

WIN!
A SHOP FULL OF TOOLS: P. 91

10 GREAT CHOP SAWS FOR UNDER \$300 pg. 54

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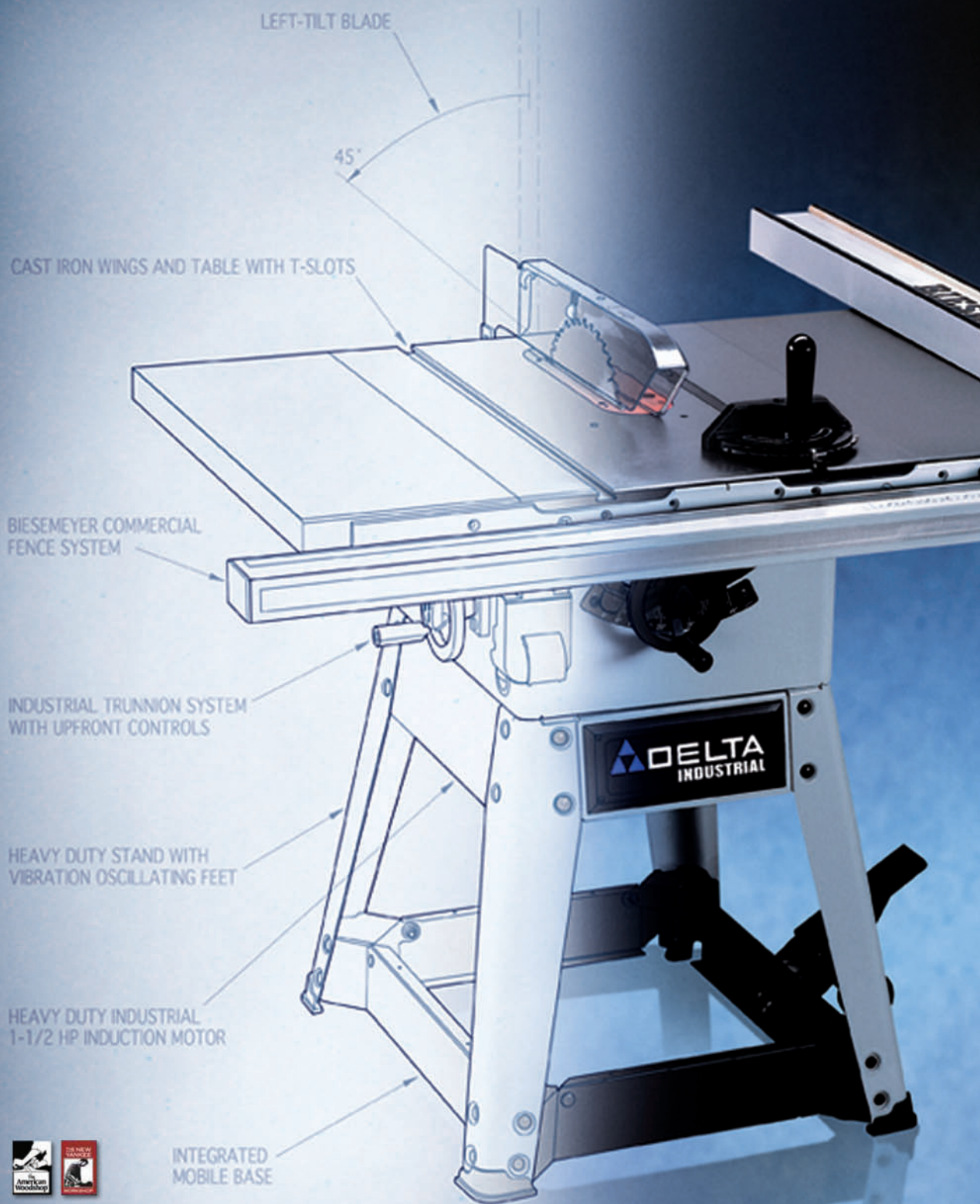
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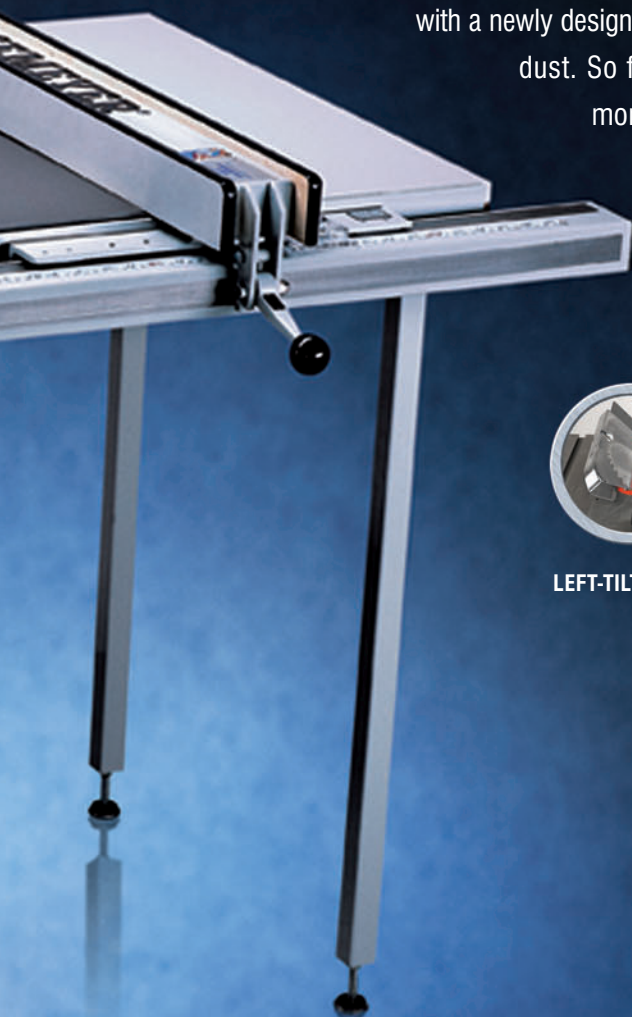
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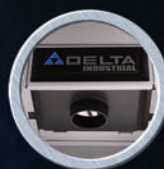
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Woodworker's Journal

Features

July/August 2006



Volume 30, Number 4

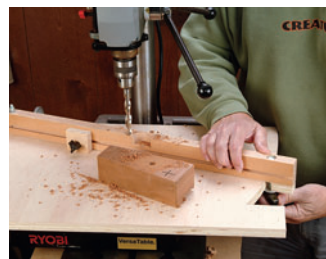


Page 34

28 Manufactured Sheet Material: The Critical Path, Part 3

By Ian Kirby

In this final installment to his three-part series, the author reveals that the critical path developed for solid wood is totally unsuited to the new materials woodworkers use today.

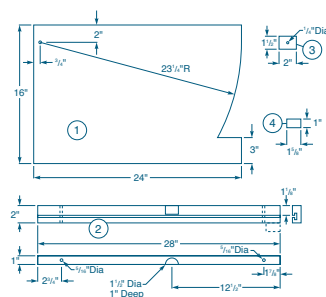


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34 Portable Outdoor Shower

By Lars Dalsgaard

A simple outdoor project you can complete in an afternoon (and clean up in before dinner)!



40 Drill Press Fence Jig

By Sandor Nagyszalanczy

A great shop project that will cut the time you spend on those "boring" tasks at the drill press.

50 Memorial Flag Case

By Bruce Kieffer

When the author's mother asked him to make her "a really nice case" for his dad's memorial flag, his response was: "I'd be honored."

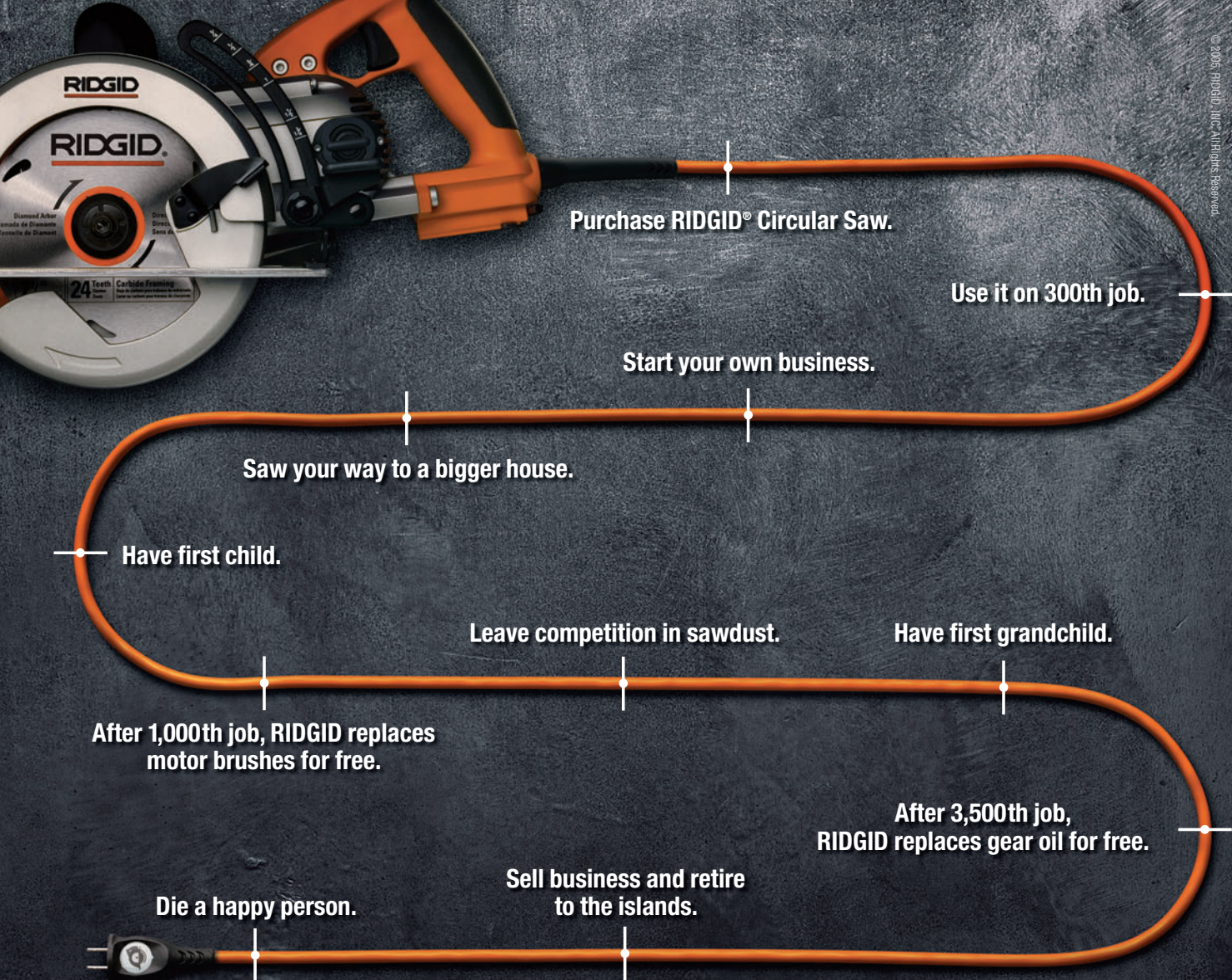


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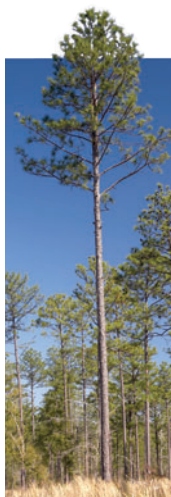
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Woodworker's Journal

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Woodworkers



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Making a table from one sheet of plywood might be a challenge, but doing good isn't hard at all.

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It's not just about face frames anymore.

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Interior vs. exterior paint, "pickling" redwood and more thoughts on finishing.

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If you have \$300 to spend, which miter saw is the best choice? Chris Marshall reviews eight options.

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Sandor Nagyszalanczy takes some of the "spin" out of saw blade claims.

88 What's In Store

Tools tweaked to make a difference in your life.

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Meeting Challenges

Our October 2005 issue featured Scott Phillips' first project with the *Journal*. His little table was based on a challenge from Lawrence Szymanski's shop class at John Adams High School in South Bend, Indiana (*Ten Board Foot Challenge*). Scott so enjoyed the "challenge" aspect of the project that he and editor Rob Johnstone decided to come up with one of their own for *Journal* readers. Their challenge: Build a table from one sheet of plywood and leave little more than sawdust on the floor. The prize? A \$500 check made out on the winner's behalf to Habitat for Humanity.



Thank you, one and all, for your entries, and congratulations to Carl O. Moore of Rochester, Illinois, our winner. Carl, a check acknowledging your participation is on its way to Habitat! You have to love the spirit of those who joined in the fun, like Kent Huelman of Minneapolis, who wrote, "Win or lose, Habitat for Humanity is welcome to the table I built. I've long been a fan of Habitat and have worked on a few of their houses." We'll let them know, Kent.



This issue brings to its conclusion a remarkable series by Ian Kirby (see page 28). His three-part illumination of "Woodworking's Critical Path" is the kind of instruction that is rarely found in print, and never in a woodworking magazine. Why? Because other than Ian, who else could bring together the building process — from design to completed project — with an internally consistent and perfectly rationalized system of woodworking, and be able to communicate it clearly in writing, illustrations and photographs? The answer is "no one." (And give your favorite woodworking magazine credit: Providing Ian with sufficient pages to cover the topic is an example of why we are America's leading woodworking authority.) As editor Rob Johnstone told me, "Working on this series of articles with Ian has been the highlight of my woodworking editorial career. We have served our readers well and our craft exceptionally well."



Larry N. Storken

Rather than send the full-size table, challenge winner Carl Moore created this small scale model and sent it to us, along with his plans.

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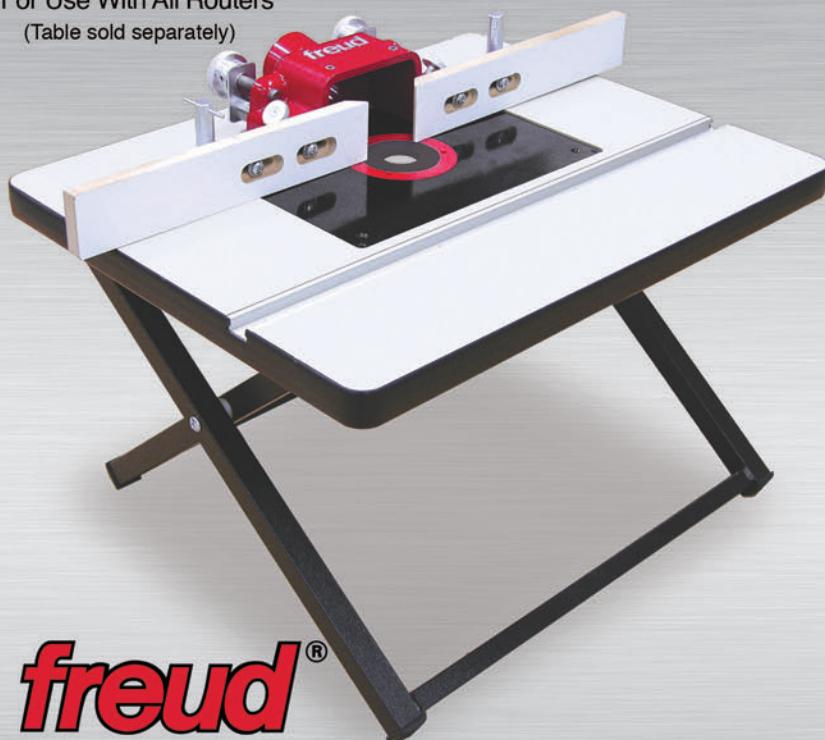


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Perfect Pages (and Some Not So Much)



Reader Jeff Lieber of Savage, Minnesota, says, "I think you have a future subscriber" in his three-year-old daughter, Amanda. She is already starting to help her uncle Brian LaLuzerne out in the shop.

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Paging Through: NOT!

Who was the mental midget that concocted the way Brad Becker's article for the "Poker Box" was installed into the [April 2006] magazine?

*Dale Zellner
Eagle River, Alaska*

The pull-out section on the poker box plan was a bad "BAD" idea.

*William Larsen
Round Lake, Illinois*

Just exactly which pointy-haired boss came up with this scheme????!!!!???

In case someone suggests this methodology in the future, please follow the time-honored advice and JUST SAY NO!

*Alan Tibbetts
Redmond, Washington*

I can picture a group of you sitting around in a room: "What can we do that is unusual? I've got it, let's fold up the pages and make them

harder to read. Also, let's staple an article together so the subscriber will have to tear his book apart to read it." Boy, that's user-friendly.

Regular pages are good enough. I still love your product, but I had to complain, and I feel better now.

*Joe Kocimski
Granger, Indiana*

WJ Response: So ... we know what these readers think of the pull-outs. How about the rest of you? Do you agree, or are you just too shy to tell us you love 'em?

Just Enough Words

As I read the editor's letter ["On the Level," April 2006] commenting on how the copy could not be cut, as it relates to Betty Scarpino's article ["Cutting, Scraping and Shear Scraping"], I wondered just how long the article was going to be?

Never in two pages have I been so informed on proper technique, method, and why to do this! I cannot wait to turn on the lathe!

*Victor Stearns
Laporte, Indiana*

Betty Scarpino's piece was NOT too wordy; she packed a lot of information and instruction in it, and I not only enjoyed reading it, but learned a lot, too. Give us more info-packed articles like this one!

*Jim Davis
Reston, Virginia*

In your April issue, the editorial focused on Betty Scarpino and turning. I COMPLETELY agree with your art director that Betty's article is perfect "as is." (Although, Jeff could have put one more graphic at the top left of the 2nd page.)

PLEASE keep Betty's articles coming. If the magazine ever stopped articles on turning, I would be very sad.

*Barbara Rhoades
O'Fallon, Missouri*

I (Still) Love My RAS

We rediscovered, with the April issue's article "Radial Arm Saws... Do They Make the Cut?" just how much passion our readers have for this tool.

— Editors

You mentioned you installed a CMT triple-chip tooth crosscutting blade to test the three different saws. You also mentioned earlier in the article that "the blade actually helps pull itself through the cut." This is true because the blade you used has a positive 12° hook angle.

You could have served your readers better if you had used the CMT Compound Miter and Radial blade with a -5° hook angle. The negative hook keeps the blade from climbing at aggressive feed rates. After all, this is what has given the radial arm saw a bad reputation over the years. With the correct blade, it's a great woodworking tool.

*Darryl Roberson
Taylors, South Carolina*



Editor Rob Johnstone confers with two renowned experts to get the final word on the horsepower debate.

A Sears radial arm saw was the first power tool I acquired, in 1963. I have read that it is a dangerous tool, but have learned that any tool can be dangerous.

Frank Trostel
Bend, Oregon

I bought my DeWalt saw in the early '60s, and it has been going strong ever since. I've made lots of good furniture with it.

Stephen H. Minnich
Ballston Lake, New York

I purchased a DeWalt 10" radial arm saw in 1964. It is the HEART of my basement shop.

Let's have a "saw off" competition RAS versus table saw. No contest!!! RAS would be the winner!

Fred Lancia
Dublin, Ohio

More on Horse ... Power

In your April 06 issue there were a series of discussions on horsepower ["Horsepower Hubbub," Letters]. My question is this. If you cannot really

attain 2 HP, then how do I view the difference between 2 1/4 HP and 3 HP routers?

Jeff Warner
Powder Springs, Georgia

WJ Response: *Different methods of measuring horsepower occur because the table saws in the original discussion have induction motors; a router has a universal motor.*

— Rob Johnstone

While I am sure the math works to calculate the efficiency and developed HP from 120-volt motors, the formulas fail to address [two key] factors that degrade that performance.

Heat.
Prolonged use.
Limited short period use is probably not much of a problem. However, if you need continuous heavy demand cycles, the 120V motor simply won't cut it. Pun intended!

Gary Burgat
Colorado Springs, Colorado

Safety First: Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

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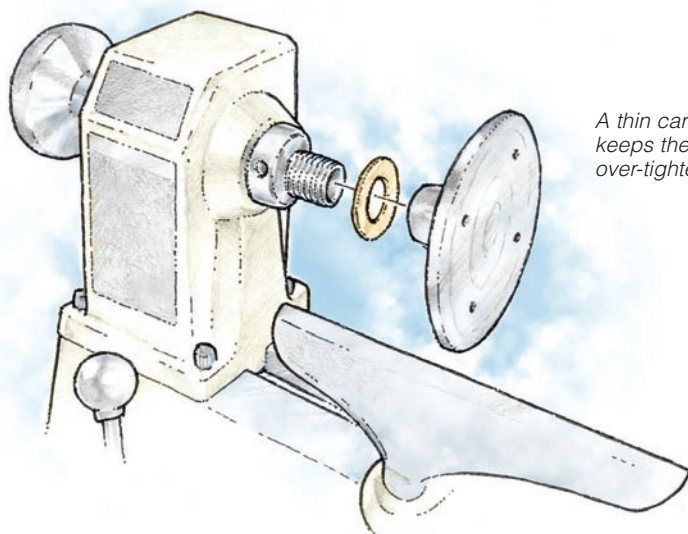
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New Twists on Shop Improvements



A thin cardboard washer keeps the face plate from over-tightening.

Jammed Face Plate Fix

When turning segments on a lathe, the face plate often jams and is difficult to remove.

I find that making a washer from a piece of thin cardboard and placing it over the spindle as illustrated keeps the face plate from over-tightening and makes it easier to remove.

Alex Nadler
Swansea, Illinois

Removing Stuck Sanding Sleeves

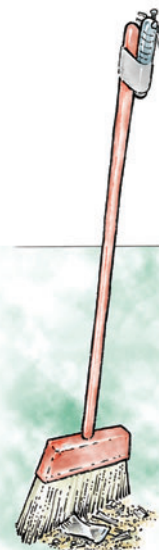
Sanding sleeves have a way of getting stuck on the rubber washers that

form the sanding spindle. My next-door neighbor says he sticks his in the freezer for a few minutes until it loosens up. I prefer to rub soft soap on the spindle before installing the sanding sleeve. Naturally, I think my way is better, but he is equally convinced!

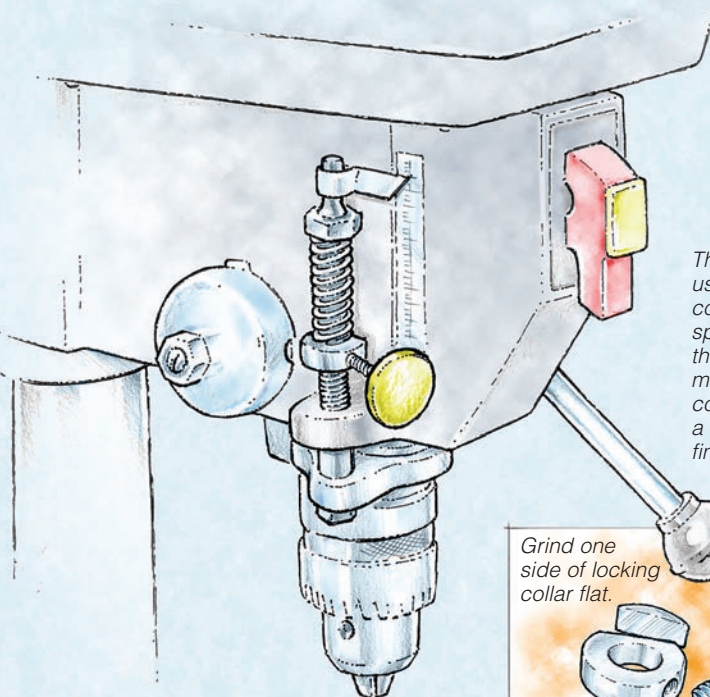
Rebecca Fieldhouse
Newfields, New Hampshire

Bovine Attraction

I've just discovered "cow magnets" and their usefulness around the shop. These powerful magnets are about 2" long, rounded at both ends and lodge in a cow's stomach. They are supposed to collect odd pieces of iron from passing into the cow's intestines. I have one taped to the end of a broomstick for picking up nails, screws and nuts. Other uses include keeping chuck keys in place and so on.



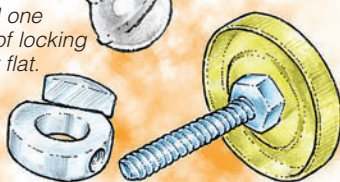
Todd Bayer
Bethel, Vermont



PICK OF THE TRICKS

This woodworker used a threaded collar to hold the spring back. He then used a modified locking collar combined with a knob and stud to finish his upgrade.

Grind one side of locking collar flat.



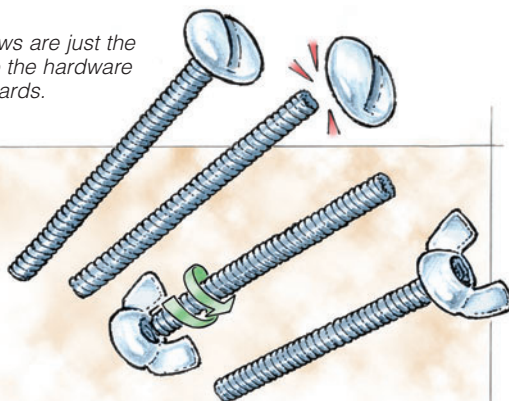
Better Depth Stop on Your Drill Press

Anyone with a benchtop drill press knows the frustration of trying to lock the depth stop in place. You can't seem to ever get enough pressure with your fingers. In the past, I tried using two wrenches of the same size to tackle the problem, but that wasn't exactly an ideal solution.

