring the pressure back up by running more compressed air through the venturi.

If you would rather not bother checking the pressure from time to time, you can buy automatic controllers that maintain pressure by switching the pump on and off. This feature will add several hundred dollars to your investment, though. We suggest you add this device later if needed.

One man's success story with vacuum veneering

Bill Hopkins (the proud guy in the photo left) used to spend a lot of time on the other side of the camera, taking pictures for WOOD* magazine. Since retiring from his photography business a few years ago, Bill still finds time to stop by and see us. Only these days, he usually has woodworking, not photography, on his mind.

On one recent visit, Bill was planning the Hepplewhite-style sideboard he's posing with. Although he had never tried vacuum veneering, he thought it might be just the ticket for his new project. As he told us: "In my previous veneering attempts, it seems I always ended up with a troublesome bubble I couldn't quite roll down flat. And, clamping the veneer to the bowed drawer fronts on this project could get real tricky." Since we had a vacuum-veneering setup on hand, we asked Bill to give it a try and get back to us with his findings.

Well, the results speak for themselves: Bill's sideboard turned out fantastically. Here's what he had to say: "I used some bumpy veneer, but the vacuum press layed it dead flat. By carefully closing the bag, I was able to hold the vacuum fairly well with a loss of less than 3 Hg over a period of an hour or so. While it would have been nice to have the automatic controller, I didn't find this piece of equipment necessary for doing excellent work. I'm sold on using a vacuum setup for veneering."

Five handy clamping jigs

Although manufacturers tell us that vacuum systems get their greatest use in veneering, you'll also find them indispensable for certain clamping chores. On the next page, we've illustrated some of the possibilities. To learn about more applications, such as vacuum featherboards, right-angle clamps, and straightedges, contact the manufacturers listed at the end of this article.

You can make our jigs from any tight-grained, ¾"-thick wood such as hard maple. When you need a flat, inexpensive surface, plywood will do. The manufacturers in the Buying Guide on the next page will outfit you with the necessary fittings, vacuum tape, and other
accessories. We found both suppliers easy to reach and more than willing to dispense advice.

- **Hold-down platform.** With this fixture clamped securely in your vise, you can sand, rout, or carve workpieces without cumbersome clamps. By using the vacuum-tape "gates," you can control the area of suction for various-size workpieces.

- **Trammel pivot.** Conventional trammel pivots require you to drive a nail or drill a hole into the center of your workpiece, but this version leaves your project unscathed. Possible applications include cutting circles or molding their edges.

- **Bandsaw circle-cutting jig.** If you would rather cut your circles with a bandsaw, here's a super setup for getting the job done. The same jig works with a stationary sander for sanding perfect circles to shape.

- **Pushblock.** We designed this handy helper for jointing tasks, but smaller versions work great for holding tiny pieces for router-table operations. You can use this basic idea to customize pushblocks for all sorts of machining tasks.

- **Router template.** You'll really appreciate this little device if you need to produce quantities of simple shapes. The reason: You'll spend little time at the bandsaw or scrollsaw if you cut the objects to rough shape, then rout them to finished shape with this jig and a flush-trimming router bit.

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**Buying Guide**
For more information on vacuum-veneering and clamping, contact these manufacturers:

- **Quality Vakum Products, 32 Longmeadow Rd., Lincoln, MA 01773. Call 800/547-5484 or 617/259-1490.**
- **Vacuum Pressing Systems, 553 River Rd., Brunswick, ME 04011. Call 207/725-0932.**
Contrary to what you might think—and what we thought—air-drying green lumber before putting it in the solar kiln on page 44 won't speed up the drying process. Says Eugene Wengert of the University of Wisconsin, "You'll only be ruining the prime on the pump, so to speak. Wood that's first air-dried takes as long to kiln-dry to the final moisture content of about six percent as green wood does." That's because after the free water that fills the cavities of the green-wood cells evaporates, the moisture remaining in the cell walls becomes bound water. And like a damp cloth, only low-humidity heat can dry it further.

Here's more great tips
• For wood to dry in a solar kiln, you should try to maintain an interior temperature that's a minimum of 50°F. Ideally, the kiln temperature should read about 30° higher than outdoor temperature. Fans help hold this temperature difference in hot weather.
• Wood can dry too fast. All hardwood species have a maximum moisture content that they can lose per day without suffering damage (their drying rate). Oak, for instance, can't lose more than 2.5 percent. Walnut, on the other hand, can lose as much as 8.5 percent. With a mixed load, dry to the wood with the slowest drying rate, like oak. Let other species go along for the ride.
• Partially filling a kiln may result in the green wood drying too rapidly and developing stress. The solar kiln design allows for drying a full load to the slowest rate. (For a shorter stack, extend the black plastic baffle down to the top of the wood pile.)
• Never introduce a supplemental heat source. Too much heat can cause defects such as case hardening, which hardens the wood's surface only.
• The kiln must cool off at night. Condensation that collects on the walls at night (with the fans off) reduces any potential stress in the drying wood.
• Regulate the drying rate with vents. In some cases, you may have to keep vents closed at first, then open them for awhile, then close them again to control moisture loss.

