149 BEST TRICKS OF THE TRADE

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FROM THE EDITOR

Enlightenment Now

What our column on workshop hints has in common with mousetraps and Zen.

The best workshop hints and tricks are – in my opinion – a lot like Zen Buddhist koans.

A koan is a seemingly impenetrable riddle told by a Zen master to the student. If the student figures out the riddle, they can experience sudden enlightenment, also known as Nirvana.

Some of the most famous koans are: “What is the sound of one hand clapping?” Or: “What did your face look like before you were born?”

Here at Popular Woodworking Magazine, we strive for every trick to be a moment of sudden enlightenment for our readers. Sometimes we succeed (see “Our Best Tricks of the Trade.” And sometimes we fall a bit short (see “The Worst Tricks of the Trade” – thankfully a very brief story).

I can remember the first time our “Tricks of the Trade” column came to my rescue. Years ago my framing square was out of whack by more than a degree, and I was just about to chuck the sucker into the woods behind my shop (though its boomerang-like shape made me pause to ponder the wisdom behind that act).

That very week I was editing our “Tricks of the Trade” column and the solution was right there, staring me in the face. That night I corrected my square with a nail set and a hammer, and it has remained true ever since.

And that wasn’t the only trick that’s come in handy. I cannot tell you how much of a debt we all owe Percy Blandford, a perennial British trickster featured in the pages of our magazine (and others).

No one can match his insight into making the little jigs and accessories that make hand tools and routers far more accurate. You’ll find a lot of his tips and suggestions inside this issue.

Some people, Blandford among them, seem to have a healthy side business of submitting tricks to woodworking magazines that offer cash and prizes.

And if you’ve been reading woodworking magazines for a few years, then you’ve probably also noticed that the prizes offered for winning tricks seem to get bigger and better every year. Heck, when we first started publishing tricks in Popular Woodworking Magazine (the column was called “Information Exchange” back then) there were no prizes. People submitted tricks just to see their name in print, I suppose.

Now the prizes verge on the astonishing. The best trick in one recent issue of our magazine would win you a $250 gift certificate to Lee Valley Tools. Even I considered submitting a tricks under a false name to try to win that.

If you’re wondering why the prizes get bigger every year, it’s because competition is fierce for good tricks. Readers love them. In every survey we’ve done of our readers, they hail “Tricks of the Trade” as the most popular part of our magazine.

Woodworkers, it appears, crave that small nugget of enlightenment – even if it does involve a couple mousetraps, a household cleaning brush and some sandpaper. The solution to that koan can be found here. PW

Christopher Schwarz
Editor
10 Tricks for Tight Joints
No matter how good a woodworker you are, your joints can stand some tightening. Here are our staff’s 10 favorite ways to eliminate gaps and add strength to your joinery.

The Secret to Great Table Legs
Making legs that look good from all four sides is a simple matter of examining the end grain and making a couple extra cuts. We show you how.

The 16 Dumbest Mistakes
Good woodworking is often a battle against our own mistakes. Here are 16 of the most common problems, and how to fix them now and prevent them in the future.

Our Best Tricks of the Trade
After reading hundreds of tricks we chose our 78 favorites from our last 25 years.

Just Don’t Tell the Missus
Woodworkers often swipe the solutions to their workshop problems from the kitchen, bedroom or bathroom of their spouse. Here is our list of the best (and oddest) of that lot.
Upgrade Your Workbench

Every workbench can become more versatile by following these 10 simple and quick, but highly effective tricks.

A New Angle on Compound Miters

Making this tricky joint on your table saw (or chop saw) doesn’t have to be a mathematical nightmare. Our simple chart makes many common compound miters easy to figure.

by Nick Engler

Secrets to a Silky Smooth Finish

To get a professional-quality finish, you need to learn the basic techniques for rubbing it out. We show you how to do it with a minimum of fuss, mess and extra materials.

Strategies for Locating Lumber

Our staff’s favorite tricks for finding good wood in unlikely places. Plus a glossary of the terms you need to know for your hunt.

The Worst Tricks of the Trade

We dig through our archives and pick the brains of readers to find the lamest tricks – the ones that never should have seen the light of day.
Some of our favorite ways to get seamless, rock-solid joinery.

**10 Tricks for Tight Joints**

You've cut all the components for your next project and are putting everything together when you first notice it – a gap. A dark void where there should be none.

Don't panic – it happens to us all. For whatever reason, there are instances when your joints just don't fit perfectly and you have to decide what to do: Do you scrap all the time, energy, money and hard work you've put into the project and start over, or do you just let there be a little gap and move on?

Well, we have a third option. We put our heads together and came up with a list of the best tricks to help you tighten your joints. These tips will help eliminate unsightly, embarrassing gaps and point your joints in the right direction.

**Compression Makes Dovetails Tight**

Hand-cut dovetails are some of the most challenging joints to fit perfectly. Many woodworkers will spend hundreds of dollars on router jigs or woodworking classes to get an airtight fit.

If you decide to hand-cut your dovetails, there are a few ways to make sure you get it right.