Now, I cure this shop problem by replacing the two locking collars with one stop collar (usually used on large diameter drill bits). After grinding one side to clear the drill press housing, I replaced the Allen screw with a nylon knob with a threaded stud. I also left one threaded collar to retain the spring. This solution works great for me!

Dan Turner
Robinson, Illinois

Custom thumbscrews are just the thing when a trip to the hardware store is not in the cards.



Making Sunday Thumbscrews

I often need a thumbscrew for a new jig or fixture, and it's great to be able to make my own on a Sunday afternoon when my local hardware store is closed. I take a short length of threaded rod, a machine screw or bolt of the right diameter, and cut off the head. I then thread a wingnut all the way to the cut end and lock it in place with epoxy or a sharp blow with a hammer. After filing the cut end, the thumbscrew is ready for use.

You could, of course, use any material — brass, bronze, aluminum or stainless steel, but in the latter case you'd need to give it a pretty good whack!

Jake St. Louis
Ely, Minnesota



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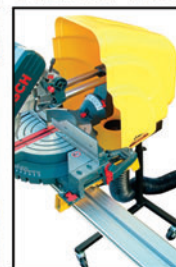
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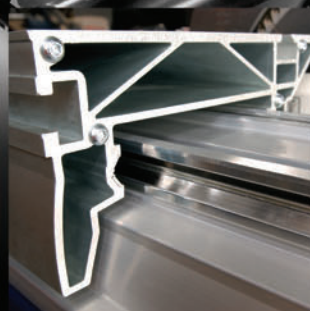
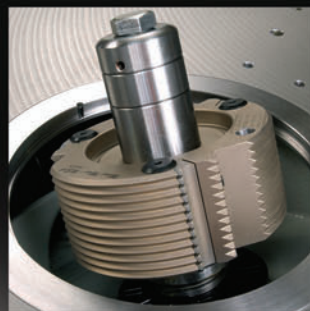
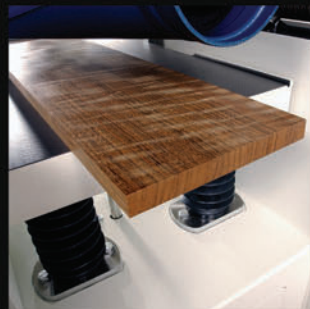
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Straight Answers on Bearing-Guided Bits



A bearing-guided rabbeting bit makes for fast work but has some limitations. Rabbeting with a straight bit offers more variety in the depth and width of the cut ... but requires more setup time, too.

THIS ISSUE'S EXPERTS

Rob Johnstone is the editor of *Woodworker's Journal*.

Sandor Nagyszalanczy is the author of several books, including *The Homeowner's Ultimate Tool Guide*.

Joanna Werch Takes is the senior editor of *Woodworker's Journal*.

Contact us by writing

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us at (763) 478-8396

or by e-mailing us at:

QandA@woodworkersjournal.com.

Please include your home address, phone number and e-mail address (if you have one) with your question.



What is the benefit, if any, to using a bearing-guided rabbeting bit versus a straight bit for rabbet joinery?

*Kurt Soukup
Spring, Texas*



The benefit of the bearing-guided bit is that it is, well, guided by a bearing. That little bearing in essence replaces (or, as some would say, becomes) a fence or a jig. With any router cut, one of the key tasks is to guide the bit (spinning at up to 20,000 RPM) exactly where you want it to go. With a straight bit you most commonly use a straightedge (be it a fence

on your router table or a guide clamped onto your stock) in some fashion to position and guide the cut. This makes it significantly more adjustable and flexible than the bearing-guided bit. It also makes the setup more complicated and time-consuming. Very often, rabbets are formed on the edge of frames or sub-assemblies which are easily accessible to a handheld router or even a bearing-guided bit used in a router table. This makes fast work of the task, although your options for the width (from bearing edge to the edge of the cutter) are fairly limited. The cut that is formed will also — due to the laws of physics — reflect the radius of the bit in the corners of the frame. This leaves you with the choice of squaring up the corners by some means, or rounding the corners of the matching panel.

— Rob Johnstone



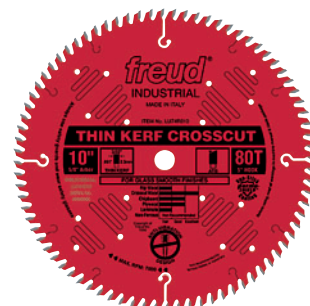
I have any number of different saw blades. I presume that the grinding of the teeth are what makes one blade superior to another blade. If this is the case, can you have your blades re-ground to duplicate the performance of a more expensive blade?

*Jon Rouleau
Geneseo, New York*



In the words of a wise mechanic: "You can't turn a Volkswagen into a Porsche just by putting on wider tires." Likewise, simply regrinding the teeth

of a so-so saw blade won't boost its performance significantly. Tooth grind geometry is only one of a number of factors that work in concert to help a really good saw blade cut well. Other factors include: the overall number of teeth and their arrangement around the rim of the saw blade; the composition of the carbide teeth themselves (the grade and formulation of carbide affects each

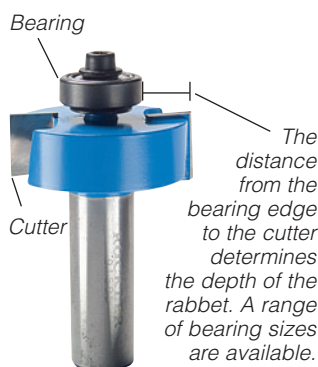


Silk purse or sow's ear, a saw blade is what it is — and you can't change one into the other by regrinding the teeth.

tooth's sharpness, fracture toughness and edge retention); the way the teeth are bonded to the blade plate (better blades have higher quality braze joints); and the design and manufacturing quality of the blade plate (tensioned blade plates have less of a tendency to flex when they heat up during heavy cutting. Flex increases blade runout and results in rough-cut surfaces).

— Sandor Nagyszalanczy

Editor's Note: Check out more of Sandor's insights on "New Saw Blade Technology" in the Today's Shop article starting on page 68.



Q I often use recycled and found wood in my projects. My problem is identifying the woods. Is there a resource on the web or in print that makes identification easier?

*Stephen Kleinatland
Dover, Tennessee*

A Among the books which have photos and descriptions of various woods' characteristics you can use for comparison purposes are *The Real Wood Bible* by Nick Gibbs and *World Woods in Color* by William A. Lincoln.



These books will help you identify unknown woods.

An additional book, *Identifying Wood: Accurate Results with Simple Tools* by Bruce Hoadley, has not only the photos and descriptions but, as the name implies, further directions for the scientific identification of woods. You'll need a hand lens or an elementary microscope.

The U.S. Forest Products Laboratory uses similar

techniques to identify wood, but do make a point of stating that they — and you — are likely to only be able to nail down a wood's genus (for example, "some sort of oak") rather than necessarily a specific, exact species.

The U.S. Forest Products Laboratory will identify a maximum of five wood samples per calendar year for a U.S. citizen. You can check out further details, like their requirements for the samples, at <http://www2.fpl.fs.fed.us/WoodID/idfact.html>.

— Joanna Werch Takes



WINNER! For simply sending in his question on identifying wood, Stephen Kleinatland of Dover, Tennessee wins **Hitachi's CJI 10MV Variable Speed Jig Saw and SVI2SG 1/4 Sheet Finishing Sander.** Each issue we toss new questions into a hat and draw a winner.

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Hunting Up the Longleaf Pine

By Rob Johnstone

The King of the Southern yellow pines has a fascinating past and an optimistic future.

Last February, I lucked out and got to combine two of my favorite things. Unlike items that just don't mix — garlic butter and ice cream, for example — my love of woodworking perfectly overlapped with my bird hunting hobby as I traveled to Andalusia, Alabama.

As the guest of Tim Knight and his wife, Maria, my trusty companion, photographer Mark Macemon, and I not only had the chance to chase some quail, but also to learn a great deal about Southern yellow pine.

In particular, we learned about the resurgence of the once-dominant coastal plains species: the longleaf pine. Tim, a silviculturist at the Conecuh National Forest, is an expert in the field. He's as likely to get excited about a vista of wiregrass and longleaf as I am about a rising covey of quail. He also loves to teach about his dream of restoring the longleaf ecosystem.

Persevering Pines

First, he taught me that there are three main species of Southern

yellow pine: loblolly, slash and longleaf. For eons, the longleaf ecosystem ruled over the Southern coastal plains from Southern Virginia to Eastern Texas. Slash and loblolly were confined to swamps and low-lying areas.

European settlers described the area as "a vast forest of the most stately pine trees that can be imagined, planted by nature at a moderate distance ... enameled with a variety of flowering shrubs."

By the middle of the 19th century, though, Tim reminded me, clear-cut logging began in earnest. Southern yellow pine lumber and tree byproducts like turpentine and pine tar built the foundations of many a rural Southern economy. But once the trees were gone, the land, not suitable for most agriculture, was considered almost worthless.

(For your reference, by the 1940s there were only three million acres remaining of what had been an approximately 90-million acre pre-Colombian forest. That's .03 percent.)

Then, a few farsseeing folks considered the idea that a forest could be a renewable resource rather than a single harvest crop. This seems unremarkable now, but let me remind you that it was truly visionary thinking in the early 1900s.

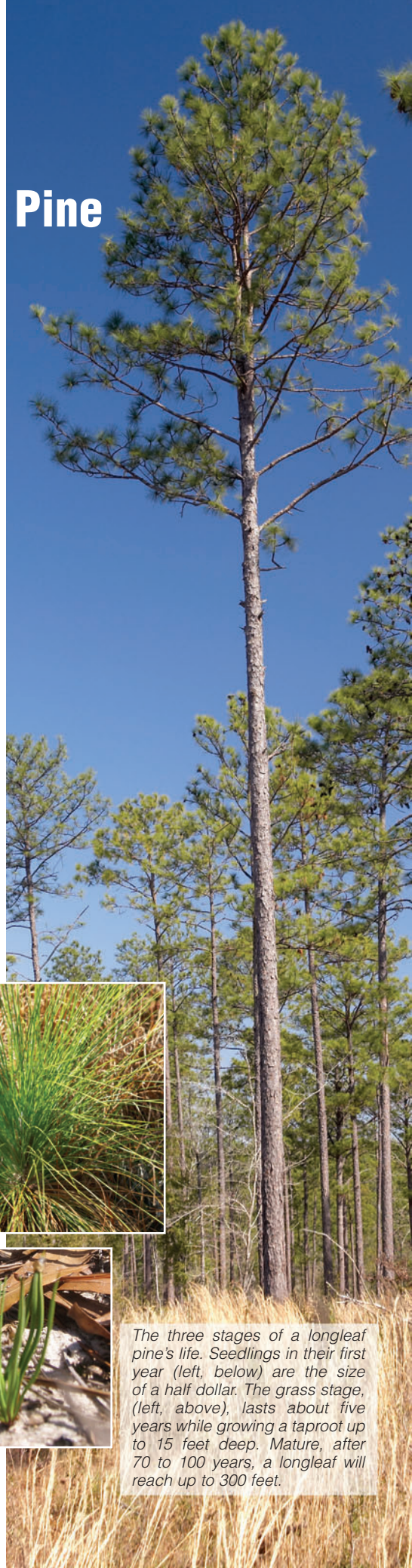
(One visionary was Napoleon Bonepart Dixon — grandson of surveyor Jeremiah Dixon, of "Mason-Dixon Line" fame.)



The author, at right, after spending time hunting with forester Tim Knight, left, developed a true appreciation for longleaf pine forests. The author's dog, Gillie, appreciated the warm weather and the Alabama quail.



The three stages of a longleaf pine's life. Seedlings in their first year (left, below) are the size of a half dollar. The grass stage, (left, above), lasts about five years while growing a taproot up to 15 feet deep. Mature, after 70 to 100 years, a longleaf will reach up to 300 feet.





Rhett Johnson (left), director of the Solon Dixon Forestry Education Center, describes the characteristics of lumber cut from 300-year-old longleaf pines blown down by Hurricane Ivan to Tim Knight (center) and the author.

Plantation Pines

Back then, the science of forestry was just getting off the ground. People didn't necessarily understand the various growing characteristics of the native pine species and, because of this, longleaf was largely passed over in favor of planting slash and loblolly. They were easier to plant by hand, and, to the casual observer, they seem to grow faster. (They were also perfectly suitable for pulp, important as the paper industry grew.)

Nowadays, scientists have figured out that the longleaf has characteristics which outweigh these early-stage advantages of the two marginal pine species. It grows taller and produces better lumber: denser, more knot-free, more rot-resistant — and generally more hurricane-resistant, since the longleaf also grows an extremely long taproot.

Fire Management

They've also figured out that, contrary to previous conventional beliefs, forest fires can be a good thing. During the mid-century regime of Smokey the Bear's philosophy, pine forest managers

actively fought and prevented fire — which meant the timber wasn't as good.

Rhett Johnson of Auburn University's Solon Dixon Forestry Education Center pointed out that, traditionally, fire thinned understory plants, creating an open, park-like forest dappled by sun reaching the forest floor —

The Longleaf Alliance

To help return the longleaf pine to the coastal plains, the Longleaf Alliance has developed a program to help encourage and guide its resurgence.

For more info, visit www.longleafalliance.org

Shop Talk continues on page 20 ...



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which allowed old-growth trees to grow with tight annual rings and very few knots.

In fact, this pine developed characteristics similar to those of hardwood in its specific density and durability. Modern woodworkers who get their hands on reclaimed old-growth longleaf sing its praises as a beautiful and high quality furniture stock. (And just how would I know that? Hmm ...)

According to Rhett, the great news is that, with the addition of fire as a management tool and a better understanding of the advantages of the longleaf species, modern forests will produce timber of the same quality as the forests of old. And that is why both Rhett and Tim Knight are such supporters of the Longleaf Alliance, a group of foresters, wildlife biologists, landowners and more.



The T.R. Miller Inc. lumber company sawmill is state-of-the-art.



The Miller family and company both have a well respected 130-year history of land and resource stewardship.



The author's sampling of longleaf stock includes not only some clear quartersawn lumber but a fine example of curly pine.

The Future

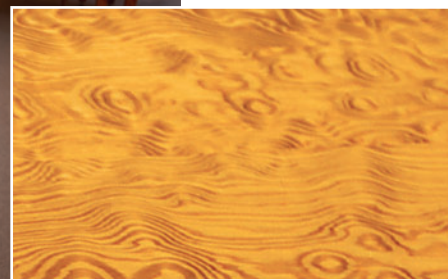
Rhett's the co-director of the Alliance, which calculates that 95 percent of today's longleaf growth is privately owned, with individual landowners making up 75 percent of that figure. "That's where the future of longleaf rests," he said, since development eliminates a forest for good.

Lumber companies, universities and dedicated woodworkers of the past and present are working to prevent that. Solon Dixon, Napoleon Bonepart Dixon's son, donated the 5,000 acres of Rhett's workplace to Auburn. That's

the past. And I'll be hunting out some good projects to make with my stash of longleaf pine and share with WJ readers to show off the wood's quality. That's the present. And the future of this "new classic" wood? Time will tell.



This longleaf lumber (made of heart pine) conference table belongs to T.R. Miller Lumber Company of Brewton, Alabama.



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The Lowdown on Lathes

By Betty Scarpino

Just like you can't tell the players without a program, you can't really start turning without a lathe.

I want to share some general information about lathes in order to answer questions you may not even know you have. For those of you who don't yet own a lathe, this will help guide you in a positive direction with your purchase. The main point to remember is to go ahead and buy a lathe. Don't be afraid to take the plunge: your first lathe will train you. Besides, most of us will have owned, at the very

least, two lathes in our lifetimes. The first lathe is often a "starter" lathe; the second one is the one we won't share with others.

Counting the Cost

My current lathe, a Oneway 2436, cost more than the car I owned at the time. Six years ago, following my own advice, I bought the best lathe I could afford. The \$6,000 I paid has been worth every penny

in enjoyment and satisfaction. It fits my needs, it has abundant capacity for me to increase the size of my turnings, and it's a top quality machine.

Twenty-two years before that, the \$1,500 I paid for my first lathe (a Hegner spindle lathe) seemed expensive. I happily used it extensively. At the time it was a good lathe for me. I finally outgrew it one or two years before I acquired my Oneway.

Lathes are priced from a few hundred dollars to over seven thousand dollars and more. You get what you pay for. More expensive lathes are heavier, they run true, and they are machined so that the parts work and move easily. They are equipped with a larger spindle size, which means they can handle large chunks of wood with relative ease. Buy the best lathe you can afford. Within your price range, try out different brands. It's sort of like deciding whether you like to drive a Ford or a Chevy. My guess is whatever you get, you will be thrilled to have.

Needs, Abilities and Interests

Lathes are fairly straightforward machines. There's not much that can go wrong with them, and what does wear out or break is easily fixed or replaced. If you are handy with fixing and restoring machines,



Woodturning continues on page 24 ...

The author's Oneway lathe is her pride and joy. It's a 2436, which means that it can turn a faceplate-mounted piece of wood that's 24" in diameter and can handle spindles 36" long. Whichever lathe you choose, the spindle should be elbow height for maximum comfort.

RIKON

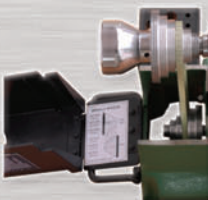
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“Lathes are priced from a few hundred dollars to over seven thousand dollars and more. You get what you pay for.”

— Betty Scarpino



The location of the controls is one consideration to keep in mind. Some lathes, like the author's, have a moveable control panel.



The author's 21-year-old son, Sam, completes his first bowl. Family has its privileges: he got to start turning on a Cadillac rather than a Kia.

consider buying a used lathe. With the growing interest in woodturning, many turners have purchased new lathes, leaving their old ones for sale. When you unburden them of these relics, they are then guilt-free to purchase yet another shiny new model! You're doing them and the economy a huge favor.

If you are going to turn only small items, consider buying a miniature lathe. They are inexpensive and can be mounted on a workbench. These lathes are

wonderful for people who travel and want to take their lathe with them. They are also nice for turners who need to sit down while turning. Years ago, when I traveled with a woodworking show, I would put a miniature Klein lathe, a few tools and some wood into a plastic tub. Upon arriving, I would unpack, plug in, and start turning. I even christened several hotel rooms with shavings that escaped the sheet I had placed on the floor. (I recommend leaving a large tip for housekeeping.)

Some turners prefer to make only bowls. If this is the case for you, buy a bowl-turning lathe. One large-capacity bowl-turning lathe has a 2" diameter spindle. That's heavy-duty for sure!

If spindles are what you will be making, you will want to make sure that the point of the live center in the tailstock lines up with the point that's in the drive center. If it doesn't, your turnings will be compromised. While you are in the woodworking supply store, check out the quality of different models of lathes by lining up the tailstock center with the drive center. That's often a sign of the quality of manufacturing.

Most of us want a lathe that will turn bowls and spindles. Fortunately, most lathes on the market are designed to do both quite nicely. Consider the size of work you want to make, then shop around accordingly. It may be that a midi-lathe — larger than a mini-lathe and smaller than a regular size — is right for you.

If you can afford it, buy a lathe with a variable-speed control. I had to change speeds on my first lathe by changing the belt on the pulley. The range of speeds was limited. As a result, I could turn only smaller-scale bowls; the slowest speed available was 800 RPM. If you are going to turn large bowls,

you will definitely need infinite control on the speed, as you will sometimes need to start out at only a few RPM. For older lathes, variable-speed conversion kits are available.

For woodturners with bad backs, several lathes on the market have swivel heads. This allows a person to turn the inside of a bowl without leaning over the bed of the lathe. There are stability considerations with this setup, but for medium- and small-scale turning, it's fine. Another option for someone who has back problems is to buy a bowl lathe. The beds of these are short, which means that the turner can stand at the end of the bed of the lathe and turn from there.

The height of a lathe is important, especially if you do a lot of turning. In general, the height of the lathe should be so that your elbow is at the same height as the spindle. Mine is a bit high, but I prefer that to having a lathe that is too short. I can always stand on a platform when I am turning for days at a time.

Quality Considerations

If you need stability in a lathe, look for one that has at least a 1" diameter spindle. The spindle shaft is where most of the vibration gets transferred to other parts of the lathe. Stability there is important. A lathe with a 3/4" diameter spindle is fine for smaller work, but if you are making large bowls, you'll want at least a 1" diameter spindle.

The stand for the lathe is important. A lightweight stand will allow more vibration. Up to a point, weight can be added to these lighter weight models. The limiting factor is the weight of the material the stand is made from. Lightweight metal stands are

Woodturning continues on page 26 ...



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intended for smaller-size turnings. They will twist with heavy, out-of-round turnings, even if weighted down.

Heavy-duty machines are designed with legs that are splayed on the headstock end for greater stability. For some turners, these splayed legs are an obstacle, especially when combined with a solid, thick stand. If this is a consideration for you, be sure to try out the lathe you are considering purchasing. You don't want to be tripping over the legs of your lathe.

Accessories

Most lathes come with a faceplate, a toolrest, a drive center, a tailstock center and whatever wrenches and implements you need for removing the drive center and faceplates. To begin with, that's all you will need, so stop there. After turning for a while, you will figure out what else you will need.



Most lathes are outfitted with the basic set of accessories you will need to get started. Acquire more as your skill increases.

Some lathes come with a control panel that you can move. Those are handy. But a word of caution: those of us with short memories might have a problem reaching for the off switch in a hurry!

Setting Up Your Lathe

When you set up your new lathe, try to put it in an area of your shop where there is plenty of light. Add light fixtures if you are in a dark corner. It continues to amaze me to discover so many turners who



Lathes come in all sizes, from the miniature Klein to the "maxi" Oneway, to meet various needs. If you're interested in woodturning, our author says it's time to "jump into the game!"

are working in the dark! I believe it must have been a gradual event. Their younger eyes didn't need as much light, but as they aged and required more light, somehow they haven't added the wattage. I use full-spectrum fluorescent light bulbs. Sure, you might break a bulb when a bowl comes flying off the lathe, but perhaps the bowl would not have flown off the lathe if you had enough light!

If you need stability in your lathe, then bolt it to the floor, especially if your floor is uneven. Some lathes come with leveling bolts, helpful for setting up a lathe on uneven floors. Some turners have limited space, so the ability to move their lathe is important.

Shop around. Most woodworking stores have demonstration lathes. Try them out. When you buy a new car, I'll bet you test drive it before you buy it. You should do that with whatever lathe you purchase! Drive safely.

Betty Scarpino is a professional woodturner who recently had the distinct pleasure of helping her 21-year-old son turn his first bowl. Now she knows for sure that anyone can turn!

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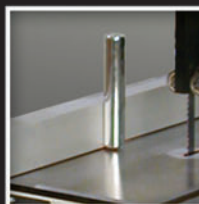
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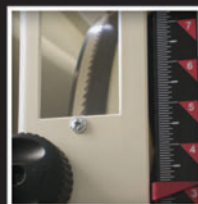
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Manufactured Sheet Material

The Critical Path, Part 3

By Ian Kirby

Although often ignored or shunned by small “solid wood” shops, manufactured sheet material, skillfully used, offers endless exciting furniture design possibilities for designer/makers.

In a previous issue, I described the path of making a piece of furniture using solid wood. As a material, it has all the quirks and splendors we’ve come to associate with natural materials. A principal quirk is that it shrinks and expands across its width and thickness with changes in atmospheric humidity, which obliges furniture designers to accommodate this behavior at every turn. Wood also has a penchant to distort,

especially by cupping and twisting. If distortion happens before manufacture, then selection and machining is required to get it right. If it happens during manufacture, replacement is the best solution.