Although there's a lot to learn at first about kiln-drying green wood, the effort's economically worthwhile. And if you're in the woodworking business, you can depreciate the solar kiln's cost for tax purposes because it's considered equipment (consult with your tax advisor).
What woodworkers need to know about...

BANDSAW BLADES

Tips for getting the most from your blade

- **Better cornering.** For a blade that takes tight curves smoothly, round its back corners with a coarse whetstone. Many dealers sell a dry stone mounted on a handle—called a blade-tuning stone—designed especially to do this.

- **Don't attempt re-entry.** If you replace a blade in the midst of a cut, don't saw into the old kerf with the new blade. That's a sure way to dull the new blade prematurely. Instead, turn the work around and start at the other end.

- **Straighten up and cut right.** For accurate cutting, you must adjust the tension and blade guides correctly. Here's how we do it in three simple steps:
  1. Set the blade tension in accordance with your saw's instruction manual.
  2. Adjust the tracking to bring the bottoms of the blade gullets into line with the front of the saw's guide pins or blocks (see illustration above right).
  3. With the saw running, carefully slide the blade support toward the back of the blade. When the blade rotates the wheel, slide the support away from the blade just a smidgen so the free-running blade won't rotate the guide wheel. Tighten the setting.

- **Blades that won't cut straight.** A blade that continually tracks off a cutting line in the same direction may be dull on one side. The blade will lead toward the sharper side. The only cure: sharpen the blade or install a new one on the saw.

Where to buy them

Can't find the blade you want locally? Try these mail-order dealers for a wide variety of bandsaw blades:

- **Garrett Wade Co.**
  212/807-1155

- **Trend-lines, Inc.**
  800/877-7899

**Woodcraft**
800/535-4482

**Woodworker's Supply, Inc.**
800/645-9292

*Note: Manufacturers' specific recommendations for use of their products always take precedence over general tips.*

Written by Larry Johnston  Illustrations: Kim Downing
FISHING REEL
Continued from page 75
Assemble the bobber and hook, referring to the drawings below. Epoxy the magnet into the hook. With a marking pen draw a hook on each side of the hook block. Paint the bobber ball red.
Scrollsaw several fish from ¼"-thick stock. Glue a magnet into each where shown. Finish the fish and the rod as desired.
Install four small screw eyes, three spaced evenly along the rod and one on the end where shown. String the rod with nylon or cotton twine about ⅛" in diameter, passing through the screw-eye guides. Tie one end through the hole on the reel shaft. Thread the other end through the hole in the bobber, tie a knot about 1" from the end, then tie the free end to the screw eye in the hook.

1½" hole drilled before cutting fish to shape
FISH
FULL-SIZED
HALF
PATTERN

Initial size of fish
(¼ x ⅛ x ⅛ x 3")
3½" dowel
1 1/2" long
9/32" hole
1 1/2" dia. wooden ball
1 1/2" dia. round magnet

3½" x ⅛ x ⅛ x 1 1/2" block (shown upside down)

Draw hook with felt-tip pen on all four sides
Sand a slight round-over on all edges
Screw eye centered on top of hook
DOOR-PANEL OPTIONS

Traditional door styles employ a raised panel within a frame, but there are several options you can explore other than the 1" panel we used. You can make the door panels 3/4" or 1/2" thick and still maintain a bevel on the edges.

By making the panels thinner you reduce the weight of the door a bit and save a little money too. You can also make the panels flat on one, or both sides. Closet doors, for example, don't need a bevel on the side that nobody sees. Thinner panels, however, result in shallower bevets and don't impart the same massive look as the deeper shadow lines of thicker panels.

If you don't have a panel-raising router bit to cut the bevel profile you want, set up your tablesaw to do the cutting as shown in the two drawings below. Whatever panel style you choose, just be sure to leave a 1/8"-thick outer edge on your panel to fit into the groove created by the molding.

Illustrations: Jim Downing

DOOR-PANEL OPTIONS

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<td>Single bevel 1/8&quot; panel</td>
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<td>6.5&quot; bevel</td>
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CUTTING PANELS ON A TABLESAW

STEP ONE
Make two 1/8"-deep field cuts in panel.

Fence
Panel
Tablessaw

STEP TWO
Cut bevel in panel with blade set as shown.

Auxiliary fence
Panel

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The Japan Woodworker's Catalog is...