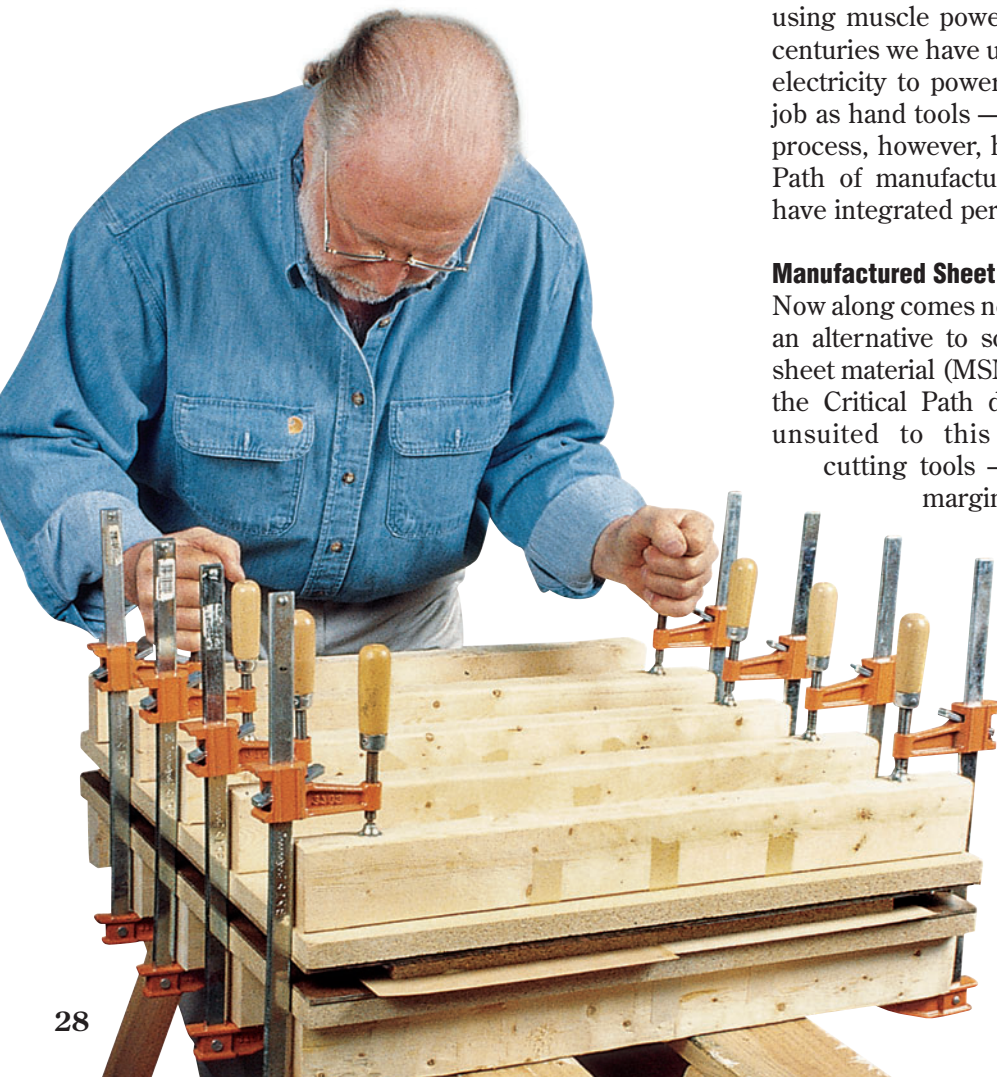
On the splendor side, its strength to weight ratio is excellent, which allows us to make it into legs and rails, as well as glue narrow boards together to make wide boards. We all agree that it’s a handsome material: some of it is downright beautiful.

For centuries, cutting and shaping wood was done using muscle power and hand tools. For the past two centuries we have used first water, then steam, and now electricity to power machines that do much the same job as hand tools — only much faster. Powering up the process, however, has not radically altered the Critical Path of manufacture because hand and power tools have integrated perfectly well.

Manufactured Sheet Material

Now along comes not a new machine but a new material, an alternative to solid wood. It’s called manufactured sheet material (MSM), and with it comes the reality that the Critical Path developed for solid wood is totally unsuited to this new material. Muscle-powered cutting tools — plane, saw, chisel — are at best marginally effective; some machines are redundant — planer; while some power tools — router and shaper — remain useful.

During the 1950s and 1960s, MSM gave birth to a new breed of machine and a new industry with its own Critical Path of manufacture and, like it or not, we are surrounded by the result, from the elegant veneered cubicles



"The fact that our small-shop tools are not dedicated production machines poses a challenge that can usually be overcome by creativity."



BUFFET TABLE

To introduce MSM, veneered furniture and torsion box construction to students at Kirby Studios, I would set the task of designing and building a buffet. A buffet was chosen to avoid the complexity of doors or drawers, yet the piece had to be about 36" high and present a sizeable surface for handling food. Made with rosewood and ebony veneers, the various proportion of parts and space of this particular project sit comfortably together. The high level of workmanship can be gauged by the ebony column which appears, as a result of the grain direction being turned 90°, to be seven 5" cubes stacked one on another. This is the only piece of furniture pictured in this article that is made as a torsion box.

Designer/maker: Scott Jansen, 1985

and furniture in our offices, to the bathroom and kitchen cabinets we find in big box hardware stores, to the inexpensive furniture which comes flat in a box from the furniture emporiums with "some assembly required."

The machines developed for working MSM are expensive and dedicated, each one performing a single step in the manufacturing process. Although they are beyond the resources of most small shops, alternative machines and procedures are available that achieve similar results by a slower and less costly means so that part of the MSM system can be adapted to a small "solid wood" shop setting. Iron-on edge veneer tape as an alternative to an edgebander is a typical example. However, simply gluing on veneer with a clamping block works equally well.

MSM in Small Shops

Having examined the high-tech way industry uses manufactured sheet material (see Critical Path—Manufactured Sheet Material in Industry *sidebar* and *flow chart* on page 31), it's reasonable to ask the question: Does this material have a place in small shops alongside the well-ordered and well-understood techniques and working methods of solid wood? For

my part, the answer is a resounding "Yes!" — a position I trust is supported by the furniture shown in the photos within these pages, all of which use manufactured sheet material wholly or in part.

First, the material responds well to cutting and shaping by machine tools. The fact that our small-shop tools are not dedicated production machines poses a challenge that can be overcome by creativity. Second, the material is dimensionally stable, liberating designers to create shapes and structures impossible using solid wood. Finally, used as a substrate, the material allows us to use veneers

cut from species that are unavailable in the solid. Let's now explore ways in which MSM is finding a place alongside solid wood.

Using Veneer for a Tabletop

When designing your first veneered tabletop, tradition may urge you to make it resemble a piece of solid wood. No doubt you can find veneer that is more attractive than solid wood of the same species, so the appearance of the top surface doesn't pose a problem. Rather, the problem is the appearance of the long grain edges. One solution is to lip the edges with solid wood that is the same color as the top, then veneer over the lippings. Or you can veneer the

edges — what industry would call edgebanding. But no matter how you do it, the end grain will reveal that the top is veneered. The lesson here is that you should drop any attempt to simulate solid wood and instead take advantage of all the creative possibilities offered by veneering.

If you have veneer with lots of color and grain pattern to put onto a fairly large top, book-matching is a common solution. The downside to this is that a tight side is next to a loose side, and each will reflect the light differently, thus undermining the “matched” appearance. If the veneer is narrow, laying it up side-by-side in a sequenced pattern is perhaps most effective.

If the veneer is plain and straight-grained, you can use the geometry of the top to good effect.

Solid Wood Lippings

For best results, color match is more important than grain pattern. The width of the lipping is also important: it need only be 1/4" wider than any molding you intend to put

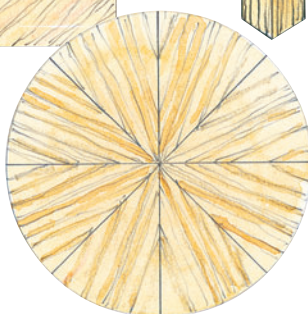
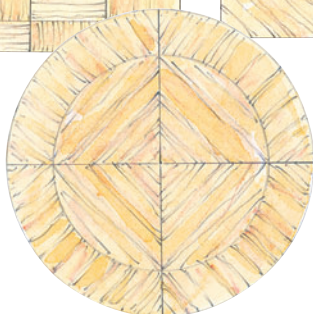
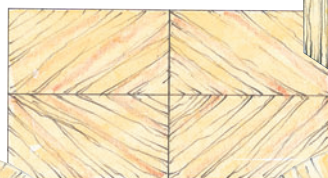
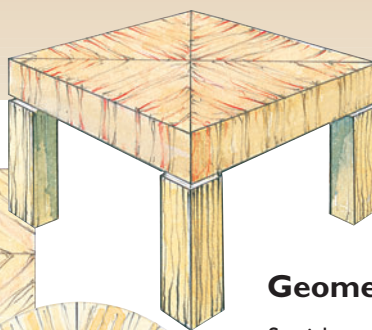


WINE CABINET

The wine cabinet is a good example of retained solid wood values combined with “show-off” workmanship allowed by MSM. The case is industrial grade particleboard veneered inside with cherry and outside with rosewood. This base is solid rosewood. The corner joints of the case are mitered and splined. The doors are lipped with solid rosewood mitered in the corners. I intended to mount the case on an elegant base. The case is close to perfect, and the base is well-made and indeed rather elegant. Unfortunately, the volume of the box overwhelms the delicate base. This is an example of first-rate workmanship being undermined by less than first-rate design: a lesson learned at the expense of much time and effort.

The lipping width is clearly shown in this photograph of the catch, which I designed and made, as was usual for that place and time. The rosewood plunger fits in the slot, and the knife edge presses on the spring-loaded arm of the catch.

Designer/maker: the author, 1961



Geometric Veneer Patterns

Straight-grained veneer can look decidedly dull in large pieces, but it takes on a very different appearance when arranged in patterns. The geometry of each design shown here is stunningly simple, but most effective in converting “ho-hum” into “ah-ha.”

on the edge. If all you need is a square edge, then a 1/4" wide lipping is sufficient.

In the early days of MSM, a wide lipping was, for some reason, preferred. However, if the wide solid wood lipping shrank only fractionally, it left a visible depression — called telegraphing or showthrough — on the glue line. Showthrough is no longer seen on new commercial products.

Be sure the substrate edge has been sawn clean, straight and square before you glue on the lippings. Biscuits or splines are unnecessary, but it does help to roll the glue lightly onto both surfaces instead of trying to squeeze a bead on only the MSM edge and spread it with a paddle.

Make the lipping flush with a trim router or a hand plane.

Up to now, I've considered the edge as the thickness of the board. However, MSM lets us make wide “edges” that are impossible with solid wood, so wide, in fact, that the edge can become a top rail in

Critical Path — Manufactured Sheet Material in Industry

Because the edges of MSM boards are not guaranteed by the manufacturer to be straight or square, the first task is to cut two edges straight and square one to the other with a **panel saw**. The MSM sheet is placed on an accurate travelling bed and a strip about 1/8" wide is cut to produce a straight, square edge. The sheet is turned 90° and pressed against a long fence which is square to the blade. Again, a 1/8" strip is removed, and the result is two edges straight and square to one another. The required parts can now be cut from the panel.

From this description, you will realize that cutting panels on a table saw using a fence as a guide presents problems. First, the table isn't big enough to easily and safely accept the panel. Second, the edge pressed against the fence isn't necessarily straight. Finally, the size and weight of the board is difficult to muscle past the blade.

The panel saw, too, has production limitations. Each board must be lifted onto the travelling bed, which is tiring. Working diligently, the operator can only achieve a certain number of cuts per shift. However, this number can be multiplied by a factor of 4 to 6 if a **vertical panel saw** is used. A **beam saw** is capable of even greater production.

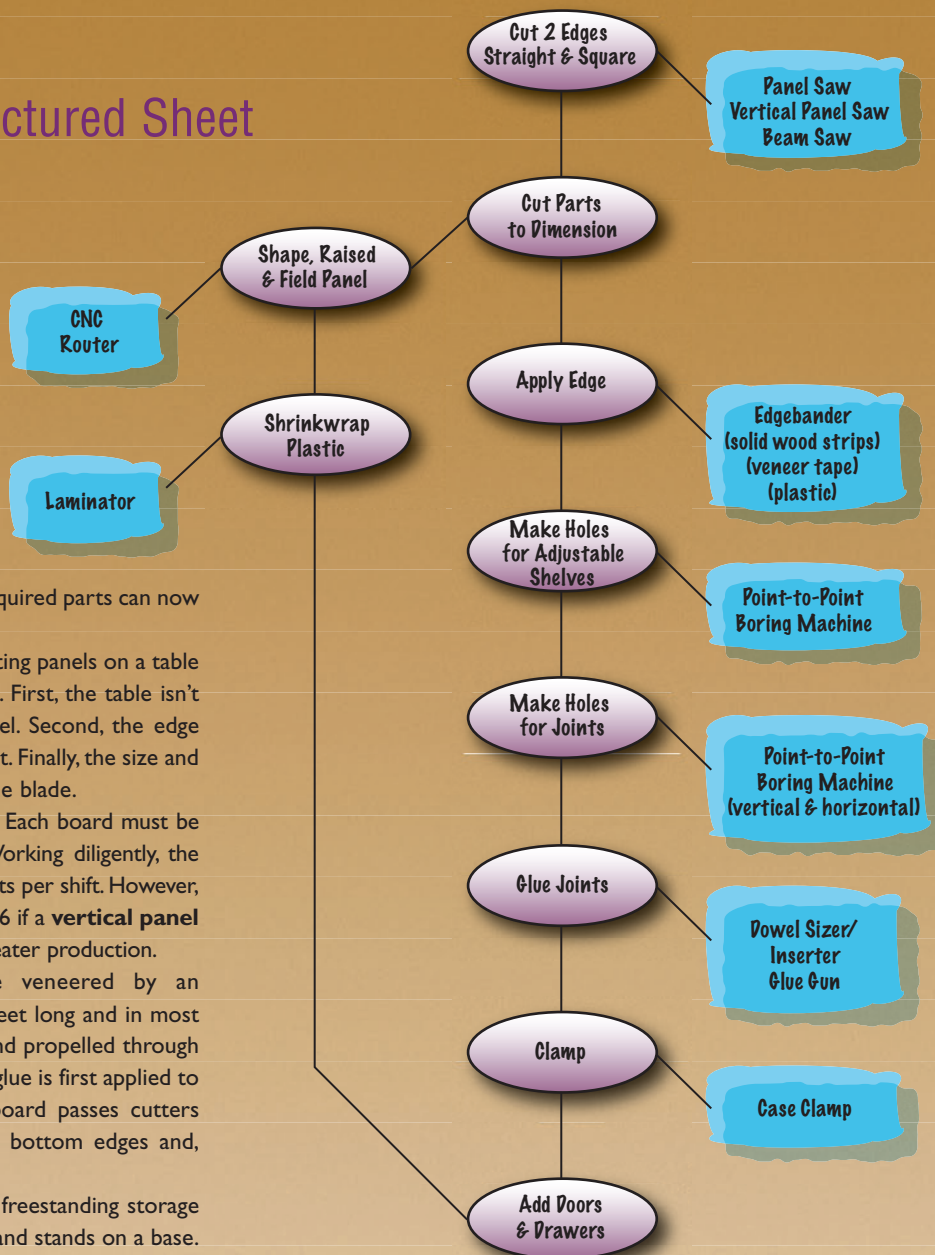
The exposed edges of MSM parts are veneered by an **edgebander**. Edge veneers come in rolls 100 feet long and in most species. The workpiece is laid flat and gripped and propelled through the edgebander by a series of wheels. Hot-melt glue is first applied to the edge, followed by the veneer. Next, the board passes cutters which trim the veneer flush with the top and bottom edges and, finally, the ends.

Let's assume that the manufactured item is a freestanding storage box with one or two adjustable shelves, a door and stands on a base. It must be joined at the corners and requires holes for the adjustable shelving. In the MSM world, dowels — usually shunned for solid wood joinery — provide an excellent corner-joining system.

A major reason is a **point-to-point boring machine**, which is a row of drills about 30" long and spaced at 32mm on center. Different diameter bits can be screwed into the drive chuck, and the row of drills can be turned from the vertical to the horizontal. Each bit has a carbide tip and revolves at about 6,000 RPM, producing an accurate cylindrical hole with a smooth face.

The 32mm hole spacing gave rise to the name "32mm system," because hardware such as hinges and drawer slides are designed with holes at the same spacing centers.

In a production setting, holes at 32mm on center make for a lot of holes that require a lot of dowels. Enter a **dowel inserter**, which looks vaguely like a 9mm semi-automatic pistol. The nozzle is presented to the hole, and the trigger pulled. A splined dowel is carried by compressed air from a tub of dowels through a plastic tube and forced through a sizing plate. The plate removes tiny shavings, making the dowel exactly the diameter of the hole. Any dowel that is too small is rejected.



The Critical Path outlined here is typical of the early industrial use of MSM. Recently, aspects of this Critical Path have altered due to the introduction of CNC machines and robotics as companies seek to produce the best possible product with the least expenditure of time and money. Clearly, this particular path has no place in a small shop, but I hope the work shown in these pages, using some of the same materials as industry, demonstrates that small shops can embrace MSM to great advantage. Each shop will have to develop its own Critical Path based on available machines and skills. See page 33 for a discussion of the small shop challenge.

A metered amount of glue is sprayed into the dowel hole, then the dowel is inserted. The whole operation takes about one-and-a-quarter seconds to size, glue and insert each dowel.

Before finish is applied, the box is glued and clamped. All the parts of the box and back are glued at the same time and clamped in a **case press** which keeps the work square. The box requires clamping for only a few minutes because the dowel joints are sufficiently tight that there is no tendency for parts to spring back.

These two tables demonstrate similar techniques possible with MSM. The veneered tops are trapped within the solid wood skirts, and the solid wood legs are held in place by screws and glue. Either table would make a good subject for a first foray into the world of MSM.



TEAK COFFEE TABLE

The skirt is planed flush with the top. The finger joint on the teak frame seemed a good idea at the time, but I now consider that design element more of a distraction than an attraction. The table is the only one I kept from a production run of 20. Structurally, the piece has survived 40 years of an active family life.

Designer/maker: the author, 1964



ANIGRE COFFEE TABLE

The simple checkerboard pattern of the top is highlighted by turning the anigre veneer squares 90°. Raising the darker mahogany skirt 1/16" proud of the lighter top emphasizes the color contrast.

Designer/maker: the author, 2000

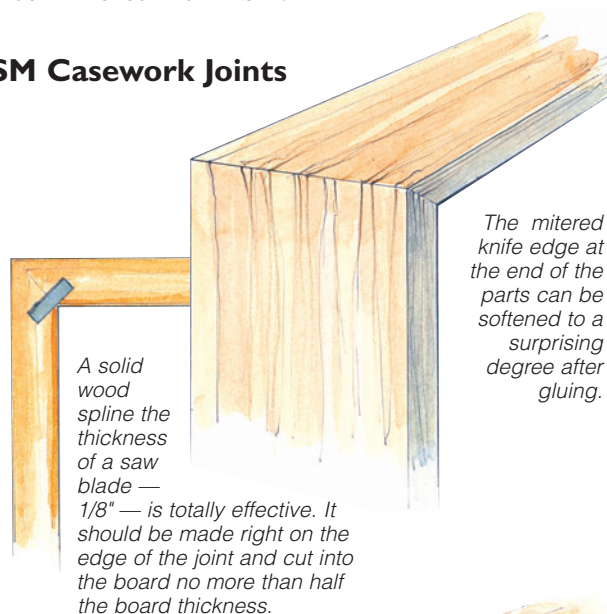
terms of a table. Such an edge can become an extension of the top by carrying the veneer over it. The same is true for circular tables and for rectangular tables. In addition to making a table without the usual top rail, the legs can also be made as MSM box columns and veneered. However, being liberated from the thickness constraints imposed by solid wood requires some very careful decision making with regard to proportion. Yet another alternative is to make the "top rail" the lipping for the top.

Casework

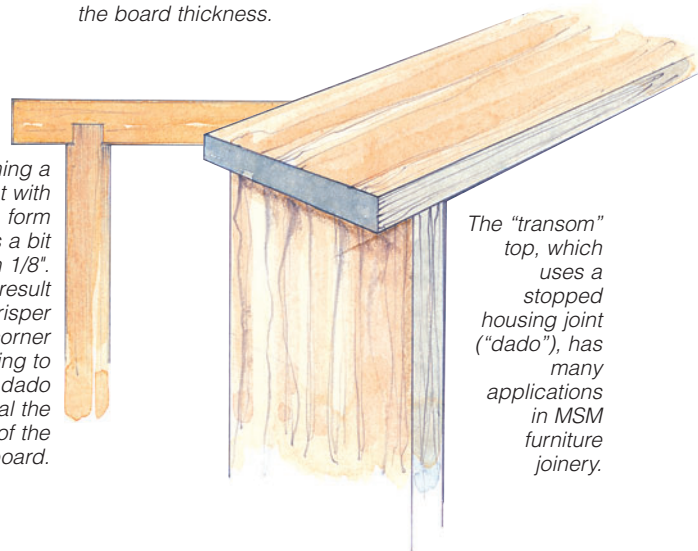
MSM is ideally suited to making casework. The challenge is to design the work so the joinery is sound. In the absence of traditional methods, it's perfectly reasonable to invent and to allow technique to follow intent.

How to join boards at their ends to make corners is well-established with solid wood. Two of these methods can be mirrored with MSM.

MSM Casework Joints



When forming a dado joint with MSM, form shoulders a bit less than 1/8". The end result is a crisper inside corner than trying to get the dado to equal the thickness of the entering board.



Small Shop Critical Path for Manufactured Sheet Material

1. Cut the material.
2. Lip the edges.
3. Veneer the parts.
4. Joint the parts.
5. Assemble the parts.
6. Apply a finish.
7. Make doors and drawers.

Because small shops are not set up to machine MSM as the material has been designed to be used, there is no true or traditional critical path as there is in solid wood construction. As identified in this article, there are steps that must be taken to effectively make use of the products. While the steps at left may need adjustment relative to whatever tools are at the small shop's disposal, they will take a maker a long way down a successful building path.



TEAK WRITING TABLE

Constructed entirely of MSM except the legs and rails, this desk has four drawers: two on the left side, one in the cantilevered case, and one in the center of the top rail. All but the cantilevered drawer are center-hung. The cantilever is made by first gluing the left side of the box between the legs, then gluing to it the top, bottom, right side and back, which is grooved into all of the other pieces.

This could only be done using MSM.

Designer/maker: the author, 1966.

When combining MSM and solid wood, the latter parts can embrace all the detail we are used to in a solid wood piece.



One is a mitered corner held together by a spline or biscuits. The other is a transom joint where the top overhangs the side, which is held in place by a dado (housing) joint.

Torsion Boxes

A torsion box (see *sidebar*, page 29) consists of a core composed as a grid with a skin of MSM glued to each side. In furniture, the core is usually plywood or medium density fiberboard.

Skin thickness is determined by the size of the voids in the core material: the larger the void, the thicker the skin. A hollow core door, which is a ubiquitous example

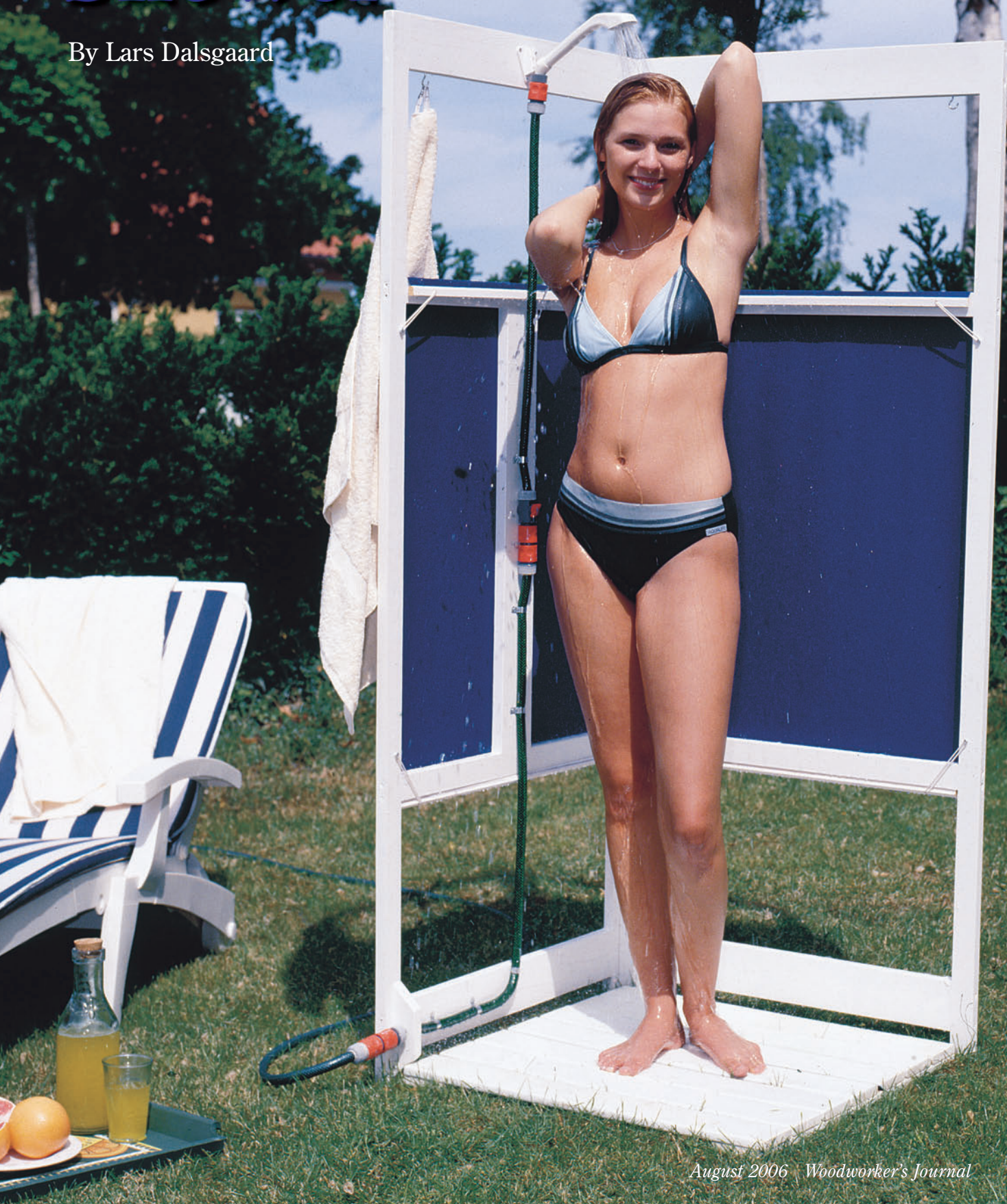
of a torsion box, has very thin skins laid on a dense core of honeycomb paper.

Torsion box construction grants the furniture maker design freedom impossible with solid wood. In addition to length and width decisions possible with solid wood, *the maker can decide thickness*: gone is the constraint of a one-inch thick board!

Ian Kirby is a master woodworker and designer and a frequent contributor to Woodworker's Journal.

Portable Outdoor Shower

By Lars Dalsgaard



Here's a simple project that will take only an afternoon to build — and you won't even have to track sawdust in the house when it's time for cleanup!

An outdoor shower is a real boon to a family in hot and steamy weather. Use it to rinse salt and sand off the kids after the beach or simply to cool off during a long day of do-it-yourself backyard activity. This portable design is lightweight and folds flat, so it can be stored in the garage when not in use. Although it isn't equipped with a hot water line, you can shower with warm water if you place your hose coil in the sun beforehand. The unit can be built in an afternoon with off-the-shelf hose-fittings (I used the Gardena system) — you don't have to be a plumber!

Get Started With the Wall Panels

I used 4/4 x 4" pine for building the two shower walls, but 5/4 x 4" would work just as well if it's all that's available to you. Rip two 6-ft. lengths to get the four stiles (pieces 1) and then rip the rails (pieces 2) from 5/4 stock as well. Next, cut the screen supports (pieces 3) and hose support (piece 4) from 5/4 x 4" stock.

Break all the sharp edges with 100-grit sandpaper and be sure to remove any splinters. Secure the joints using glue and galvanized wood screws, two per joint. The two walls are identical, except for the hose support on the wall with the plumbing. Join the walls together with four strap hinges (pieces 5) mounted to the outside face of the center stiles. Offset the second frame so the two

1



This easy-to-assemble outdoor shower folds quite flat, making it easy to carry to your site and store in the garage during the off-season.

2



It's also lightweight, so it can be easily carried to wherever the sun is — as long as your hose can reach it.

3



The optional privacy screening is made from awning fabric and attaches to the wall frames with elastic loops.



Epoxy, polyurethane and the new Titebond III are up to the task of gluing together wood in an outdoor environment.

Exterior Glues

Some glues that work great for indoor projects are just not up to the challenge of life in the great outdoors. There are three commonly available products that are designed to take the abuse that Mother Nature dishes out, without losing their grip.

These high-tech adhesives all have different properties. Polyurethane glues foam and have a long-ish open time. Epoxy must be mixed and generally does not flow. Titebond® III acts more like a “regular” woodworking glue, but features extreme water-resisting characteristics. All three will work swimmingly for this project.

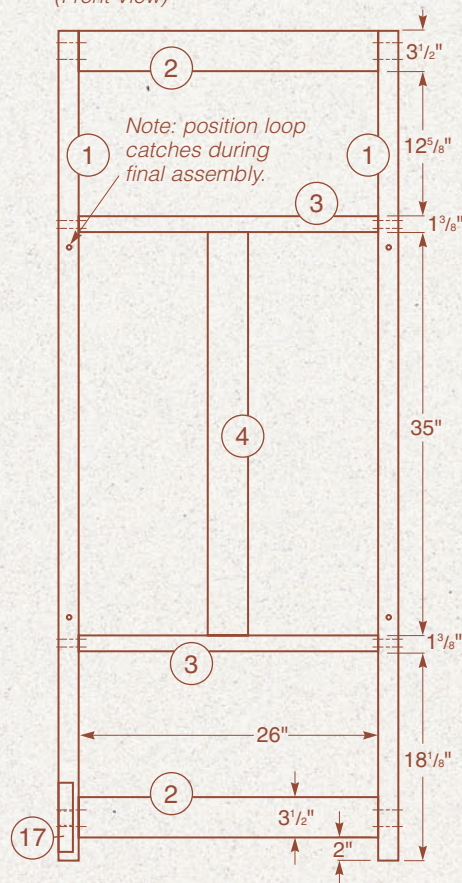
wall panels stand at 90 degrees when in use, and so that the walls lie flat when they’re folded back.

Building the Platform

The platform is made from one-by-stock. Simply cut the sleepers and floorboards (pieces 6 and 7) to the lengths shown and assemble with

galvanized wood screws, two per joint. Drive the screws from the sleepers into the underside of the floorboards to prevent any possibility of cutting bare feet. While you’re at it, round over all topside floorboard edges to prevent splinters. If your shower is going to be placed in rougher settings, you may just want

Side Panel Subassembly (Front View)



Cut out the parts for the two frames and lay them out on a large flat area, such as a patio or garage floor. Mark the screw holes and drill pilot holes. Take a few moments to work through the assembly process.

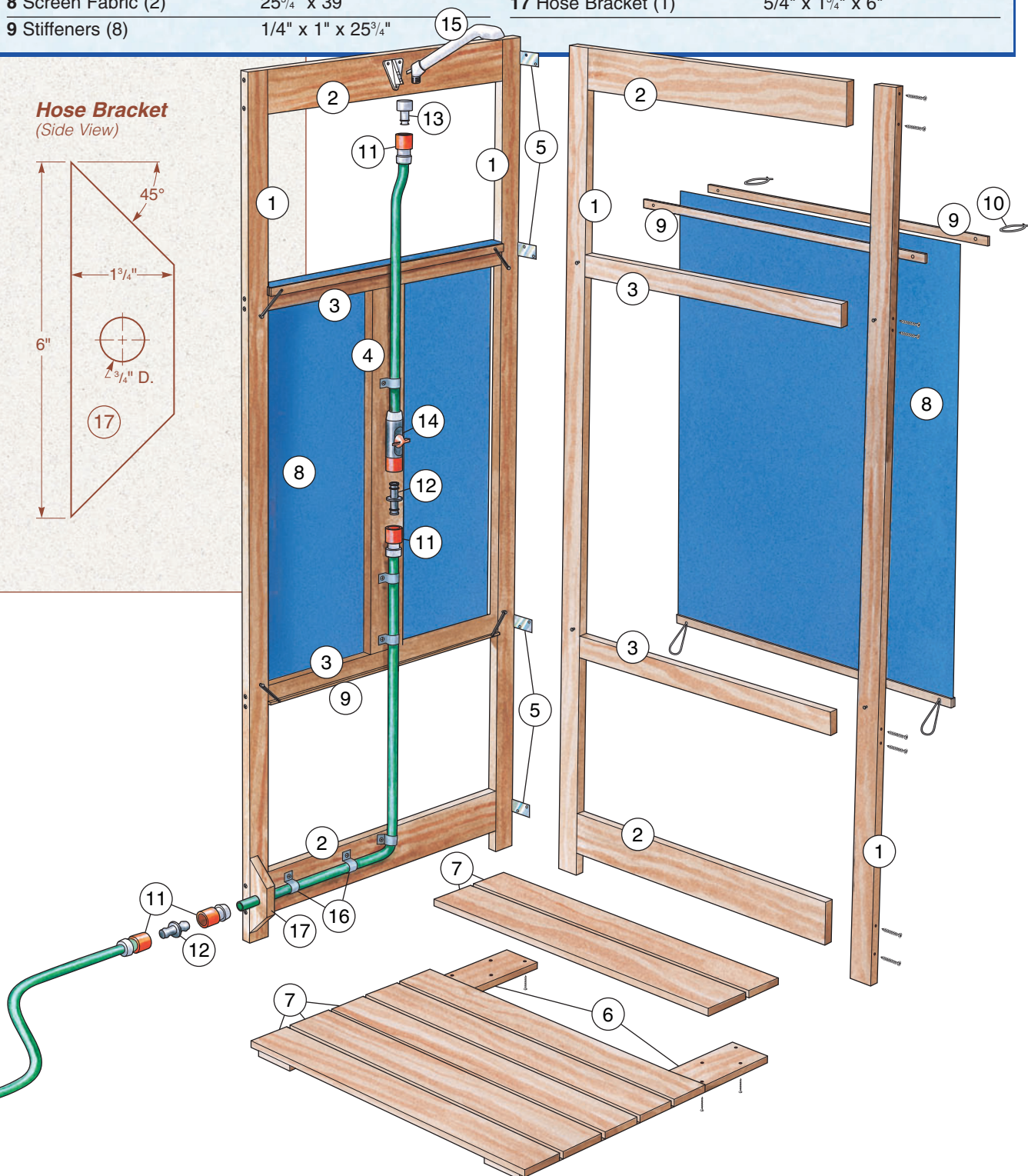
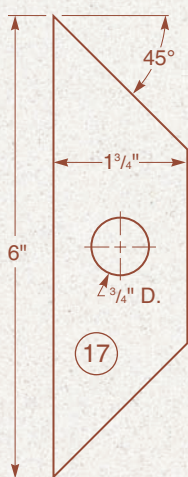


Join the wall panel members with glue and 3" wood screws. Use clamps to keep frame members flush while driving the screws. Allow the glue to cure.

MATERIAL LIST

	T x W x L		T x W x L
1 Stiles (4)	5/4" x 1 3/4" x 72"	10 Elastic Loops (8)	Tie from 1/8" x 5" elastic cord
2 Rails (4)	5/4" x 3 1/2" x 26"	11 Hose-end Connector (4)	Gardena hose fittings
3 Screen Supports (4)	5/4" x 1 3/8" x 26"	12 Hose Extension Joints (2)	Gardena hose fittings
4 Hose Support (1)	5/4" x 3 1/2" x 35"	13 Faucet Adapter (1)	Gardena hose fittings
5 Strap Hinges (4)	1" x 7" (or to suit)	14 Shut-off Valve (1)	Gardena hose fittings
6 Sleepers (2)	3/4" x 3 1/2" x 28 1/2"	15 Hand Shower/bracket (1)	Gardena hose fittings
7 Floorboards (7)	3/4" x 3 1/2" x 29"	16 Cable Clips (6)	3/4" or to suit
8 Screen Fabric (2)	25 3/4" x 39"	17 Hose Bracket (1)	5/4" x 1 3/4" x 6"
9 Stiffeners (8)	1/4" x 1" x 25 3/4"		

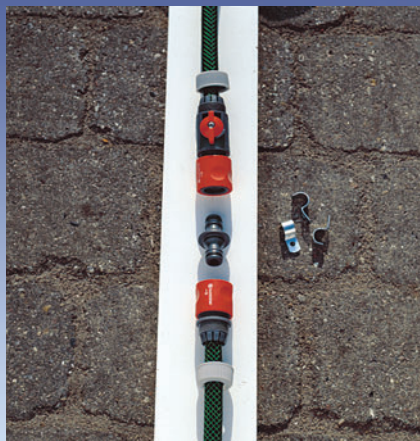
Hose Bracket
(Side View)



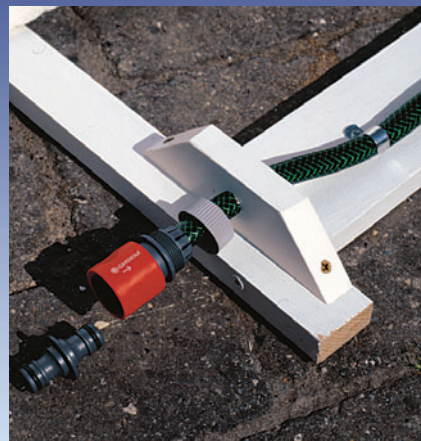
Can't get wet without the plumbing!



Fasten the bracket for the hand shower on the topmost board. Place a hose-end connector on the hose and screw a faucet adapter on the shower arm. Put the parts together and place the shower arm in the fitting.



Cut the hose for the shut-off valve at the middle of the hose support board. Join the hose to the valve. Place a hose extension joint in the valve and a hose-end connector on a new piece of hose and assemble.



Feed the hose through the hose bracket and cut away the excess, leaving 2". Fasten a connector to the hose end and attach a hose extension joint. Secure the hose to the frame and hose support with cable clips.

to beef up the platform by switching to 5/4 inch decking material and 2 x 4 sleepers.

Privacy Screens

If you desire a little privacy while showering outside, you can add screening (piece 8). I made mine with awning material. It's synthetic, so it dries quickly. Neither sunlight nor water will damage it, and it won't fray as long as you cut it to size with a heating device, such as a soldering iron. Use the soldering iron to cut the fabric exactly as you would use a utility knife. Attach the stiffeners (pieces 9) to the tops and bottoms with glue and bore holes for the

elastic loops (pieces 10). The elastic loops hook to screws partially driven into the inside of the wall panels, as shown in the *Drawings*. Note: elastic line is available at marine stores.

Plumbing Your Shower

I used Gardena hose fittings to plumb my shower, but any snap-together system of hose fittings will work. In addition to four hose-end connectors, two hose extensions and a faucet adapter (pieces 11-13), you will want to install a shut-off valve (piece 14) for convenience. The hand shower shown (piece 15) was the least expensive one I could find in the housewares section at my

local building supply store — look for one with a bracket. I used simple cable clips (pieces 16) to secure the hose and fashioned a hose bracket (piece 17) to secure the hose at the base of one of the side subassemblies. The dimensions for this piece are shown in the *Elevation Drawings*.

Where to Place Your Shower

If you're not a big fan of taking cold showers, this project will also provide you with a quick lesson in the fundamentals of solar energy. For best results, use your longest hose length and keep it out of the shade when supplying your shower. Generally, I've found that about

A Perfect Outdoor Finish

When you think about it, this project suffers a double water whammy: it spends time outside in the sun and rain — and it is a shower. It is going to get wet, repeatedly! For that reason, this project needs to have a very good paint job. To achieve that, start by sanding the wood smooth and filling any voids with an epoxy-based wood filler. Next, apply a coat of sealer. Put two coats of sealer on all the exposed end grain. Lightly sand the sealed wood and caulk any cracks or holes that come to light at this point.

Select a high quality exterior enamel (oil or acrylic) and apply two coats. Again, look for cracks or flaws in the finish and caulk as required. Allow the enamel ample time to cure, and you're done!



Don't scrimp on the finish. A high quality primer and exterior enamel are essential for your success.



With all the fittings secured and the shower's hose clamped in place, it's a simple matter of attaching your garden hose to the shower stall, no matter where it's located. Just remember to give the water a half hour to warm up!

a half hour of exposure to the sun is enough to ensure the next family member a warm shower. If you want to experiment, buy extra lengths of dark-colored hose and hang them on a south-facing wall, serpentine style.

Where to Place Your Shower

As mentioned above, this unit is portable. You can place it just about anywhere your hoses will reach. If you're using soaps and shampoos, however, you may not want to place it on your lawn because the runoff may damage the grass. Even if you don't plan to use soaps, leaving the shower in one spot for too long may damage the turf beneath it. Instead, prepare a site in a private, sunny spot that's protected from the wind. Excavate an area slightly larger than the shower base to a depth of 6" and fill it with gravel. Place the shower over it, and your worries about the lawn are over.

Lars Dalsgaard is a reader who lives in Denmark and has a fondness for contemporary style projects.

**Summertime and the living (and lounging) is easy!
Our portable outdoor shower is a wonderful
addition to your backyard enjoyment.**

Build the floor with one-by-stock or 5/4" decking. Screw the sleepers to the deck boards from below to avoid any chance of bare feet getting cut by exposed screw heads. Prime and paint all boards prior to assembly for best results.

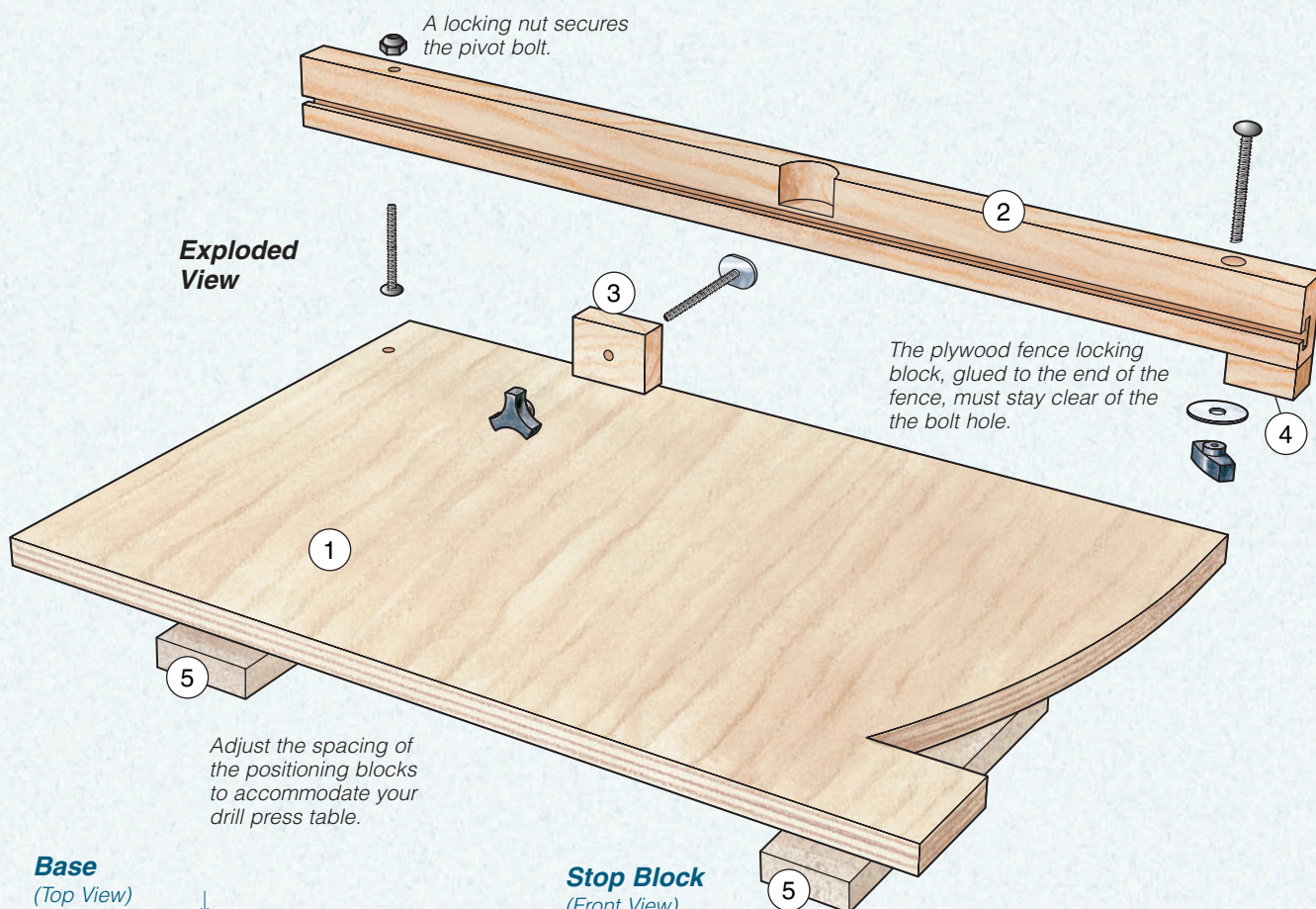


Make two privacy screens with awning fabric. Cut to size with a soldering iron and straightedge, then glue and clamp the fabric ends between stiffeners. Bore 3/16" holes through the fabric and stiffeners in the corners. Then thread elastic through the holes and fashion loops by tying the ends with square knots. Melt the ends of the elastic with a cigarette lighter, to prevent fraying.

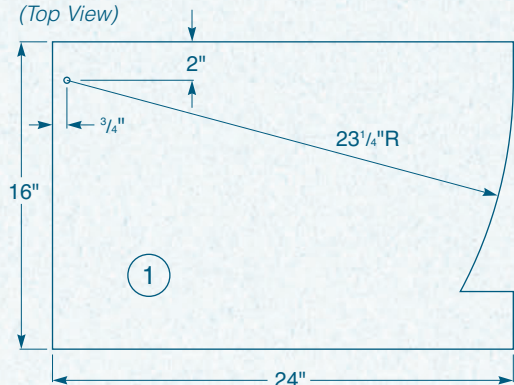


Drill Press Jig with Pivoting and Locking Fence

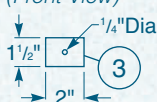
By Sandor Nagyszalanczy



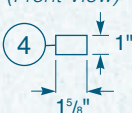
Base
(Top View)



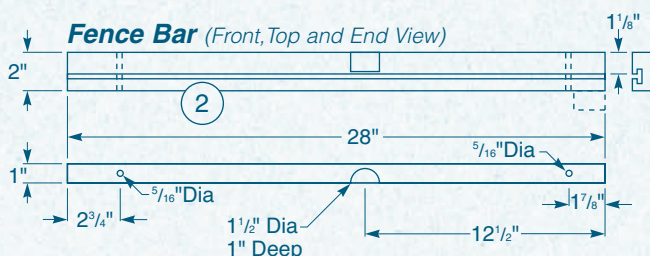
Stop Block
(Front View)



Fence Locking Block
(Front View)



Fence Bar (Front, Top and End View)



MATERIAL LIST

	T x W x L
1 Base (1)	3/4" x 24" x 16"
2 Fence (1)	1" x 2" x 28"
3 Stop Block (1)	3/4" x 1 1/2" x 2"
4 Fence Locking Block (1)	3/4" x 1" x 1 5/8"
5 Positioning Blocks (2)	3/4" x 2 1/2" x 10"

Find more great jigs and fixtures in Sandor's newest book: *Taunton's Complete Illustrated Guide to Jigs and Fixtures* (28057), available in hardcover for \$39.95 from *Woodworker's Journal*: 800-610-0883. Mention code W6081.

This ultra-practical drill press fixture will save time and add a measure of accuracy to your drill press boring tasks. It is certain to become a “shop buddy” for years to come.

This pivoting-arm fence jig makes most boring operations on the drill press quicker and more precise. The jig’s adjustable fence and end stop let you locate holes relative to the width and length of the workpiece, with repeatable accuracy. Start by cutting the jig’s 24" x 16" base from a piece of 3/4" plywood. Mark a point in the exact center of the base, which will be used to align the jig with the center of the drill press chuck later. Bore a hole through the base for the jig’s pivoting fence, located 3/4" from the left edge of the base and 2" from the rear edge. Using this hole as a pivot point, draw a 23" radius curve on the right edge of the base (from the back edge to 3" short of the front edge) using a beam compass. Saw out the curved section and notch with a jigsaw and smooth the edge with sandpaper. To make the jig quicker and easier to mount to your drill press table, glue and nail a couple of positioning blocks to the bottom of the base (Figure 1), making sure the blocks accurately align the drill’s chuck with the center point you marked on the base.

Saw a 28" x 2" wood fence from straight-grained 1" thick stock, and bore two holes through it, (see *Drawings*), for the carriage bolts that pivot and lock the arm to the base. For a cleaner look, counterbore the holes for the heads of the carriage bolts. To provide clearance for the drill press chuck when boring close to the fence, bore a half hole into the top edge of the fence. Clamp a scrap block to the face of the fence, and bore a 1½" dia. hole about 1" deep (Figure 2). For the jig’s sliding stop, rout a T-slot into the face of the fence. Cut a 1/4" wide, 3/8" deep groove first, centering it 3/4" up from the bottom of the fence. Then, re-route the

groove with a special T router bit to complete the slot. Cut a 1¾" x 2" stop block from 3/4" scrap, and drill it for the T-bolt and threaded knob that locks it into the slot.

Before attaching the pivot arm to the base, glue a small block cut from 3/4" plywood to the underside of the arm, to act as a locking block on the fence. Fit a large fender washer under the threaded knob that secures the pivot arm’s adjustment, and use a locking nut to secure the pivot bolt (Figure 3).

To make the fence jig quicker to adjust to commonly set distances — say, to space holes 1/2", 1", 2", etc. from the edge of the work — mark the position of the fence at each distance: Measure from the center point of the bit to the fence, then strike a pencil mark on the base to mark the fence position. Now you are ready to drill some holes.

Sandor Nagyszalanczy is an award winning writer and expert woodworker. His new book, Taunton’s Complete Illustrative Guide to Jigs and Fixtures, is now available.



Figure 1: Positioning blocks are affixed to the underside of the base with glue and nails, to locate the jig on your drill press’ table.



Figure 2: Form a “half hole” on the face of your fence in order to provide clearance for the chuck when drilling close to the jig surface.



Figure 3: Add a small plywood lock block to the fence (see *Drawings*), place a fender washer on the bolt, and follow with a threaded knob.



Make the jig even more practical: with the jig mounted and ready to go, you can add speed and easy repeatability to your drilling by marking commonly used spacing on the base of the fixture.