WOO. MAGAZINE June 1994

83
Drill holes into the sides and ends of dowels, such as those required for our Craft Shop fishing pole, page 75, can challenge even the best woodworkers. The problem: trying to hold round stock in position. Here are a couple of simple jigs that will hold your dowels rock-steady.

Both jigs rely on a V-groove that you cut into a piece of 3/4"x3"x20" scrapwood. To cut the V, tilt the blade of your tablesaw to 30° from vertical, and set the cutting depth to 3/8" as shown in the illustration at right. Adjust the fence to locate the top of the cut on the centerline of the board. Make one pass over the saw blade, turn the board around, and run it through again, creating a 60° V-groove.

Crosscut a 4 1/4" piece off one end. The longer piece holds your dowels flat on the table, as shown in the photo above left. The shorter piece forms the basis for the second jig, which holds dowels vertically for drilling into their ends.

To complete the vertical jig, cut a 1 1/2"x3"x3" block, clamp it to the back of the 4 1/4" piece and check to make sure that the V-groove is perpendicular to the base. Then glue and screw the two pieces together as shown in the Vertical Jig drawing. Use the vertical jig as shown in the photo above right.
BLACK LOCUST
THE ENDURING TREE OF TALL-SHIP FAME

When English naturalist Mark Catesby first visited Jamestown, Virginia, 100 years after its founding, he saw only the stark ruins of what the first inhabitants in 1602 had called home. But at each corner of the tumble-down huts remained a post—as solid as the day it was erected. He marveled at the still-sound wood, which had been named “locust” after an old-world look-alike.

Other colonists eventually learned of locust's longevity, too, because the tree became widely used. No wonder.

Black locust (Robinia pseudoacacia), as it has come to be called, offers superb qualities. Because a locust's trunk contains mostly sapwood, it's strong. In drying, locust hardly shrinks. In stiffness, it outdoes hickory. Fighting decay, it outlasts white oak. Burned, a cord of black locust throws off the heat of a ton of coal. And machined and sanded, the wood takes on a high luster.

Yet, black locust has never attained commercial status. That's because in most of the areas where it grows the tree suffers from insect attack, leaving few trees sound enough to harvest. So instead of becoming commercial lumber, black locust winds up as fence posts, firewood, and railroad ties. Except for one fleeting moment of historical greatness, that's the way it has always been.

You see, a variety of black locust, caringly cultivated in the late 18th century in New Jersey and New York—especially Long Island—earned renown. The tree's straight, branchless trunk proved perfect for shipmasts. Even today in the area, you can still find examples of those once sought after “shipmast locusts.”

Illustration: Jim Stevenson

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WOOD MAGAZINE  JUNE 1994
Disc-Sander Sidekick

Sanding rough-cut discs perfectly round will be easy once you build this sanding jig. We made ours in about 30 minutes.

To put your jig to work, clamp the base of the jig to your sander table, and center the disc to be sanded on the dowel near the end of the adjustment arm. Start the sander and slowly slide the adjustment arm with attached workpiece into the sanding disc until the disc sands to the marked circumference line on the workpiece. Turn the sander off, clamp a 3/4 x 4 x 2" stop to the adjustment arm, turn the sander on again, and slowly rotate the workpiece against the sanding disc.

Photograph: John Hethington Illustration: Jamie Downing

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#49 Country quilt hanger, coffee table, airbrushes.
#50 Powder miter saw, bookcase, toy truck.
#51 High chair, plate rack, planners.
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1) Fill out the form at right, indicating which issues you want to purchase.
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Note: Supplies are limited, so we recommend you purchase your magazines by credit card (MasterCard, Visa). This allows us to charge you only for those magazines we have in stock at the time we receive your order. We also accept checks, payable to WOOD Back-Issue sale, but this may result in a processing time on our end. Allow 4-8 weeks for delivery.

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- Video on how to veneer using a vacuum bag. See article on page 76. Packed full of veneering know-how as well as the equipment used. A must for anyone who wants to expand their capabilities to obtain superior results on custom furniture. Special $19.95 + $4 S&H, reg. $35.85, 78 minutes. Quality VAKuum Products, Inc., 1-800-647-0484.

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WOOD MAGAZINE JUNE 1991
ADVEMENT

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FINISHING TOUCHES

OFF TO CONGRESS

The continent’s longest-running competitive woodcarving show will reconvene at the Putnam Museum, in Davenport, Iowa, on June 23 and conclude on June 26. For nearly three decades now, the International Woodcarvers’ Congress has featured top North American carvers vying for prizes in 12 categories and more than 40 classes, plus special awards. Admission is free, but carvers must belong to the Affiliated Woodcarvers, Ltd., to compete. For more information, write: Larry Yudis, P.O. Box 10408, Bettendorf, IA 52722-8408, or call 319/359-9684.