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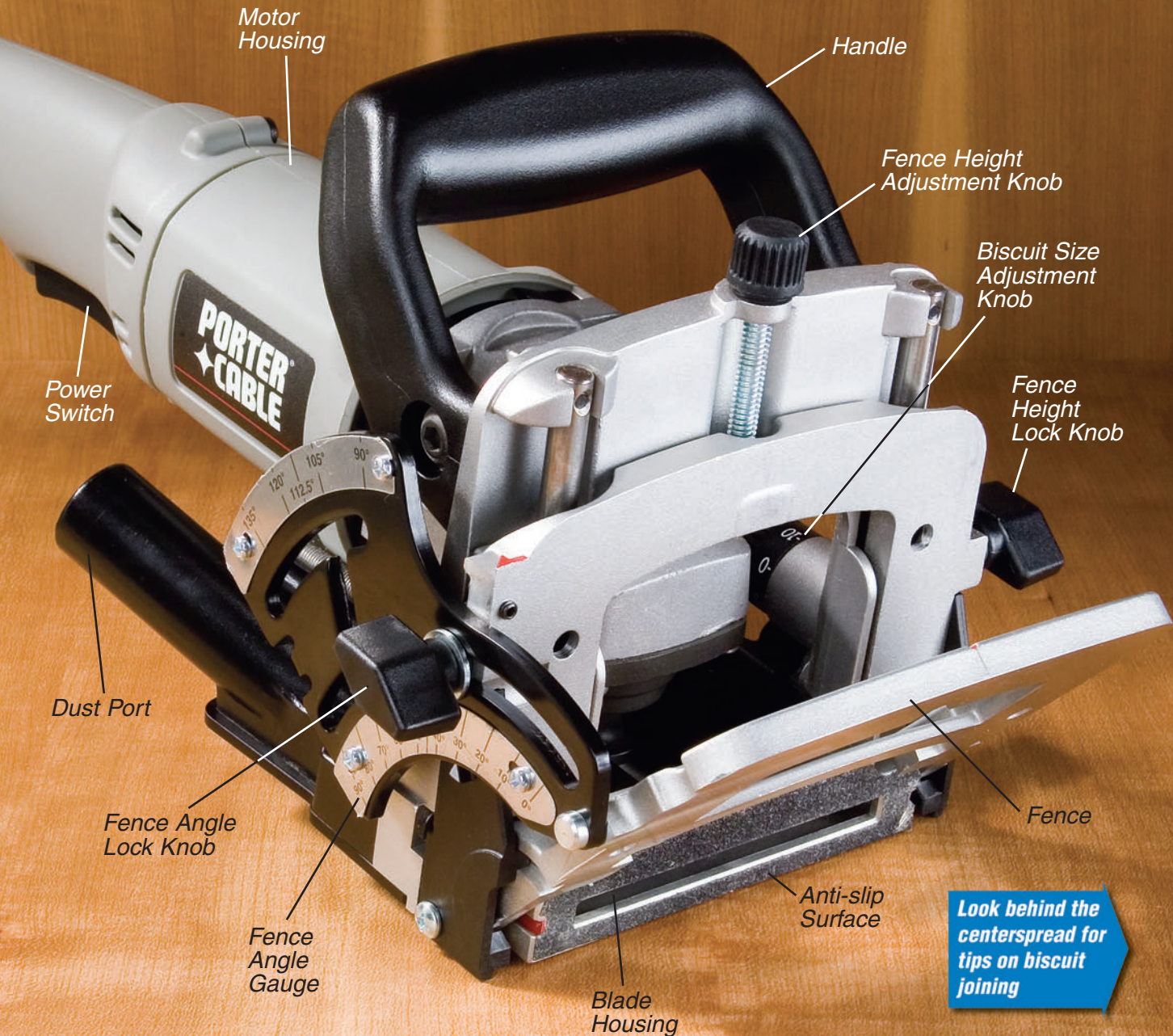
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Biscuit Joiners: Beyond the Basics

By Rob Johnstone



Precise, efficient and effective, the biscuit joiner and its pressed-wafer companions may lack for pizzazz, but they make up for it in practicality. And their versatility may surprise you.

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Biscuit Joiners:

They're not just for face frames anymore ...

By Rob Johnstone

As creatures of habit, we tend to categorize tasks and even tools into comfortable little niches. When most of us think of biscuit joints, they are often considered for their ability to join end grain to edge grain, as when forming face frames; or aligning long butt joints, as when gluing up panels. But biscuits and the biscuit joiners that cut their slots are much more versatile than those obvious bread-and-butter uses. For example, with the use of specialty biscuits, you can form very handy knockdown joints. And speaking of specialty

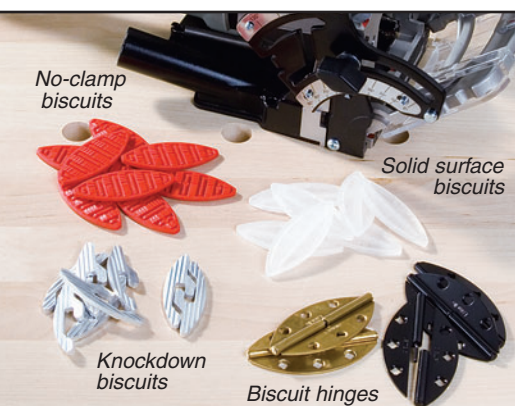
biscuits (see photo at left), there are biscuits that hold edges together without the benefit of clamps, transparent biscuits for

solid surface work and even hinges that can be mounted in surface mortises shaped by your biscuit joiner. That's versatility.

How They Work

Biscuits are compressed wooden wafers (there are wood fiber biscuits, too) that come in different specific sizes. When they are inserted into their mortise and come in contact with glue, the wafers expand (photo above right), filling the mortise and even "grabbing" the mortise walls to a degree with their expansion pressure. As you would expect, the closer the tolerances, the tighter the fit, and the better this joinery system works.

The advantages of this joinery approach are obvious. Setup is quick (photo below): biscuits are much easier to align than dowels and much quicker than chopping and cutting traditional mortise and tenon joints. And, while the strength of a mortise and tenon cannot be beat, often, biscuit joints are more than sufficiently strong to



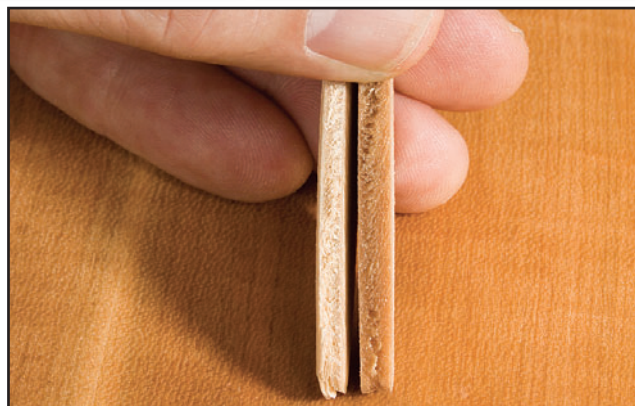
Here's a trick that will provide accurate setup and save you time. Create an assembly of setup blocks (photo below). For each common thickness of stock that you work with, make a block with a biscuit slot perfectly located for various joints. Use these blocks to set your joiner in a jiffy (below left).



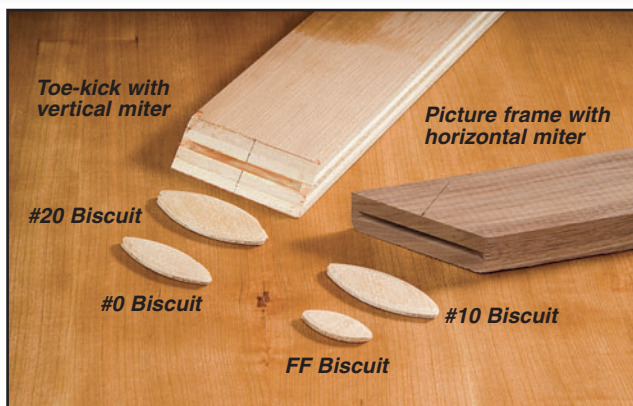
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C E L E B



When biscuits become wet with glue, they expand in their slots. This increases the glue joint area and creates a bit more of a “grab” on the mortise walls. Close tolerances make for better glue joints.



Biscuits come in several sizes to accommodate different sized stock and joints. The #20 biscuit above is fine for the 3½" wide toe-kick, but the #10 is correctly sized for the 1¼" mitered picture frame.

do the job. In the photo below, shelf locations are created when their biscuit mortises are cut. This is a perfect example of the fast setup and sound joinery of the biscuit system.

To increase the strength of a biscuit joint, there are a couple of easily employed tricks. Most common is the double biscuit joint, where you offset two separate biscuit mortises and use a biscuit in each slot. Create a variation of that joint by forming a double-wide single mortise on each face of the joint. Then put two well-glued biscuits into the mortise and proceed as normal. The biscuit swelling will increase by a factor of two, and the biscuits will also bond together to form a moon-shaped loose tenon.



Locate and form shelf joints for a simple shelved casework project. Use a clamped-on straightedge to guide the biscuit joiner.

Miters and Square Corners

One joint that the biscuit excels at is the miter joint (*see photos, above right*). In vertical miters, biscuits replace a traditional spline with the added advantage that they can be completely hidden within the miter joint.

With very small biscuits (size FF, for example) picture frames (an example of a horizontal miter) are easily fabricated, and their miters are considerably stronger than traditional end grain to end grain glue-ups could ever hope to be.

With that said, care must be taken to select the proper size biscuit for the job. In some tasks, such as a mitered toe-kick, if the

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Miters: Horizontal and Vertical



Clamp your vertical miter stock back-to-back, and you won't need to set your joiner fence at 45°. Set the biscuit slot close to the inside edge of the miter to avoid cutting through the opposite face.



Biscuits must be wholly captured within their face and are best located in the center of a horizontal miter joint. Biscuits add considerable strength to these traditionally flimsy miter joints.

biscuit mortise was exposed on either edge of the assembly, there would be no big problem. This is not true of a picture frame. For that reason, it is always a good idea to check your setup with scrap lumber. On vertical miters, the mortise should be located very close to the inside edge of the miter ... this allows significantly more depth in the cut before you break out of the opposite face of your material.



On stock narrower than 3/4", you may need to adjust placement of the biscuit slot with a spacer or jig. Biscuits used in this type of joinery add control during glue-up in addition to the strength of the joint.

Joining 90° corners in casework, especially when using manufactured sheet goods (*see Ian Kirby's article on page 28*), or even with small boxes, is another arrow in the biscuit joiner's quiver. As shown in the *photo below left*, a 90° jig can be a very useful adjunct for this technique, adding a level of stock control without the need for clamping.

Aligning Long Butt Joints

While there remains controversy in regards to whether biscuits add strength to a long butt joint in solid material, there is no argument about the help they provide in aligning the joint. An area where biscuits do absolutely add strength to this sort of joint is where you are gluing plywood to solid wood. In this case, the benefit is clear. On these long joints, use the largest biscuit size you have. Another tip: If you are joining MDF in this manner, whether solid wood to MDF or MDF to itself, the new fiber biscuits are your best bet to prevent the shape of the biscuit from telegraphing through the material as they expand.

Using biscuits to align a long glue joint is a common and useful technique. This is especially true if you are joining solid wood to plywood or MDF.

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Fancy Tricks

For 99% of its life, a biscuit joiner will simply do its designed task of cutting mortises for biscuit joints. But even this plain-Jane tool can shine with a bit of creativity. For example, the Eastlake style molding running across the top of these pages was made using only a biscuit joiner and a table saw. I laid out the spacing for the half-ellipse patterns and then began milling the largest half-moon shape (at the maximum cut setting) into the surface of the stock — in this case, white oak. Next, on exactly the same marks, I cut the second half oval at the #10 setting a full blade thickness deeper.

I followed up on the table saw, cutting successive rabbets on all four edges of the stock to the depth of each half oval.

A bit of sanding and a classic molding is created using a biscuit joiner.



Make this Eastlake Molding



After preparing 1/2" thick by 2" wide stock, the author laid out the half-moon pattern on the face of the molding with simple cross marks. With the joiner set at its widest cut, half ovals were cut at each cross mark down the length of the molding.



Use the same cross marks to register the second half-moon detail. Now the joiner is set to cut #10 biscuits, and the depth of cut is a full blade thickness deeper. Hold the joiner firmly in place during the cut.



The final bit of machining is forming successive stepped rabbets around the molding. The rabbets are cut to match the depth of each half oval detail. It all comes together to create the lovely design running across the top of this article.

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Memorial Flag Case

By Bruce Kieffer

Those bottom corners may look impossible, but a simple tenoning jig and table saw setup make the work easy.

It's tradition to drape an American flag over the casket of a deceased U.S. forces veteran. Prior to burial, the flag is removed, folded into a triangle and presented, "on behalf of a grateful Nation," to the deceased veteran's next of kin. I know this first hand because my father recently passed away, and our family was given his burial flag. My mother asked me to make her "a really nice case" for Dad's flag. I responded without hesitation: "I'd be honored." And even though this is an easy thing to build, I still put my heart into making it perfect, knowing how proud my father would have been with the results.

When my brother got wind of my making Dad's flag case, he asked if I would make one for his father-in-law's flag as well. So I made two out of walnut, and I used one board for each case. I ended up with one case having all dark and figured wood, and the other having all lighter, straight-grained wood. Both are beautiful!

Getting the Fit Right

I did a little research and found out that these flags are called burial or internment flags. When open, they measure 5' x 9½'. When folded, the height from the bottom center to the peak is approximately 10½", and the length across the bottom is twice the height, thus 21" long. Those were also the inside

dimensions given for "store-bought" cases. My flags seemed a bit larger than that, so I made a quick hot-glued-together mockup to assure myself of the fit. I didn't bother with the 22½° mitered ends yet; instead,

I just 45° mitered the bottom ends of the sides and set them butt on a square-cut bottom.

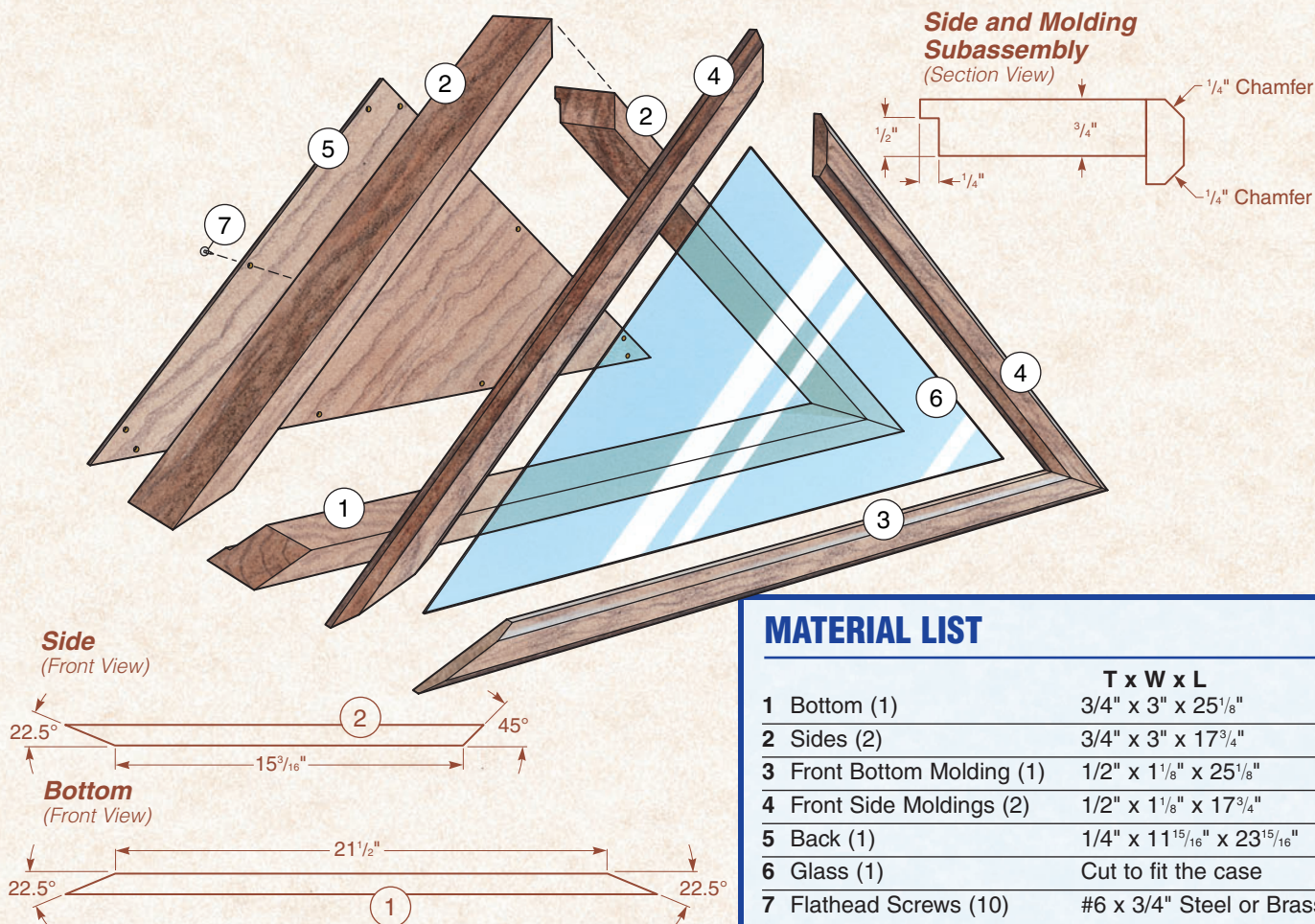
My flags fit really snug in the mockup, so I made another, this time ½" taller. To my surprise, that was too big! One more mockup, this time just ¼" taller than the first, and fit was perfect. The final inside dimensions of my flag case became 21½" across the bottom, with a 10¾" peak.



Using a hand saw (top photo), trim away most of the 22½° mitered joint waste. Then make the finished cuts using a table saw and tenoning jig. Rough cutting the joints first eliminates the risk of creating nasty flying projectiles.

Cutting The Steep 22½° Miters

In the meantime, while I was making my mockups, I'm thinking to myself... "How the heck am I going to cut those steep bottom miters?" After much experimentation, the solution hit me. If I set my table saw blade to 22½°, and hold the workpieces upright, I can cut the angle I need. Now, what better tool is there to hold the pieces upright other than a tenoning jig! I tested the setup, and it worked great. The only drawback was that with my saw blade raised to its maximum of 3", the widest front molding I could cut was 1⅝". You'll need to check your maximum blade height and shrink the width of your front moldings as needed.



Build the Main Case

The main case consists of the bottom (piece 1) and the sides (pieces 2). Cut the sides to the dimensions given in the *Materials List*, adding one inch to the length. Using a miter saw, cut the top corner 45° mitered ends, then cut the sides to their finished lengths. Cut the bottom to its finished size. Set a bevel square to 22½° and mark the bottom to side joints. Remove most of the waste with your band saw.

Now for the tenoning jig and table saw setup. Make sure your tenoning jig table and fence are aligned 90° to your saw's table, and that the saw's blade is tilted to 22½°. As you can see in the photo on the previous page, I placed a 3/4" thick spacer between the work piece and the tenoning jig's table to keep the saw blade far away from the jig, and I screwed a backer board to the tenoning jig's fence to reduce tearout at the rear of the cuts.



Rout the back rabbets on the sides and bottom. Do this procedure by making several passes, slowly increasing the depth of each cut. This will reduce the chance of tearout.

I used a 1/8" thick riser board, which rests on the saw's table behind the blade and to the side of the tenoning jig. When you clamp your workpieces in the tenoning jig, you do so with them on top of the riser board, so the jig holds everything 1/8" off of the saw's table, and the wood can't bind against the table as you saw.

Use scrap wood to test your table saw setup. Adjust the blade to tenoning jig distance so the cut makes a point on the end of the workpiece without reducing its length. Cut the ends of two scraps and check the combined angle to verify that it's exactly 45°. Make any necessary adjustments, then finish cut the 22½° miters.

Rout the rabbets for the back on the rear edges of the sides and bottom and then clamp the main case pieces together using band clamps. Make sure the top edges are flush at the corners.



Band clamps are a fast and sure way to clamp together the bottom and sides of this complex shape. Place pieces of cardboard under the bands at the corner joints to keep the glue from smearing and the bands from binding.

Make the Front Molding Frame

Make the front moldings (pieces 3 and 4) the same way you made the case sides and bottom. Cut the moldings $1/32''$ longer, so when attached to the main case, their edges will overhang slightly. Covering the molding end faces with masking tape prior to cutting the $22\frac{1}{2}^\circ$ miters greatly reduces tearout.

Use a router table and chamfer bit to rout the molding inside chamfers. Finish sand the chamfers and inside edges. Glue and band clamp the moldings together to make the frame. After that cures, glue and clamp the frame to the main case.

Do the Finish Work

You're just about done ... but there are a few more steps. Start by sanding the frame edges flush with the main case. Next, rout the frame outside chamfers and

Rout the front outside chamfers using a chamfer bit and router table. Do this after the front molding frame is attached and sanded flush with the case.



complete your finish sanding of the whole case. The final construction step is to make the back (piece 5), testing the fit as you go, to ensure a nice, tight fit. Finally, finish the case with three coats of clear stain spray lacquer. Take the case to your local glass supplier and have them fit the glass (piece 6). Set the glass in the case and affix it with a few dollops of clear silicon or hot glue. Add protective felt dots to the bottom, insert your flag, and attach the back. I can tell you right now, once you build one, there are probably a couple more in your future!

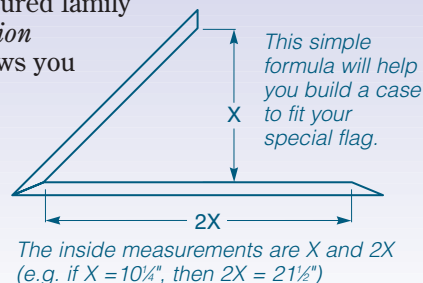
Bruce Kieffer is a professional woodworker and frequent contributor to the pages of Woodworker's Journal.

Adjusting dimensions for flag sizes

While it's true that internment flags are all the same size, there are plenty of folks out there with a flag that isn't flying anymore, but still has some special meaning to a family. Rather than fold it up in a box, a flag case like the one built here can become the perfect honored resting place for a treasured family

heirloom. The *Elevation Drawing* at right shows you the formula to use to decide on your box dimensions.

Remember, start with scrap wood and test the fit of your folded flag.



Bargain-priced Miter Saws: Eight Great Picks

By Chris Marshall



Now considered a must-have tool by most woodworkers, the power miter saw is a versatile and accurate shop companion. But how much saw do you really need? Our author contends that around \$300 buys a bulletproof saw with all the features you may ever desire.

When it comes to woodworking tools, that old song about “tomato” or “to-mah-to” sure fits. Your “must-have” tool list is probably different than mine. But I think we can all agree that some machines belong in everyone’s shop, and a quality miter saw ranks right up there with a good router. Whether you’re shaving a little length off a tenon, crosscutting rails and stiles for a face frame or adding crown molding to a highboy, a miter saw should be your “go-to” tool. The accuracy and control you gain with a miter saw makes a miter gauge seem like a clunky afterthought.

There are scads of miter saws on the market these days, and choosing the right saw is tough. If you need maximum crosscutting capacity, a sliding miter saw may make the most sense (see *sidebar*, page 63). There are also plenty of new dual-bevel miter saws to tempt you. For general woodworking, I suggest keeping it simple. A single-bevel, 12” saw still fits the bill for most tasks. These saws will crosscut a 2 x 8 or 10/4 lumber in a single pass and slice a compound miter with hair-splitting accuracy. Plus, a single bevel saw won’t cost you an arm and a leg — all eight saws in this test group sell for right around \$300.

Recently I put these saws to task cutting some Southern yellow pine,

8/4 hard maple and 1x oak. I’ll level with you straight away: each saw made smooth cuts. They’re all capable of a high degree of accuracy if you tune them up carefully. It’s subtleties and extras that separate the cream of the crop from the rest. Here’s what you should know about each saw and which one gets my vote for best test tool.

Bosch 3912

Bosch’s 3912 miter saw has been around for almost 10 years without significant design changes or added bells and whistles. Still, what I appreciate most about this Bosch saw are the basics, starting with its spunky motor. Spinning the 90-tooth test blade through 2”-thick hard maple is no easy feat, but the 3912 tackled it easily and left glass-smooth cuts. The miter table swiveled smoothly and snapped positively into the angle detents.

Bosch provides a swirled milling pattern on the saw fence. This extra texturing helps keep workpieces from creeping during cutting. It’s one of those little details you’ll really appreciate if you cut crown molding tipped against the fence, where every bit of friction counts.

Swirled milling on a Bosch’s 3912 saw fence may not seem like a big deal, but you will appreciate it for those critical cuts. It adds extra “bite” to keep workpieces from creeping.



Bosch

Model: 3912

Price: \$299

Phone: 877-267-2499

Cutting Capacity:

At 90°:

2½" x 7⅞" or 3⅞" x 6⅜"

At 45° Miter:

1¾" x 7⅞" or 2¾" x 6⅜"

At 45° Bevel:

3⅞" x 4½" or 2½" x 5½"

Max Compound:

2¾" x 4½" or 1¾" x 5½"

Miter Detents:

0°, 15°, 22.5°, 31.6°, 45°

Weight: 43 lbs

For more info on the web: use our



Tool Review continues on page 56 ...

Are dual-bevel saws worth the price?

What's your opinion of dual-bevel miter saws?

Is your "dually" the best miter saw money can buy?

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and tell us why. We'd love to hear from you!

All in all, the 3912 is a modestly appointed but worthy contender in this lineup. A few design improvements could help, but it's weathering

the test of time well against the competition. It's still a decent value for \$299.

Craftsman Professional 21235

Dual-bevel compound miter saws have risen in popularity in recent years, especially among trim carpenters who install crown molding every day. The dual bevel feature enables you to tip the saw left or right for making compound miter cuts. Usually dual-bevel miter saws are more expensive, but Craftsman has figured out a way to provide the added feature along with a bunch of other goodies without inflating the price.

Running through its standard features, this saw has an excellent set of miter and bevel scales. Black markings on a white background make angle settings bright in low light, and the cursors are close to the scales to prevent viewing errors. The tool has a contoured trigger grip that fills your palm nicely, and its bevel and miter lock knobs clamp down tightly as they should. You can tilt the blade up to 45° in both directions. Flip stops also park the saw at a 33.9° bevel if you prefer to cut crown molding laying flat on the table.

Craftsman provides tall, moveable fences on both sides of the blade for backing up large workpieces. A long list of other features rounds out this package. The saw's dust bag elbow fits a standard 2½" shop vac hose — an excellent option for cleaner cutting. Even without a vac attached, the large dust port didn't clog up and worked well for clearing sawdust.

The 3912 also has a small pull-out extension on the table and a hold-down clamp to keep your hand out of harm's way when cutting short stock.

Triggers on most miter saws don't have a safety lock-off feature

to prevent accidental startups, but Bosch is one of the few saws that does. I think all saws should have the safety; it's too easy to accidentally

squeeze the trigger when you're pivoting the blade to set up a cut. Bosch's safety can be engaged from both ends of the handle — beneficial for left-handed users.

Despite its strengths, there are a few minor drawbacks to this saw. For one, the background color of the miter scale is dark blue, which makes the thin, red cursor line difficult to see down inside its viewing area in the handle. The saw also suffers from an undersized dust port; the dust bag elbow clogged quickly with sawdust and stopped working. I pulled off the elbow and connected the bag directly to the saw housing to fix it. The port is too small to connect to a standard 1¼" shop vac hose.

Craftsman's 21235 Professional is the only test saw that tips both left and right for making bevel cuts. It's a handy feature for cutting crown molding.



Cutting crown molding in the "sprung" position against the fence is tricky without a clamp to hold the molding steady. Craftsman includes a good one with the 21235 saw.

Craftsman

Model: 21235 Professional

Price: \$329

Phone: 800-932-3188

Cutting Capacity:

At 90°: 1½" x 7½" or 3½" x 3½"

At 45° Miter: 1½" x 5½"

At 45° Bevel: 1½" x 7½"

Max Compound: 1½" x 5½"

Miter Detents:

0°, 15°, 22.5°, 31.62°, 45°

Weight: 41 lbs

For more info on the web: use our



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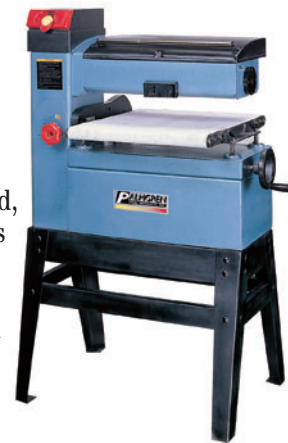
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You also get a pair of table extension rods, roller support, stop block, hold-down clamp and a nifty crescent-shaped clamp for cutting crown molding.

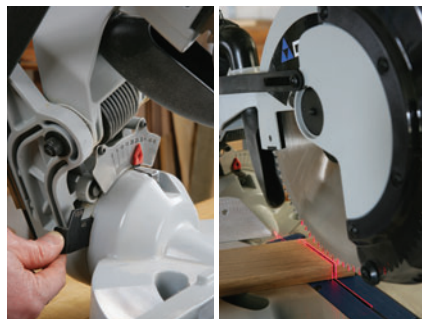
Craftsman provides a Laser-Trac® cutting guide that shines a single beam of red light onto the saw table to locate the blade's path. Trouble was, the laser beam and blade on my test saw didn't line up precisely. The beam was off by about 1/16", and you can't adjust it like the lasers on the Hitachi and Delta saws tested here. Despite the problem, that red light still serves as a good reminder of where not to put your hand! It will also help you "ballpark" a tricky contoured cut on crown molding.

During testing, the 21235's motor was up to snuff, but slicing through

thick maple required a gentler hand than with the Bosch. Still, the saw wasn't underpowered compared to the other test saws. Considering the long list of sensible features, dual-bevel versatility and good performance, the 21235 is a heckuva saw for the money.

Delta 36-322L

Delta doesn't load up the 36-322L with a boxcar's worth of extras, but the features it does have are well conceived and helpful. My favorite doodad on this saw is its exceptional TwinLaser™ blade guide. A pair of lasers on the upper blade guard shine down on the



Delta outfits the 36-322L with stops for setting both 33.9° and 45° bevel cuts (left photo). Pushing or pulling the lever switches the stops. Delta's TwinLaser™ feature (right) takes all the guesswork out of locating a cut. A pair of adjustable beams track the edges of the blade teeth exactly.



Delta Machinery

Model: 36-322L

Price: \$299

Phone: 800-438-2486

Cutting Capacity:

At 90°: 1½" x 7½" or 3½" x 5½"

At 45° Miter:

1½" x 5½" or 3½" x 3½"

At 45° Bevel: 1½" x 7½"

Max. Compound: N/A

Miter Detents:

0°, 15°, 22.5°, 31.62°, 45°

Weight: 46 lbs

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Step up to a premium saw blade

All these test saws come with carbide-tipped blades, but most are better suited for carpentry than woodworking. The best way to make surgically smooth cuts is to switch your

40-tooth-and-under blade with a premium blade engineered specifically for crosscutting. I outfitted each test saw with a 90-tooth, alternate top bevel blade from Infinity Cutting Tools to help level the playing field during testing. Cutting quality was impressive, even

on a bargain-priced saw. A top-shelf blade will set you back around \$100, but the results will amaze you. To learn more about Infinity blades, check the company's web site at www.infinitytools.com or call 877-872-2487.



table to establish the exact width and location of the blade. If the lasers ever fall out of alignment or if you change to a different blade thickness, just tweak a couple of Allen screws to adjust the laser beams left or right. I didn't need to touch them; the factory settings for the lasers on my test saw were right on the money. The laser has its own On/Off switch, so you can line up the cut before turning on the saw. It's a safer approach than other lasers that only illuminate when the blade is spinning.

Reaching around behind a miter saw to loosen the bevel tilt knob can be a hassle. Delta makes it easier to do by moving the bevel lock to the front of the saw. It's a big paddle lever in front of the miter lock knob. Locking down the miter table is also a cinch: just a quarter twist locks the knob.

The miter and bevel scales on this saw consist of large black markings on stainless steel, and the red cursors are close to the scales so they're easy to read

Tool Review continues on page 60 ...

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DeWalt provides a helpful push-down lever instead of a twist knob for setting miter cuts. The feature locks the table solidly when making a cut off the detents.



to get my hands on the new 715 to see how things have changed on the new model. For the most part, these cutting cousins

are still quite similar, but there are some updates worth noting.

Starting from the top, DeWalt shortened the trigger on this saw from a four-finger grip to a two-finger pull. Squeezing the trigger feels just like powering up a drill. I like the style, but if you're a southpaw you'll probably have to use your right hand to operate it. DeWalt doesn't include a safety lock-off on the trigger.

The motor sliced through pine and oak like butter, but it had to work harder on the thick maple. Even so, cuts were impressively free of blade swirls. It's easy to set up bevel cuts using the large three-wing knob behind the saw, and DeWalt has added a 33.8° bevel flip stop for cutting crown.

The blade directed dust adequately into the bag, but the bag is smaller than most of the test saws and filled up fast. It seems like an afterthought feature that a contractor would probably leave off the tool at the job site. The dust port will accept a 1¼" vac hose — an option I'd choose to do here.

DeWalt outfits this saw with a nice black-on-silver miter scale, but the scale's cursor is an arrow pointer made of clear plastic. I think the tip of the arrow should be colored so it's easier to see in low light. My DeWalt miter saw has a thin red line that's more visible. The bevel scale has a red pointer that stands a little too far off the markings. Be sure to view it from straight on to read setups correctly.

The fence has been updated with swirled milling, and the standard

miter locking knob is now a push-down paddle lock that works well. You can override the detent stops by flipping a couple little levers next to the paddle. For other extras, the saw comes with a long workpiece support and 32-tooth carbide blade.

The throatplate on this saw may cause you fits if you make a lot of fine trim cuts. Its blade slot is 9/16" wide, and thin cutoffs tend to fall down inside the table. The large gap is also an invitation for tearout.

If you need a crossover saw for carpentry, this DeWalt saw may be the right pick. But, at \$329 it comes up a little short on extra features and finery that would make it even more appealing for woodworking.

Hitachi C12FCH

Hitachi's C12FCH saw is a newbie in the miter saw market, but there's nothing wet behind the ears in terms of how it performed. Aside from one minor gripe, this was an enjoyable machine to use.

Hitachi provides a huge black-on-silver miter scale. It's perfect if you're at that stage of life where you have to read the morning paper at arm's length. The bevel tilt scale is also generous, and the cursors on both scales make them easy to use. Most of the controls on this saw are straightforward and conventional: a comfortably long miter lock knob, thumb-activated override for the detents and an overmolded handle with a two-finger trigger. A standout feature on this saw is the bevel-setting mechanism. Hitachi provides a large dial to help set the bevel and a lever to lock it. The dial enables you to tip the motorhead easily with one hand, and the gearing allows for delicate micro-adjustment. It's a slick detail!

I really like the laser feature on this saw. It flips on with a separate switch and shines a thin, bright line down onto the table. The beam is fully adjustable and stays on track as you lower the blade for the cut.

DeWalt

Model: DW715

Price: \$329

Phone: 800-433-9258

Cutting Capacity:

At 90°: 3½" x 5½" or 2½" x 7½"

At 45° Miter:

2½" x 5½" or 3½" x 4½"

At 45° Bevel: 1½" x 7½"

Max. Compound: N/A

Miter Detents:

0°, 10°, 15°, 22.5°, 31.62°, 45°

Weight: 42 lbs

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accurately. The 36-322L is also the only saw with a swirled milling pattern on both the saw table and fence for even better stock control.

In testing, pine, maple and oak were no obstacles for the Delta. The saw cut cleanly, thanks in part to a tight-slotted throatplate that minimized tearout. Dust collection was better on this saw than most. A curved fender behind the blade bagged the sawdust fairly well.

For \$299, Delta's 36-322L is a solid buy. Lasers may seem silly on some tools, but they sure make sense here.

DeWalt DW715

I've owned DeWalt's previous version of this saw — the DW705 — for about 10 years. So, I was anxious

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TOOL REVIEW



A large dial on Hitachi's C12FCH (left photo) makes it easy to micro-adjust the saw for setting bevel cuts. A separate lever locks the angle. Hitachi's single-beam laser (right) throws a bright, clean line down onto the table to locate the left blade edge. It turns on with its own switch and without the blade spinning.



Hitachi

Model: C12FCH

Price: \$299

Phone: 800-829-4752

Cutting Capacity:

At 90°: 2½" x 7⅞" or 3⅞" x 6⅞"

At 45° Miter: 2½" x 5½"

At 45° Bevel: 1⅝" x 7⅞"

Max. Compound: 1⅝" x 5½"

Miter Detents:

0°, 15°, 22.5°, 31.62°, 45°

Weight: 41.9 lbs

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During testing, this saw didn't disappoint me. The motor was well matched to the task and provided crisp, smooth cuts. A work clamp on the table kept things from shifting. Dust collection worked well on the C12FCH, thanks to a 2⅞"-diameter dust port that didn't clog up. The fitting is a bit too small to connect to a standard shop vac hose, but the bag is large enough to handle many cuts before it's full.

My only qualm with this saw is that the blade slot is a bit wider than it should be in the throatplate. Those sliver-sized cutoffs tend to slip right down inside the 3/8"-wide opening. Trouble is, the kerf is too narrow to fish the scraps back out easily, and they don't fall out under the saw. I had to tip the saw over to clear them.

For \$299, this Hitachi is attractively priced with sensible features and plenty of power. Be sure to include it in your short list of saws to try before you buy.

Makita LS1221

Like Bosch's 3912, the LS1221 has been around for years — and for

good reason. It isn't brimming with extras, but the essential features deliver dependable performance.

Makita opted for a different color scheme for the scales than other saws: the background is black and the markings are silver. Provided you're working in bright light, the markings are easy to see. The scales are harder to read in a poorly lit shop. Orange arrow pointers mark the settings clearly.

Both the table and motor pivot have silky smooth action, and the miter and bevel controls lock solidly. Makita outfits the saw with a four-finger trigger and a push-button safety to prevent accidental starts. Once under power, the LS1221's motor zips right through tough lumber without struggling. Dust collection was decent, but the smallish bag fills up fast.

The fence on this saw doesn't provide as much bearing support as some others, but screwing on a couple of scrap wood facings would be a quick and easy fix. Makita provides two sturdy extension

wings and a work clamp to help keep longer workpieces from tipping off the table.

My favorite feature on this saw is its adjustable throatplate. You can open the gap when tipping the blade to make bevel cuts or close it up to reduce tearout. And, even slivers of waste stay out of the slot. It's a smart, convenient feature.

You probably won't change blades on your miter saw regularly, but the

Makita

Model: LS1221

Price: \$299

Phone: 800-462-5482

Cutting Capacity:

At 90°: 2½" x 8" or 3⅞" x 6"

At 45° Miter:

3⅞" x 4¼" or 2½" x 5⅝"

At 45° Bevel:

2¾" x 5⅞" or 1¾" x 7⅞"

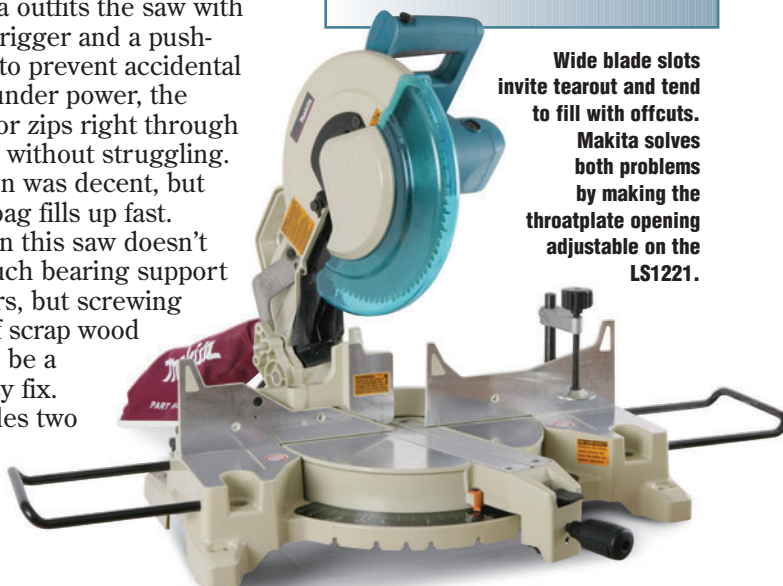
Max. Compound: 1¾" x 5⅞" (L)
or 1¾" x 5½" (R)

Miter Detents:

0°, 15°, 22.5°, 31.6°, 45°

Weight: 36.4 lbs

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Wide blade slots invite tearout and tend to fill with offcuts. Makita solves both problems by making the throatplate opening adjustable on the LS1221.

task was harder to do on this saw. Other blade guards retract far enough to stay out of the way for working on the blade, but I could have used a third hand to hold Makita's guard up. Fumbling with the guard made the job a hassle.

Other competitively priced saws in this test pack in more features, which may make it harder to justify the cost of this low-frills saw. Still, I think you'll find that the Makita LS1221 is an accurate, proven saw that's worth its price.

RIDGID MS1250LZ

The folks at RIDGID seem to fuss over those little creature comforts

Tool Review continues on page 66 ...

Monster saws for giant crosscuts

If you can't remember the last time you crosscut a piece of lumber wider than 8", a single-bevel compound miter saw will probably satisfy your every need. For some of us, "woodworking" has a looser definition that sometimes includes framing jobs and general carpentry. If you need a saw that can slice through crown molding one day and a 2 x 12 the next, a sliding compound miter saw may be the better fit. "Sliders" are a cross between a radial arm saw and a miter saw. The motor pivots down and slides forward to make a cut. A 12" sliding compound miter saw will crosscut 2x lumber up to a foot wide and even wider 4/4 stock. Most can also be set for stopped-depth "dado" style cuts. The tradeoff for increased capacity is a jolt of sticker shock when you buy — these saws will set you back \$500 or more.



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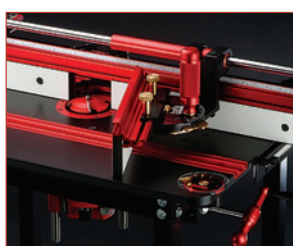
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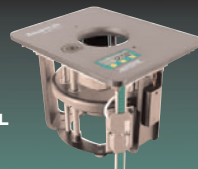


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TOOL REVIEW



RIDGID

Model: MS1250LZ

Price: \$289

Phone: 800-474-3443

Cutting Capacity:

At 90°: 2³/₄" x 7⁷/₈" or 3¹/₂" x 3¹/₂"

At 45° Miter: 2³/₄" x 5¹/₂"

At 45° Bevel: 1³/₄" x 7⁷/₈"

Max. Compound: 1³/₄" x 5¹/₂"

Miter Detents:

0°, 15°, 22.5°, 31.6°, 45°

Weight: 49 lbs

For more info on the web: use our



extension wing that adds another 5" of tabletop and a tall fence with a write-on surface for marking repetitive crosscuts. The tool trigger is a four-finger design with a thumb-activated safety.

RIDGID equips this saw with an Exactline™ laser feature that works the same way as the lasers on the Craftsman and Ryobi saws. It mounts on the saw arbor and turns on by centrifugal force when the blade spins. It suffers from the same alignment problems, and you can't adjust it ... unfortunately.

Other, stronger features include a huge, 2¹/₂"-diameter dust port that channels chips effectively into the collection bag or attaches conveniently to a shop vac. I made a second set of test cuts with a vacuum attached, and the added suction kept the table tidy. The saw also comes with a sturdy quick-

RIDGID and a few other manufacturers include a safety lock-off switch on the trigger handle. If you typically line up your pencil mark with the blade teeth before making a cut, there's no chance of an accidental startup.

release work clamp. To top off the package, RIDGID even provides a steel workstand.

All the extras don't matter much if a saw underperforms, but I was pleased with how the Ridgid fared in testing. The motor had plenty of gusto for the tough stuff, and it made clean, smooth cuts. A more accurate laser would help, but this is a sweet saw regardless. Check it out at your local Home Depot™.

Ryobi TS1551

We all know woodworking isn't exactly a miser's hobby. Tools are expensive, and ramping up your shop can take a big bite out of the budget. That's why the TS1551 is appealing to me: for \$219, this saw will cut wood right along with the "pro" series tools and leave a little more money in your pocket.

Ryobi provides excellent scales on this saw. A bright, black-on-white color scheme is easy to see, regardless of your lighting situation. The table on my test saw was much stiffer to turn than other saws, but it locked easily into the detents. Swiveling the table repeatedly seemed to loosen it up some. A generously sized bevel lock knob holds the saw firmly when tilted off of square.

The fence on this saw is shorter than most, and it doesn't have



The black-on-white color scheme of Ryobi's scales provides excellent visibility, especially if you work in a dark corner of the basement or garage.



Ryobi

Model: TS1551

Price: \$219

Phone: 800-525-2579

Cutting Capacity:

At 90°: 2¹/₂" x 7⁷/₈"

At 45° Miter: 2¹/₂" x 5¹/₂"

At 45° Bevel: 1³/₄" x 7⁷/₈"

Max. Compound: 1³/₄" x 5"

Miter Detents:

0°, 15°, 22.5°, 31.6°, 45°

Weight: 41 lbs

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that make a tool pleasurable to use, while still keeping the price affordable. Covering the important knobs and controls with soft overmolds isn't a make-or-break deal on a miter saw, but the fact that they're here on the MS1250LZ makes twisting and gripping more comfortable. The saw has legible black-on-silver

"Best Bet" Award

With this issue, *Woodworker's Journal* introduces our **Best Bet Award**. This selection indicates a tool that our writers feel has the best bet of satisfying our readers' demanding quality expectations.



a taller portion like the other test saws do. You'll need to add wood facings for cutting wide crown or base molding. The fence is drilled with mounting holes to make this modification simple.

Ryobi includes two extension wings that provide a whopping 42½" of bearing support. An adjustable stop fits on the extensions for setting up repetitive cuts. There's also a hold-down clamp to secure workpieces against the fence.

During the cutting tests, this saw sliced through tough Southern yellow pine and hard maple with the best of them, although the dust port clogged up in a hurry. Removing the elbow and connecting the bag directly to the blade guard helped. This saw shares

the same Exactline laser as the RIDGID saw, and it didn't line up correctly with the blade.

If you're planning to build decks as a side business or if you have a machinist's need for absolute precision, this saw probably isn't the right choice. However, for light-duty woodworking, the TS1551 is up to task for a thrifty price.

When the Dust Cleared ...

At the end of a long week of testing, the saw that "wowed" me most was Craftsman's 21235 Professional. Delta and Hitachi definitely have strong contenders in this test with dead-on laser guides, and Ridgid's MS1250 LZ is also feature-packed. Choosing the "best" saw wasn't easy. But Craftsman still has a leg up on the competition with dual-bevel convenience and a boatload of extras. It seems an excellent value to me, and it deserves to win the *"Woodworker's Journal Best Bet"* award in this test.

Chris Marshall is a *Woodworker's Journal* contributing editor.

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Testing 10" All-purpose Saw Blades

By Sandor Nagyszalanczy



With all the dozens and dozens of parts that bolt together to form a table saw — the motor, trunnions, arbor & pulleys, table, rip fence rails, blade guard, etc. — a single part can make or break the saw's entire cutting performance: the saw blade.

for cleanly cutting specific materials, such as laminates, plastics, etc. (See the *sidebar* at lower right). However, most woodworkers I know leave a single “all-purpose” blade on their 10" table saws (or radial arm saw) practically all the time. This may be due to budget constraint, lack of knowledge or just plain laziness.

But the most compelling reason is that most of us are simply satisfied with the cutting performance of our jack-of-all-trades saw blade most of the time. This would account for their

great popularity: Every single saw blade manufacturer produces a 10" all-purpose blade in at least two styles: general purpose (GP) blades, which typically have 40 evenly-spaced teeth, and combination (combo) blades, which most often sport 50 teeth, arranged in 10 five-tooth groups around the rim (See *box*, facing page). One manufacturer (Porter-Cable) makes a third style of blade called a “finisher” with an unusual variable-spaced tooth pattern (See top blade in *photo* at right).

The big question is, of all the all-purpose blades in all the world, which one performs all those

different cuts in all those different materials the best all the time? My mission in this article is to go all-out to answer precisely that question. Therefore, I've set about reviewing 28 different 10" GP and combo saw blades representing 16 different manufacturers' brands: Amana, Bosch, CMT, DeWalt, DML, Everlast, Forrest, Freud, Infinity, Irwin, Milwaukee, Oldham, Porter-Cable, RIDGID, SystiMatic and Vermont American. These 18 standard-kerf and 10 thin-kerf blades were manufactured in a variety of countries: the U.S., New Zealand, the Czech Republic, England and Italy, to name a few.

In order to assess the performance and quality of these blades, I spent a couple of weeks running them on two different table saws, taking literally hundreds of cuts with each one. In order to compare the blades fairly, I came up with a comprehensive series of measurements, cutting tests and quality-of-use observations that generated numerical scores (shown in the *charts* on pages 70 and 72).

Carbide-tooth blades have become the standard for both professional and amateur woodworkers, primarily because they can cut (seemingly) miles of lumber and plywood between sharpenings. The durability and edge retention of carbide teeth is especially great for cutting abrasive manufactured sheet stock, like Masonite®, MDF, etc., which quickly dull the teeth of even the highest quality all-steel saw blade.

There are plenty of specialized saw blades designed to deliver terrific performance for specific kinds of cuts (rips, crosscuts) or



Three saw blades, showing general purpose, combination and variable tooth designs.

I then used these scores to pick out the best standard- and thin-kerf blades. (If you're wondering if standard-kerf or thin-kerf is better for you, check out the *sidebar* on page 74.)