A place where woodworkers have aged to perfection

Drop by the Kuempel Chime Clock Works and Studio in the suburban-Minneapolis community of Excelsior, and in the shop you’ll see grandfathers making grandfather clocks. Yessiree, in these days of company downsizing through early retirement, Kuempel management embraces the opposite approach. In fact, 15 of the clock company’s 20 employees are ages 63 to 85!

Zoing in on older workers isn’t new to this manufacturer of wood-cased clocks and clock kits (from grandfather-size to mantel). Way back in 1916, founder Rueben Kuempel often enlisted the aid of older visitors to his workshop. Today, Kuempel lists among employees a retired school principal, a former banker, and other active senior citizens who learned woodworking on the job in the company’s clock shop.

According to Bruce Hedblom, one of the owners, older workers make ideal employees because they’re meticulous about quality, honest, early on the job, and they work hard. But, they do like to have time off, so the company provides flexible hours. Because of this, about the only type of clock you won’t find at Kuempel is a time-clock.

Visitors to Kuempel Clock are welcome to tour the shop. You’ll find them at 21195 Minnetonka Blvd., Excelsior, MN 55331. Call 800/328-6445.

Russ Barnard, at 65 one of Kuempel’s youngest craftsmen, has managed the wood shop for nearly 20 years.

FINGER-TO-FINGER REDWOOD

The annual growth in California’s coastal redwood forests is about 2.9 percent, with some areas nearing six percent. By the year 2040, the total annual growth rate will increase by at least 28 percent due to the number of newly emerging young redwood forests, predict officials at the California Redwood Association.

At the same time, redwood lumber producers make better use of existing timber by marketing finger-jointed products. Available in thicknesses of 3/4-2", widths to 12", and lengths up to 24", the joined wood equals architectural quality redwood in strength and appearance but sells for less. For information, request the data sheet for finger-jointed products from: The California Redwood Assoc., 405 Enfrente Dr., Suite 200, Novato, CA 94949.

Photographs: Mitch Kezar, Jim Kahler
Illustrations: Jim Stevenson

HIGH-WATER LUMBER

In July 1993, surging water from the Raccoon River in Des Moines, Iowa, flooded the Frank Paxton Lumber Co. yard (loading dock shown) and other businesses.

Floodwater can do great damage—just ask any Midwesterner—but it's especially damaging to kiln-dried stock because the wood becomes rewetted. All wood need not be lost, though, says the University of Wisconsin's Department of Forestry.

Its free guidance bulletin No. 67, "Drying Rewetted Kiln-dried Lumber," by Gene Wengert and Dan Meyer, gives complete instructions for handling flooded wood, as well as dry stock that’s been exposed to high humidity. In the bulletin, the authors emphasize the need to act quickly in order to avoid fungal staining and other defects that render wood a total loss. If you have a stack of wood in or near a potential flood area, hurry a request off to: Wood Processing, University of Wisconsin-Extension, Dept. of Forestry, 1630 Linden Dr., Madison, WI 53706.
In woodworking, every project is an adventure. You explore the wood, studying its grain, searching for something hidden within. Your goal is to emerge, weeks later, with a proud souvenir: a planter, a Shaker chair, or perhaps a rustic chest of drawers.

Ironically, the ease of any woodland journey depends largely on a decision you make before embarking. Your choice of tools.

To this end, a move in the right direction is Skil Woodshop Tools.

Skil Woodshop Tools are a full line of woodworking tools designed to make any project a pleasure.

Every step of the way. Confidently enter the thickest woods with the new HD 3640 10" benchtop band saw. Its powerful induction motor makes small work of resawing stock up to 7 inches wide. And afterward, navigate intricate curves on the large, tilting table that adjusts from −6" to 50".

Whatever your plans call for next, the HD 1875 plunge router is sure to be part of them. Its 2½ hp motor can carve signs, cut joints and trim decorative edges with power to spare.

For accurate, repetitive drilling, the new HD 3580 13" benchtop drill press is exactly what you need. Its exclusive fence can be set a precise distance from the drill bit, to ensure consistency from first hole to last. This unique fence also offers plenty of room to clamp down your workpiece for added support.

When it's time for assembly, try the innovative HD 1605 plate joiner. Simply cut matching slots, pop in a wooden biscuit, glue and you have yourself a quick, durable joint. Once it's all together, give your project a once-over with the HD 7575 palm grip sander. The 7575 performs an exacting 1/8" orbit 13,000 times a minute for a fast finish.

Next time you explore the woods, bring along the perfect traveling companions—Skil Woodshop Tools. You'll find those shown here and other Woodshop tools in stores everywhere. Just look for this label.

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