Carbide Teeth

The quality of a blade's carbide teeth is essential not only for good cutting performance, but for impact resistance (so teeth don't chip or break when you hit a knot), edge retention, and corrosion resistance as well. Carbide teeth are made from a mixture of tungsten carbide and other alloys and additives, including titanium, chromium, vanadium and boron. The carbide alloy used in casting all-purpose blade teeth, such as C3, C4, Dyanite, Ti-Co, etc., is formulated to strike a compromise between hardness and fracture resistance, to make teeth both durable and wear-resistant. Better quality teeth are composed of submicron-size carbide grains (often called "micro-grain" carbide), which may range in size from .8 microns down to .4 microns (Freud's new "super density" carbide), depending on the blade model and brand. The smaller the grains, the longer the tooth's cutting edge retains its sharpness,



Closeup of saw blade teeth on two identical model (Forrest Woodworker II thin-kerf) blades: tooth on right is brand-new; tooth on left is chipped and dull.

because smaller particles end up with smaller voids between them as a tooth's edge wears down from use, as shown in the *photo* above. Inexpensive "use and throw away" blades almost always have physically smaller carbide teeth than expensive blades whose larger teeth can be resharpened many times. Compare the orange CMT blade's teeth in the *photo* on previous page with the teeth on the Irwin 40T General Purpose blade to its left.

Carbide teeth are brazed to the blade plate either with a silver braze alloy or a layer of silver alloy on either side of a copper core. The latter is supposed to be better because the ductility of the copper helps absorb shock the teeth may encounter during use. The blade's

General purpose or combo ?

Why do saw blade makers produce two different styles of all-purpose blades? The design of each style of blade, they say, is biased towards being better at one range of cuts than the other. General purpose blades have less teeth that cut faster, but leave a less smoothly cut surface. Combination blades have more teeth, for better crosscutting and smoother cuts in sheetgoods. So, all other factors being equal, convention says that general purpose blades are a little better for ripping, and combination blades are preferable for cross-cuts. Does this advice bear up to testing? Read the testing section of the main article to find out.

rim is sandblasted (or ground) to clean up the brazes. Teeth are then ground to final shape and sharpness, often by sophisticated, automated machinery, as shown in the top left *photo* on the next page. The fineness of the sharpening grind can vary considerably, depending on the quality of the saw blade (some blades don't even have a grind on all tooth surfaces). Examined with a 10X hand lens, better blades have teeth with a smoother, more polished-looking surface finish.

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Purpose-specific blades

Even the best quality "do-everything" blade is a compromise of ripping, crosscutting and sheet goods cutting performance. When a job requires the very best, it's time to remove that general purpose or combination style blade and fit one made specifically for the job at hand. For quickly ripping lumber to width, choose a 10" rip blade with either 24 teeth (for a fast, but somewhat rough, cut) or, for a cleanly cut edge ready for glue-up, choose a 30-tooth "glue line" rip blade. When cutting parts to length, a 60-, 80- or 90-tooth, 10" cutoff or "fine finish" crosscut blade will leave cut ends so clean that they'll need very little or no sanding. For chip- and splinter-free cuts in melamine, MDF, plywood and similar sheet goods, choose an 80-tooth laminate blade. There are also specialty blades designed just for specific materials, including plastics, solid-surface materials (like Avonite) and nonferrous metals.



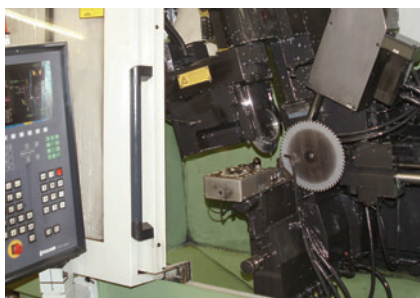
Specialized saw blades excel at the task they're designed for. Clockwise from upper left: DeWalt rip blade; Freud glue-line rip, DeWalt plastics, Freud plywood and melamine. RIDGID "polished finish" cutoff blade in center.

Tooth Style and Geometry

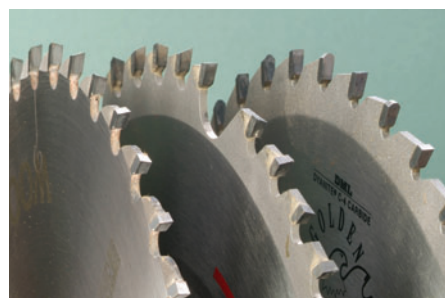
The shape and configuration of an all-purpose blade's teeth is a real balancing act: The same tooth geometry that's best for cutting with the grain is very different from what's ideal for cutting across the grain. All-purpose blades employ several different tooth configurations. Most GP-style blades have evenly spaced alternating top bevel (ATB) teeth (see *photo* at upper right), with the top bevel angles alternately slanting left and right. The steeper the bevel angle, the cleaner the tooth will cut. Combo-style blades typically use an ATB + R (raker tooth) design with teeth arranged in groups of five separated by deep, chip-clearing gullets around the rim: one flat-topped raker tooth (the CMT 216.050.010 has a triple-chip-grind tooth), followed by four ATB teeth, an arrangement well-suited for both crosscuts and rips. There are two other tooth configurations used on blades in this test group: the DML Golden Eagle™ and Everlast Magnum blades use a triple-chip grind (TCG) that alternates trapezoidally shaped teeth with flat-topped raker teeth, a configuration more commonly seen on blades designed specifically for cutting melamine and laminates. The Porter-Cable Razor™ saw blade's "variable tooth" configuration combines series of fast-cutting and smooth-cutting ATB teeth in an asymmetrical spacing that the manufacturer claims disrupts harmonics, so the blade produces less noise.

Regardless of configuration, the rake or hook angle of a blade's teeth affects how easily

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A CNC saw blade sharpening machine at the DeWalt saw blade factory in Maltby, England.



Three different saw tooth configurations (left to right): ATB, ATB and raker, and TCG.

Saw Blade Test Results Chart									
See page 80 for test grading									
Make and 10" Blade Model	Crosscut softwood	Crosscut hardwood	Rip softwood/hardwood	Plywood	Melamine	Blade feel	Subtotal	Price/Value**	TOTAL POINTS
Amana "Prestige" line PR1040	G	G	G	E	E	G	20	G	23
Bosch PRO1040GP	G	G	G	G	P	G	16	G	19
Bosch PRO1050COMB	G	G	F	E	P	G	16	G	19
CMT 213.040.10	E	G	G	G	F	G	18	F	20
CMT 214.040.10	G	G	E	E	G	G	20	F	22
CMT 216.050.10	F	E	G	E	G	F	18	F	20
CMT 251.042.10	F	F	G	E	G	F	16	G	19
DeWalt DW7657	F	F	F	G	F	E	15	G	18
DeWalt DW7640	G	G	G	E	E	E	21	G	24
DML Golden Eagle 74014	G	G	F	E	G	E	19	G	22
Everlast Magnum 1040M	G	E	F	G	G	G	18	E	22
Forrest Woodworker II	E	E	E	E	F	E	22	P	22
Forrest Woodworker II "Thin Kerf"	G	E	E	E	F	E	21	P	22
Freud Premier Series F410	E	G	G	E	E	E	22	P	23
Freud LU83R010	G	G	G	G	P	G	16	G	19
Freud Diablo D1040X	G	G	G	G	G	G	18	E	22
Infinity Super General Purpose 010-040	E	G	F	F	G	E	18	F	20
Infinity Combo-Max 010-050	G	G	G	G	G	E	19	F	21
Irwin Marathon 14070	F	G	P	E	P	G	14	E	18
Irwin Marathon 14133	F	F	F	F	P	F	11	E	15
Milwaukee 48-40-4162	G	P	P	G	F	G	13	E	17
Oldham "Signature" 100740T	G	E	G	E	F	G	19	G	22
Porter-Cable Razor 100VT50	F	F	G	G	G	G	16	E	20
Porter-Cable Riptide 12911	G	P	P	E	F	G	14	E	18
RIDGID R1050C	G	E	G	G	G	G	19	E	23
SystiMatic "Budke Blade" 37104	G	F	G	G	G	E	18	G	21
SystiMatic 51821	F	P	P	P	P	P	11	G	15
Vermont American 27256	P	P	F	F	F	G	11	G	14

** For this column; up to \$40 = E, \$41-\$60 = G, \$61-\$80 = F, \$80 and over = P

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Saw Blade Test Results Chart

Dark yellow = Thin-kerf Blade		Blue text = Combination Blade								
Make and 10-inch blade model	Street Price	Style*	Teeth	Tooth Geometry^	Hook	Kerf Size^^	Plate Thickness	Coating	Blade Runout	Noise**
Amana "Prestige" line PR1040	\$49	GP	40	ATB	18°	STND .134"	.102"	No	.002"	88
Bosch PRO1040GP	\$50	GP	40	ATB	15°	STND .129"@	.087"@	Clear anti-friction coating	.004"	89
Bosch PRO105COMB	\$59	COM	50	4 ATB+ 1R	10°	STND .127"@	.087"@	Clear anti-friction coating	.003"	91
CMT 213.040.10	\$63	GP	40	ATB	18°	STND .130"	.098"	Teflon®	.002"	89
CMT 214.040.10	\$70	GP	40	ATB	18°	THIN .108"@	.080"@	Teflon	.002"	91
CMT 216.050.10	\$70	COM	50	4 ATB+ 1 TCG	12°	THIN .098"@	.064"@	Teflon	.002"	92.5
CMT 251.042.10	\$46	GP	42	2 ATB+ 1R	15°	THIN .101"@	.072"@	No	.004"	88.5
DeWalt DW7657	\$50	GP	40	ATB	20°	STND .125"@	.098"@	No	.003"	88.5
DeWalt DW7640	\$53	COM	50	4 ATB+ 1R	15°	STND .120"@	.098"@	No	.003"	89.5
DML Golden Eagle 74014	\$60	GP	40	TCG	15°	STND .126"@	.086"@	No	.003"	93
Everlast Magnum 1040M	\$38	GP	40	TCG	12°	STND .125"	.085"	No	.002"	91
Forrest Woodworker II	\$96	GP	40	ATB	20°	STND .125"	.092"	No	.002"	91
Forrest Woodworker II "Thin Kerf"	\$81	GP	40	ATB	20°	THIN .094"	.076"	No	.002"	88
Freud Premier Series F410	\$85	GP	40	ATB	18°	STND .126"	.098"	No	.002"	89
Freud LU83R010	\$45	COM	50	4 ATB +1R	10°	THIN .091"	.071"	PermaShield™	.004"	87
Freud Diablo D1040X	\$32	GP	40	ATB	15°	THIN .098"	.071"	PermaShield™	.005"	88
Infinity Super General Purpose 010-040	\$72	GP	40	ATB	18°	STND .125"	.087"	Nickel	.003"	90
Infinity Combo-Max 010-050	\$67	COM	50	4 ATB +1R	12°	STND .125"	.087"	Nickel	.002"	91
Irwin Marathon 14070	\$30	GP	40	ATB	20°	THIN .095"	.063"@	No	.003"	89.5
Irwin Marathon 14133	\$20	GP/Deck	40	ATB	20°	THIN .095"	.063"@	"Super Slick"	.005"	88
Milwaukee 48-40-4162	\$36	GP	40	ATB	12°	STND .122"	.071"	No	.004"	92
Oldham-Black & Decker "Signature" 100740T	\$44	GP	40	ATB	12°	STND .130"	.090"	No	.004"	90.5
Porter-Cable Razor 100VT50	\$30	Finisher	50	Variable ATB	12°	THIN .104"	.075"@	No	.004"	87
Porter-Cable Riptide 12911	\$40	GP	40	ATB	13°	STND .123"@	.072"@	No	.002"	92
RIDGID R1050C	\$40	COM	50	4ATB+ 1R	15°	THIN .098"	.071"	T3 Titanium	.002"	.89
SystiMatic "Budke blade" 37104	\$51	COM	40	4 ATB+ 1R	15°	STND .131"	.085"	No	.002"	91
SystiMatic 51821	\$57	GP	40	ATB	15°	STND .125"	.090"	No	.001"	88
Vermont American 27256	\$48	GP	40	ATB	12°	STND .121"	.082"	Clear anti-friction coating	.004"	90

* GP = General Purpose; COM = Combination ^ ATB = Alternating top bevel; R = raker tooth; TCG = Triple chip grind

^^ Measurements are not meant to be absolute, but to provide a relative comparison. @ Author measured, not manufacturer specification

** Author measured at 24" from a spinning (but not cutting) blade

the blade cuts, as well as how long it will stay sharp. The higher the hook angle, the easier the teeth cut. But high-hook-angle teeth (20° plus) tend to cut a little rougher and lose their sharpness more quickly. Lower-hook-angle teeth cut smoother, but less aggressively.

The Blade Plate

A saw blade's teeth may do the actual cutting, but it's the job of the blade plate to keep those teeth straight and cutting true. While a few inexpensive blades are punched out of soft sheet steel, the great majority are laser-cut from high

quality steel plate material and tempered, to harden the plate and make it resistant to heat and twisting and deflection during heavy cutting (like ripping 8/4 maple planks). Quality blade plates

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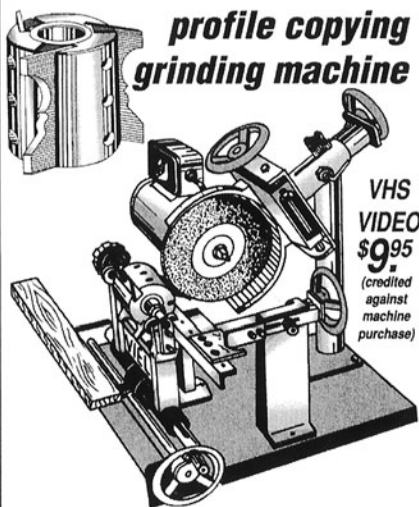
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are surface ground for consistent flatness and balance, and the finer the grind marks, the better the blade quality is likely to be. Most blade plates are tensioned after the teeth have been brazed in place, a process that pre-stresses the plate to further reduce the likelihood of distortion during heavy use. While some high-end blades, such as Forrest, are individually hand tensioned, the majority are roller tensioned by machine, as revealed by the telltale ring pressed into the plate halfway between the rim and arbor hole.

Blade plates vary greatly in thickness, but are usually proportional to kerf size — the thicker the teeth, the heavier the plate. Generally, thicker blade plates resist deflection better than thinner plates, and have mass that can help to dampen shocks that occur when cutting stock with knots or sections of dense grain.

Expansion Slots & Coatings

A series of narrow cuts, called expansion slots, spaced around the rim of the blade plate help keep it flat — and the teeth cutting true — as a saw blade heats up normally and expands during use. As you can see in the *photo* above, different blades have different slot shapes, but most are specifically designed to reduce saw blade noise (one



A montage of the different styles of expansion slots and anti-vibration cutouts in plates.

manufacturer told me that the ultra-narrow expansion slots in their thin-kerf blades help reduce blade noise by keeping it from ringing, like a crack in a bell). Additional squiggly-shaped lines laser-cut into some blade plates are designed to help reduce plate vibration, as well as noise produced during cutting. Less vibration in the plate is reputed to keep teeth running steadier, and thus cutting more smoothly.

Some blade plates are finished with a slick coating, such as Teflon®, or plated with nickel (Infinity blades) or titanium-nitride (RIDGID blades), to reduce friction during cutting, and reduce gum buildup and prevent corrosion. Blade coatings can also reduce heat absorption, which is especially useful for keeping thin-kerf blades flat and true (six out of 10 thin-kerf blades in this test are coated or plated).

Testing the Blades

I started my evaluation of the 28 saw blades in the test group by carefully examining each blade, checking for chipped or broken teeth or other damage that may have occurred in shipping. All of the blades looked hardware store-fresh and ready to run. Then, before using the blades, I checked each for flatness and ran them on the table saw to

measure noise output level. Next, I performed an extensive series of cutting tests to check the cutting performance of each blade. I also evaluated each blade's performance "feel" and did a final test to check how easily each blade cut. I did all the test cutting on my trusty Powermatic 66 cabinet saw, a sturdy machine with a very true-running arbor and a powerful 5 HP motor. My goal was to bring out the best possible performance in each blade, to see what it was capable of. Before I began testing, I checked all the table saw's settings and confirmed that the miter gauge and rip fence were properly adjusted.

Checking Blade Flatness

In order for a blade's teeth to cut smoothly, without leaving scoring marks on the adjacent sides of the

continues on page 78 ...

Standard vs. thin-kerf blades

Tired of having your benchtop table saw or economy contractor's saw bog down every time you take a demanding cut? Switching to a thin-kerf blade is a bolt-on solution that can up your cutting performance significantly. The reason is simple: It takes a saw's motor less energy to remove a narrow strip of wood than a thicker one — and it's less energy for you to push stock through the cut. An underpowered saw fitted with a thin-kerf blade can cut thicker, denser stock, and/or cut at a higher feed rate, without bogging down. There's more good news: Since you lose less material with each cut, you'll get more useable cut pieces when ripping many narrow strips from a wide board, say, 1/2" slats for a tambour door. Thin-kerf blades also generate less sawdust, making less waste to have to collect and dispose of. On the downside, even the best thin-kerf blade's plate can only take so much heat buildup, so never push such blades too hard. In fact, veteran woodworkers advise saving thin-kerf blades for cuts in high quality, relatively defect-free stock that's not prone to warping or twisting when cut. You can make a thin-kerf blade more resistant to deflection by mounting a pair of stiffeners or stabilizers on either side of it on the blade arbor.



Fitting stabilizing washers on either side of a thin-kerf blade can help reduce deflection during heavier cutting.

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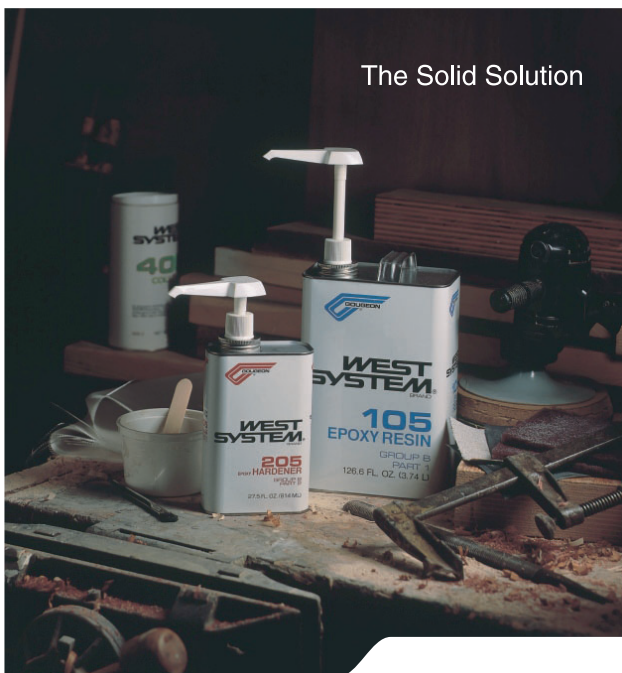


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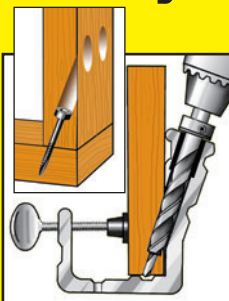
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cut, the blade plate should be as close to dead flat as possible (saw teeth are ground and sharpened in reference to the plate). I checked the flatness of each blade by measuring the runout (plate wobble) using a high quality dial indicator. With the blade mounted on the unplugged saw's arbor, I positioned the dial indicator's plunger lightly against the ground surface of the blade plate near the outer rim, as shown in the *photo* below. I then slowly rotated each blade by hand, recording the amount of deviation from flatness (see the *chart*, *page 72*). Just to make sure that any irregularity in the table saw's arbor wasn't skewing the numbers, I rotated each blade 90° on the arbor and



The author measured runout of the test saw blade plates with a dial indicator.

remeasured. While most blades showed acceptably small amounts of runout, ranging from .001" to .005", the two Bosch saw blades showed unacceptable .009" for the GP and .011" for the combo. Bosch sent me a second set of blades that tested much better (see the *chart*, *page 72*).

Noise Level

After reading advertisements about how the shape of an expansion slot can reduce a blade's noise level, I was curious to see how the blades in the test group compared. I ran

"Like dogs and people, each saw blade has a personality; a set of unquantifiable qualities of what it feels like when you take a cut with it, and how it responds in a variety of different situations."

each blade in the table saw (raised to maximum height) while measuring its noise output using a sound level meter (*photo*, right). The noise level readings I recorded, (see *chart*, *page 72*), showed an overall difference of only 6 DbA between the loudest and quietest blades. This may sound like a lot, but it's a relatively small difference, considering that human hearing is only able to detect noise level differences of three decibels and greater. Personally, I found that the high-pitched "whistling" produced by most of the combo blades (due to the deep gullets between sets of teeth) bothered me more than the 93DbA of the DML Golden Eagle, the loudest blade measured.

Obviously, any saw blade makes a lot more noise when it's cutting wood. Besides blade noise, several factors contribute to a table saw's total noise output. These include noise produced by the saw itself, the sound of the running saw reflecting off the walls, and the feed rate, thickness and density of the workpiece. Because of all these variables, I didn't even try to take measurements while cutting, nor did I factor in blade noise as part of each blade's overall test score.

Cutting Tests

The real meat and potatoes part of the saw blade evaluation was to see the quality of the cuts the blades produced in a wide assortment of common woodworking materials. I cut seven different materials, generating a small "test strip" which I used to grade each blade's performance.

First, using a miter gauge, I crosscut strips from both a length of 2" x 3" fir construction lumber and from a 10" x 1 1/4" plank of squirrely-grained red birch (highly prone to fuzzing and splintering). Next, I ripped strips from several soft and hardwoods: 3/4" #2 pine, 13/16" thick mahogany and hard rock maple (which is prone to burning). Finally, using the rip fence as a guide, I cut three different sheet goods: 3/4" white melamine, 3/4" mahogany plywood, (cutting across the ply's splinter-prone face grain) and 1/2" MDF. I guided the crosscuts using a high quality Woodhaven miter gauge fitted with an extension fence, for



To explore advertisers' claims about noise reduction, the author used acoustic foam panels to set up a three-sided baffle and then used a sound level meter to compare the noise output of the various saw blades.

continues on page 78 ...

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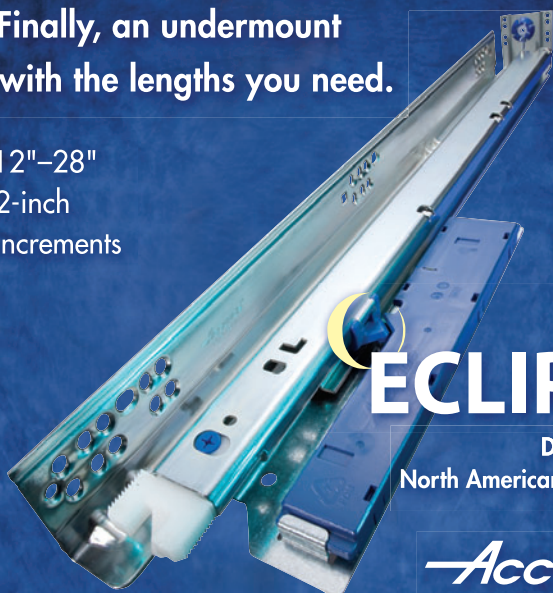


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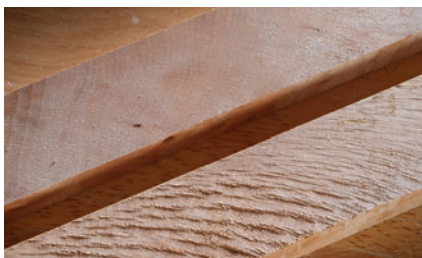
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Cutting test: crosscutting red birch plank using Woodhaven's miter gauge, with the cut test strips in the foreground and background.



Cutting test: sawing test cut strips from melamine panels using table saw rip fence.



Two red birch test cut strips; front one rated a "Poor" and the rear strip rated "Excellent."



Two melamine test cut strips, with their bottom cut edges facing each other. The lower strip rated "Poor," the upper strip "Excellent."



Four mahogany plywood test cut strips, showing the lower edge of cut (arrows indicate test edges). They are rated, left to right: "Poor," "Fair," "Good" and "Excellent."

Test Cuts Tell the Story

better support close to the blade, (see *photo* at left). For rips and sheet goods, I ran boards and panels along the Powermatic's slick plastic-faced T-square type rip fence.

I carefully numbered each test strip, to positively identify the blade that cut it.

Grading the Test Cut Strips

After sorting the test strips into groups organized by type of material, I carefully examined and compared the cut surfaces and edges of the strips in each group. I looked for surface scratches, scorching and grain tear, as well as for splintering and tearout on the cut edges. I then sorted each group of strips into four grades: The best quality cuts received an "Excellent" grade, and above-average cuts got a grade of "Good." Slightly below-average were graded "Fair," and the poorest-cut-quality strips received a "Poor" grade. The final grades are shown in the *chart* on page 70.

Some of the test strips revealed dramatic differences between the best-cutting and worst-cutting saw blades. For example, look at the two birch crosscut strips at left (3rd *photo*). The top strip, cut by the RIDGID thin-kerf blade, shows a very smooth surface with hardly any scoring or tearout, while the Milwaukee "Endurance" blade's cut strip (bottom) shows deep scoring and bottom edge tearout that earned it a poor grade.

Differences between melamine test strips were also quite dramatic, showing a considerable difference between the poor-grade strips with lots of tearout on their bottom edges and the practically defect-free excellent-grade strips (4th *photo*). It's important to mention that I cut all the test strips with the standard throat plate installed in the table saw. But better results could be achieved — especially with melamine — by fitting the saw with a zero-clearance

throat plate (highly impractical for this test, given the range of kerf widths of the 28 blades). Variations in cut quality were more subtle between some groups of test strips. For example, the difference between good and excellent plywood cuts was very, very close, as you can see in the bottom *photo* at left. I'd say the majority of woodworkers would find even the strips that received a fair grade in this category acceptable. The quality of rip cuts was very uniform between the softwoods and hardwoods, so I decided to give only a single grade for rip cutting, and list it in a single column of the chart. The best blades created ripped surfaces so smooth that they showed nearly no tooth scoring marks, and even the good-graded blades produced surfaces clean enough to be ready for glue-up without further jointing or planing.

Assessing "Blade Feel"

Besides generating enough test strips to kindle woodstove fires for an entire winter, the cutting tests also generated pages of notes, containing my observations about the performance characteristics of each blade. Like dogs and people, each saw blade has a personality: a set of unquantifiable qualities of what it feels like when you take a cut with it, and how it responds in a variety of different situations. Did the blade cut smoothly and solidly, or did it vibrate or pulsate during cutting? Did the blade cut stock easily, or did it require unduly heavy feed pressure? Based on my notes, I assigned each blade a grade for "feel of use," ranging from poor (I wouldn't want to use it again) to excellent (I'd choose this blade for my most important projects).

But before adding the "feel of use" grades to the chart, I decided to double-check my perceptions of feed pressure by doing a final test to see how blades I observed as

continues on page 80 ...



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The author compared feed pressures of various blades by cutting 3/4" MDF panel, using a power-feed set up on a Bosch portable table saw and an ammeter to measure the amperage draw from the saw.

being “easy cutting” measured up to blades I thought required heavier feed pressure. I devised the following test: I temporarily mounted a small power feeder to a benchtop table saw (see *photo* above) and used it to feed a panel past the saw blade. I used a 3/4" thick MDF panel for the test, so the density of the material would stay the same for each cut. An electrical ammeter measured the actual amount of amperage drawn by the table saw's motor as the cut was being taken. The point is that the saw's motor draws less current (lower amps) when the saw blade cuts easily (requires less feed pressure to make the cut), and vice versa. By keeping the rate of feed constant with the power feeder, I reasoned that I could justly compare the amperage drawn by various saw blades cutting the same material at the same rate.

First, I checked the amperage draw by thin-kerf versus standard-kerf saw blades — a test I figured would be a slam-dunk, given that thin-kerf blades remove less material during cutting. Sure enough, the ammeter showed significant differences. For example, the current draw of the thin-kerf (.098 in.) RIDGID R1050C ranged between 7 and 8.3 amps, while the standard kerf (.125 in.) Everlast Magnum blade drew between 9.7 and 10.1 amps while cutting the MDF panel. But I quickly determined that kerf width

is only one factor affecting how easily a blade cuts. The Amana Prestige blade (which I had observed cut easily) also registered a lower amperage draw than the Everlast Magnum, even though the Amana's kerf is nine-thousandths of an inch wider.

Next, I tested a couple of the blades that my test notes recorded as demonstrating notably light or heavy cutting effort. Sure enough, the ammeter readings substantiated most of my subjective observations. To be honest, a few measurements were just too close to call (not too surprising, since the test wasn't performed under laboratory conditions).

What the Tests Didn't Show

Once all my tests were complete, I tried to do a little statistical analysis, to see if I could correlate my measurements, observations and the grades generated by the tests to particular design characteristics of saw blades in the test group. Ideally, this could provide some insights about which blade styles and tooth configurations were best for which particular kinds of cuts and materials. For example, you'll recall that conventional wisdom says that general purpose blades should do a better job of ripping, and combination blades handle crosscuts and sheetgoods better than GP blades do. Also, blades with teeth set to a higher hook angle are supposed to require less feed pressure.

Alas, my test results just didn't support this convention. The average ripping performance of GP blades was very similar to what combo blades could do. In fact, on average, combo blades did a slightly worse job crosscutting softwoods and cutting MDF or melamine than GP blades did. And, based on my feed-pressure tests, I found that there are blades with identical hook angles that have significantly different feed pressure requirements.

Here's another interesting inconsistency: Although less runout in a blade plate is a good thing, lower runout isn't necessarily a good measure of cutting performance: The SystiMatic 51821 produced the lowest runout reading of any blade I checked (.001"), yet its performance was quite poor. Its cutting action felt grabby and rough, and it received a poor grade in four out of five cutting tests. In contrast, the Freud Diablo measured significantly higher runout (.005"), yet it cut quite smoothly and evenly, and received a good grade in all five cutting tests.

Ultimately, these inconsistencies should serve as a reminder that, just like a sports car's performance isn't defined by the size of its engine or width of its tires, a saw blade's performance reflects a complex interaction of all its attributes — design, features, and manufacturing quality.

Test Grades and Winners

Well, by now you may have already picked out a saw blade you think is best, based purely on the results of the various cutting tests and evaluations. If you add up just the cutting test and “feel” grades on the chart for each blade, assigning points to the grades (Excellent = 4, Good = 3, Fair = 2, Poor = 1 point), you'll find three blades at the top of the heap: The Forrest Woodworker II and the Freud F410 are tied for

WINNERS: The standard-kerf DeWalt 7640 and the thin-kerf RIDGID R1050C blades both receive *Woodworker's Journal's* "Best Bet" award. Both of these blades deliver impressive overall performance and value.



best-performing standard-kerf blade (22 points each), while Forrest's thin-kerf blade takes the performance title for thin-kerf blades (21 points). All three of these blades are awesome performers, with the top-scoring standard Woodworker II earning an "Excellent" grade in five out of six tests! None of these are what you'd call "economy" blades, ranging in purchase price from \$81 to \$96 dollars. But if you're after ultimate cutting performance on your table saw, you simply can't go wrong with any blade from this trio.

But if you don't have a fat wallet, you're probably wondering which of these blades offers the best value — performance relative to price. To find out, I gave each blade a grade

based on its selling or "street" price (the lowest I could find). Saw blades selling for less than \$40 received four points (excellent value); \$41-\$60 blades got three points (good value); \$61-\$80 blades got two points (fair price), and blades that sold for \$81 and more got only a single point, due to their high prices.

Adding the value scores to the previous point subtotals reveals two combination style blades as the winners: The standard-kerf DeWalt 7640 and the thin-kerf RIDGID R1050C blades both receive *Woodworker's Journal's* "Best Bet" title. Both of these blades deliver impressive overall performance that's a slim notch below the top-notch Freud and Forrest blades at

amazingly affordable prices.

Do these results mean that the few blades I've singled out are the only ones worthy of your purchase dollars? Far from it. I believe any of the 16 blades that scored a final total of 20 points or more deserves your consideration. Several of these blades, including the Infinity Combo Max and Freud Diablo, scored well in all five cutting tests, and are incredibly consistent performers that, mounted on a well-tuned table saw, are likely to make slick cuts that'll put a smile on your face.



Sandor Nagyszalanczy is a writer whose book: The Complete Illustrated Guide to Jigs & Fixtures, is available from Taunton.



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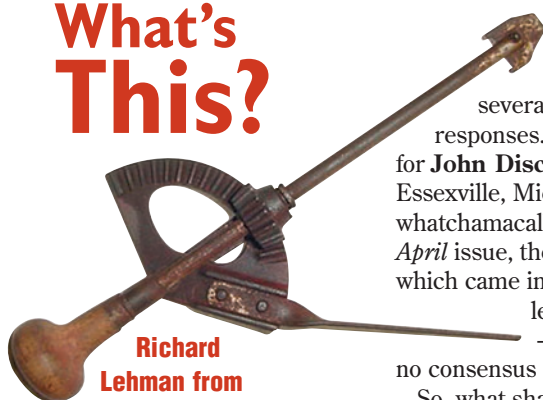
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Still Stumped On This One ...

What's This?



Richard Lehman from Upper Lake, California sent in the tool above. It moves back and forth with pushes on the handle, and he thinks it's possible to change the tip — but he **doesn't know what it is**. Do you? Send in your answer for a chance to win a prize!

If you have your own woodworking mystery tool (or the answer to this issue's entry), send it to Stumpers, c/o Woodworker's Journal, P.O. Box 261, Medina, Minnesota 55340. Or send us an e-mail: stumpers@woodworkersjournal.com

Everybody's Stumped

Usually, in this space we would be revealing the answer to the mystery tool that appeared a couple of issues ago, choosing from several hundred responses. Usually. But for **John Discher** of Essexville, Michigan's whatchamacallit from the *April* issue, the answers which came in numbered less than 30 — with really no consensus among them.

So, what shall we do now? Forge gamely onward, of course. Below, you'll find a sampling of some of the answers we did get to Mr. Discher's tool, although we're not satisfied that any of them are the definitive right answer.

If you can provide proof that you have that elusive, definitive answer, the first one who sends it in will win an extra prize.

And, of course, don't forget to take a look at Richard Lehman's new mystery tool, shown at left.

*Joanna Werch Takes
Woodworker's Journal*

Answers: Right or Wrong?

What did we hear about John's tool? **Marc Padilla** of North Bend, Ohio, thought it looked "like an old lead pipe cutter," while **Stan Clapp** of Grand Rapids, Michigan, guessed "rope cutter" and **Steve Porter** of Paris, Illinois, said "barbed wire stretcher vise."

**What is it?
No one seems
to know ...**

Why aren't we jumping on these answers? Maybe because of comments like **Terry L. Murphy's** from El Cajon, California, who wrote, "It looks like an adjustable, locking metal clamp I believe I've seen around welding shops." But wait! Terry wrote again: "At a second glance, I noticed what could be cutting or knurling wheels, making it either a tubing cutter or a knurling device. Even at my age (64), with all my exposure to tools, I still cannot identify the tool with any degree of certainty."

That statement seems very appropriate for this *Stumper*.

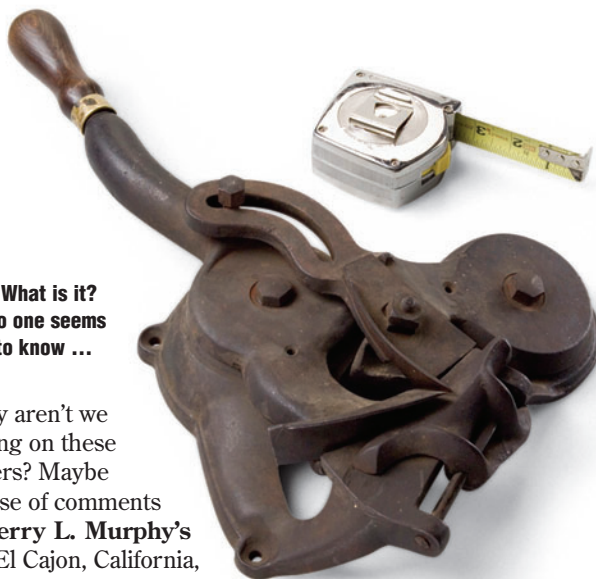
We did receive what seemed to be very reasonable explanations for how it works — except that they weren't the same explanation. According to **Walter Hardy Jr.** of Tinley Park, Illinois, it's used as a cutter for dowels or trim, with the tool mounted and secured upright with bolts. When pressed down, "the wood would be firmly secured in the tool, and the blade cuts

across, and you'll have a clean crosscut." He also added, "It appears to have an adjustment for tension by means of a spring or coil so the handle goes back in the original starting position."

But, **Olaf Trytten** of Redmond, Washington, says the tool is "a thread cutter for screws of the sort commonly found on wooden clamps and vises. The single cutting edge stemming from the handle starts the cut. The canted following edges between the cutting edges regulate the feed rate. The V-shaped cutting edge wastes the valley of the thread. The whole two halves of the tool articulate at the elbows for variable stock diameter."

Is Olaf right? Do you know? Send us your answer, for an "extra" chance to win a prize (don't worry, I'll come up with something good!)

— *Joanna Werch Takes*



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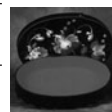
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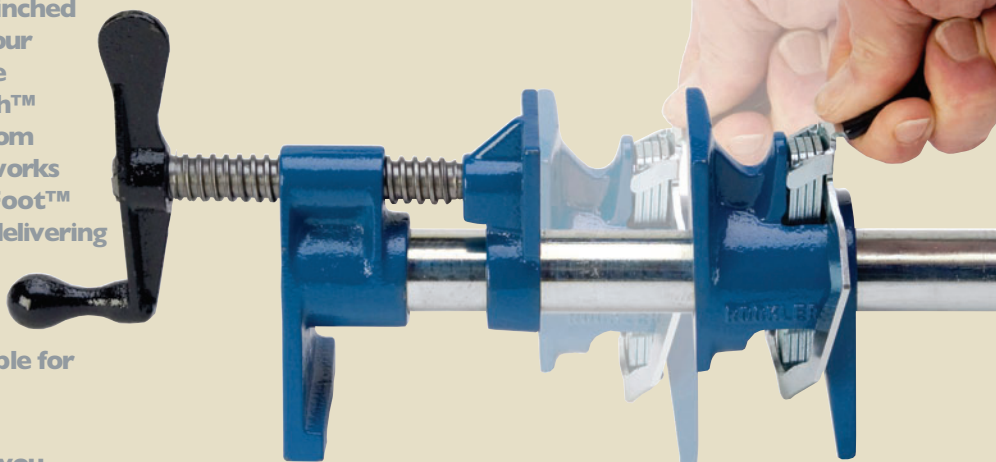
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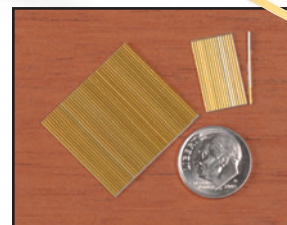
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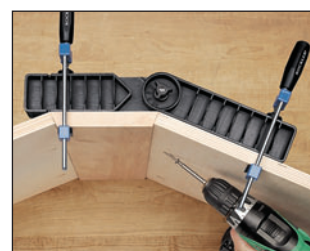


What also comes with the Octo 7300-01 is an assortment of 32 abrasives, designed to allow you to sand or remove finish in all those promised areas: inside corners, outside corners, convex areas, concave areas, spindles, slots and narrow areas. It sells for about \$40. For more information, call 877-754-5999 or visit [QUICK-LINK](#).

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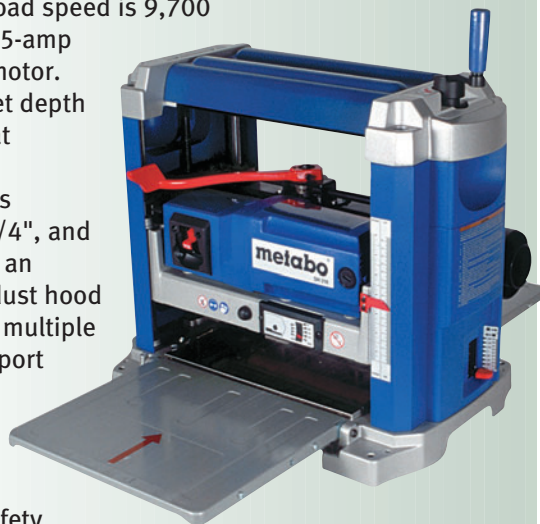
Dremel's Stylus™ rotary tool grinds, polishes, sands and buffs with a lithium-ion battery charge. Separate speed and on/off controls retain speed settings between uses. The Stylus comes with 25 accessories and retails for \$69.99. *For more info, call 800-437-3635 or visit*

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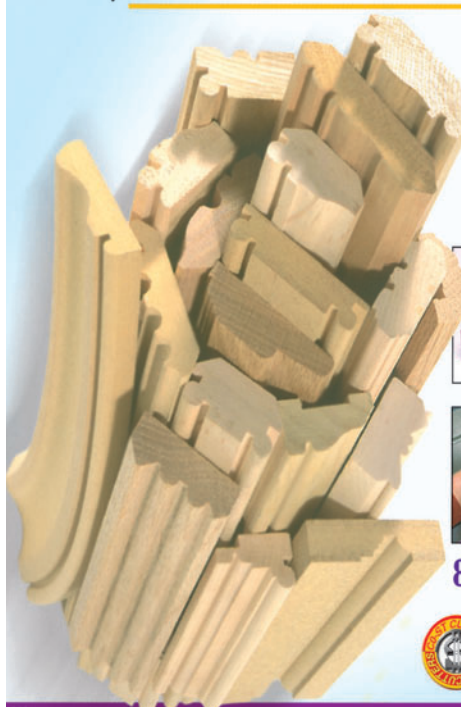
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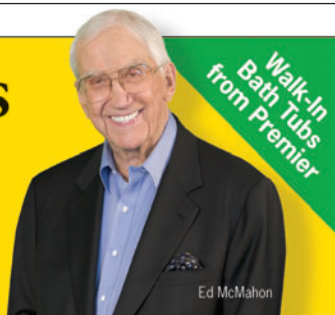


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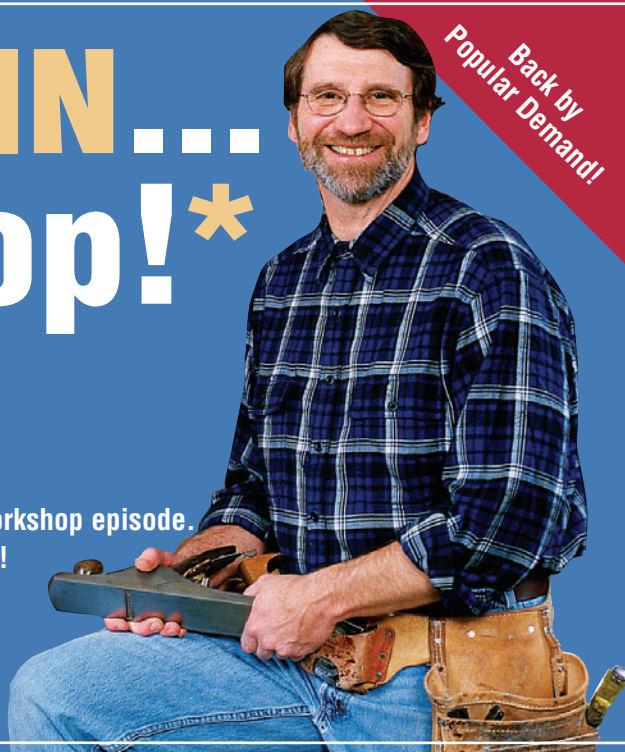
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By Michael Dresdner

ABOUT MICHAEL DRESDNER

Michael Dresdner is a nationally known finishing expert and the author of *The New Wood Finishing Book* by Taunton Press. When not writing about woodworking, he is an active community theater participant.



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with your question.

Q What is the basic difference between exterior and interior paint? The reason I am asking is that I have just painted some of my arbor in the backyard and, after I finished, I realized I had used an interior paint. This arbor is exposed to the weather.

— *Albert J. Sindlinger,*
Visalia, California

Michael's Advice: Paint consists of solvent, pigment and resin. It is the resin which acts as a binder to bond the pigment to the wood, and also provides the protective film. The resins used in exterior coatings are more flexible than those used for interior ones. That's because outdoor wood moves more, thanks to wider swings in temperature and humidity. In addition, exterior paints employ resins and pigments that are UV stable. Many interior resins will yellow or deteriorate in sunlight, while some interior pigments can chalk or break down if used outdoors.

The same is true of clear finishes. Exterior polyurethane, whether oil-based or waterbased, is typically made from aliphatic urethanes which have a vastly higher resistance to UV degradation than the harder aromatic

urethanes frequently used for interior polyurethane. Exterior finishes and paints may also contain mildewcide and fungicide to prevent the growth of mold and mildew. Clear coatings may contain ultraviolet blockers or absorbers as well, to lessen the impact of the sun on both the coating itself and the wood below.

You did not ask, but my guess is that you would also like some advice on whether you need to remove what is on there, or can simply cover it with something else to save it. If you used an exterior primer below the interior paint, you can go over the paint with a good exterior paint and should have no future problems. If, however, you did not use a primer (in which case, shame on you!) there is a good chance you will see peeling and delamination within a few years. Remove the finish either with a chemical stripper or by sanding, then use an exterior primer topped with exterior paint.



Our author introduces instant (well, almost) aging using a wire brush combined with some loosely mixed white and black paint.

Q What is the best formulation for chemically aging or pickling redwood? I know that fungus attacking redwood and turning the lignin gray is the process used by nature. I want to accelerate the process.

— *Andy Anderson,*
Saint Helena, California

Michael's Advice: Whoa, let's back up a bit. Woods left unfinished turn gray, but it is not because of any fungus. The graying is caused by simple oxidation of the wood surface. Any finish will block this process, so to have it happen, you need only leave the wood unfinished. Secondary to the oxidation is the effect sun has on wood left outdoors. Sunlight will often make wood appear more translucent, changing dull gray to a silver gray with a nice shimmer. Exposure to the elements will also make the surface rougher.

Short of putting wood in a hyperbaric chamber, I'm

afraid there is no practical way to speed up the oxygenation process so that it looks precisely like what nature does. Sad to say, the same is true of the translucent quality sun exposure imparts. That is not to say you cannot mimic the color or roughness with a variety of finishing tricks, but it is not so simple as flooding on a potion and walking away. Most chemical reactions that change the look of wood are slanted more toward adding color and making wood darker. One you mentioned,

pickling, is a good example. It is a traditional chemical stain that uses nitric acid to turn softwoods darker. While that may look aged to some, it does not look much like oxidized gray.

My favorite way to mimic grayed, weathered softwood is to first scrub with a wire brush along the grain to get a rough texture, then wash with driftwood color stain. I mix either oil-based or waterbased white and black pigments in their appropriate solvent, and stir lightly. Flood it on, wipe it off, and you will have a nice,

gray driftwood color that lodges unevenly in the brushed recesses. The poorly mixed stain will color some areas more white and some more black, giving the wood a taste of the varying grays that nature imparts.

Q I recently made a tray table for our den. My wife objects to the odor of solvent-based finishes, so I decided to use a waterbased varnish for the project. After reading the directions on the can, I used my best synthetic bristle brush to



WINNER! For simply sending in his question on interior vs. exterior paint, Al Sindlinger of Visalia, California wins an **Olympic Interior Wood Finishing Kit**. Each issue we toss new questions into a hat and draw a winner.

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A Short History of HVLP

By Michael Dresdner

If you bought a Kirby vacuum cleaner in the 1930s, chances are it came with a cute little red spray gun attachment. The cast Bakelite™ gizmo fit on the end of the hose and, when attached to the blow port, sprayed thin liquids. Though it was not called that at the time, this was one of the first HVLP guns sold in America, and other vacuum cleaner companies, such as Electrolux, followed suit with similar attachments.

Invented in the early 1900s, spray guns for finishing had become highly popular in furniture and guitar factories by the 1920s. Most U.S. systems used compressed air, and the idea of using the exhaust port of a turbine,

a major player in the field, showed off its benefits to SCAQMD, California's "South Coast Air Quality Management District," in the early 1980s. At the time, SCAQMD was seeking technologies to reduce the air quality problems in the Los Angeles basin, and HVLP fit right in.

It was SCAQMD that coined the term HVLP to describe guns that use a "high volume, low pressure" spraying format. The gentler spray minimized bounceback and overspray, reducing both solvent emissions and material consumption. That made it a technology favored by

both users and regulators.

Today, effective and portable turbine HVLP units are

wildly popular among woodworkers and finishers, and have even become the darlings of an oddly unrelated field: sunless tanning. Thanks to their low-impact delivery, HVLP guns are used to spray bare skin with

DHA (dihydroxyacetone), a compound that reacts chemically to create a tan without exposure to pesky UV rays. Perhaps that, even more than its woodworking credentials, is an indicator that HVLP has truly arrived.



Early HVLP spray gun or Buck Rogers' ray gun? Michael Dresdner fills this information vacuum.

which is essentially a vacuum cleaner motor, was not embraced stateside until the late 1970s.

Though already popular in Europe, its acceptance here expanded only when Apollo,

apply the finish. I was careful not to over brush each coat but could not avoid some very small bubbles. Is there a way to apply this finish without bubbles?

— Rusty Aurand
Vancouver, Washington



Chase away tiny bubbles with a commonly found defoamer — half and half. Just don't get your finish confused with your coffee.

Michael's Advice: Waterbased finishes contain two incompatible materials: water and resins that are not water soluble. To force the two to co-exist, formulators add surfactants, molecules that bond to the water on one end and the resin on the other. All surfactants tend to foam, and that is the root of your problem.

Some brands are more prone to this "foaming" than others, so you might want to try other brands. You can also help by how you apply the finish. I find paint pads work much better than brushes when it comes to waterbased coatings, and very thin coats will bubble less than thicker ones.

If all else fails, you can tweak the mixture by adding your own defoamer. Simply stir one ounce of half and half into a quart of waterbased finish. Like more traditional defoamers added by formulators, half and half is an oil (butterfat) in a format that mixes readily in water, though in this case it is thanks to homogenization. Although it is usually added to coffee or tea, it will work just fine in small doses and will mix readily into waterbased coatings.



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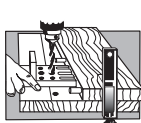
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