Because wood is – on a cellular level – similar to a bunch of soda straws glued together, you can compress it a little bit. Usually, compression is a bad thing, such as when you drop a hammer on your work and it dents. But a bit of compression is good when dovetailing.

Here's how it works: Cut the first half of your joint as you usually would – I usually cut the tails first. Then use that first half to knife in the second half of the joint – in this case, the pins.

Next, when you saw your pin lines, don't saw right up against the knife line you marked, as most books tell you. Instead, saw slightly wide. How wide? The whisker of a gnat would be a good place to start. Here's how I do it: After I knife in my joint lines, I run a pencil over each knife line and then erase the excess marks. Then I start my saw cut to leave the entire knife line.

Like all things pertaining to dovetails, this takes practice. Cut sample joints to get a feel for it and use a magnifying glass at first to gauge your progress.

Once you cut your pins, use a knife to ease the inside edges of your tails, which will be inside the joint. When you join your two pieces, the too-tight pins will slightly compress the tails and the joint will be seamless. If you try to compress things too much, one of your boards will split as the two boards are knocked together.

This compression works especially well with half-blind drawer joints where you are joining a secondary soft wood for the sides (such as popular) with a hardwood drawer front (such as oak), because the soft wood compresses easily. But be careful: This trick doesn't work when you are trying to join two pieces of dense exotic wood, which doesn't compress much at all.

— Christopher Schwarz
Fake Half-blinds for Dovetail Joints
Half-blind dovetails are trickier to cut than through-dovetails, but they don’t have to be. I picked up this trick from dovetailing maestro Rob Cosman, who has two excellent videos on dovetails that are available from Lie-Nielsen Toolworks (800-327-2520 or lie-nielsen.com).

Essentially, you first build a drawer with the easier through-dovetails and then glue a 1/4"-thick piece of veneer over the drawer front, making them look like half-blind dovetails.

Deeper Mortises Close Gaps
It’s easy to get gaps when using a traditional mortise-and-tenon joint. Luckily, it’s also straightforward to get rid of them.

If you make your mortises exactly as deep as your tenons are long, you’re asking for trouble. By doing this, you haven’t created a place for any excess glue to go, so it will be forced out of the joint. And if there is even a little bit of gunk at the bottom of your mortise, the joint won’t close tightly no matter what you do to it with your mallet.

To fix this, make your mortises 1/16" deeper than your tenons are long. This trick will save you time because you don’t have to clean up the bottoms of your mortises as much, and it will prevent glue from squeezing out if you use too much in the joint.

Paring Your Tenon Shoulders
Before you assemble your joints, you should always clamp them up without glue. That way, you can
disassemble everything and fine-tune your joints if you find ugly gaps at this stage. But what if you can't track down the problem? We've found that tuning up the shoulder of the joint will help you fix a variety of problems and make sure you don't hurt the strength of the joint.

First, clamp the tenon in your bench's vise with the tenon pointing straight up. With a sharp chisel, pare away the inside of the shoulder without cutting the outside of the shoulder that shows, as shown above. Pare away about $1/32$" all the way around and then test the fit again.

This should help you solve problems where your shoulders are angled a bit because of miscutting. It also helps out when the tenon's mating surface isn't perfectly square – it's quite common to sand or plane that area so it's bellied a bit.

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**Tighten Mortise-and-tenon Joints with a Shoulder Plane**

A common problem with a mortise-and-tenon joint is that it's easy to make the joint too tight (so it won't go together) or too loose (where it will fall apart under a little stress).

Even expertly machined joints have this problem because it's tough to hold all your parts with exactly the same pressure as you cut them on your table saw or router table. A $1/128$" difference can make or break this finicky joint.

Your tenons should slide into your mortises with hand pressure only. The fit should be firm but not forced. To get that every single time, I make all my tenons so they are slightly oversized. Usually I shoot for a tenon that fits a bit too tightly but would go together with a mallet.

Then I get ready for a dry assembly and use my shoulder plane to tune up each joint. A good shoulder plane removes just a couple thousandths of an inch in a pass. This allows you to sneak up on a brilliant fit with only five or six swipes of the plane. It takes about 10 seconds per joint.

Be sure to remove the same amount of material from each face cheek of the tenon by taking the same number of passes on each side of the tenon.

Shoulder planes are available new from Lie-Nielsen, Clifton, Veritas and some other custom plane-makers, such as Shepherd Tool. You also can find them at flea markets or on eBay.

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**Add Rabbets to Dado Joints**

Dados are deceivingly simple: You just cut a trench in your work that is exactly the same width as the thickness of its mating piece.

The problem is getting the dado sized exactly right so you don't have an ugly gap at the front of your joint or along the trench where the boards meet. Of course, to precisely size your dados you can use shims in your dado stack, buy undersized router dado are a pain to get sized just right. So don't bother sizing the dado to the material. Cut the dado undersized and then cut a matching rabbet on its mate.
bits or cut your joint in a couple of passes.

Another option is to cut a rabbet on the mating piece. Using a rabbet requires an extra machinery setup, but it’s worth the trouble. Cut your dado so its width is \( \frac{1}{8} ” \) undersized. For example, if you were planning on making a \( \frac{3}{4} ” \)-wide dado, make a \( \frac{5}{8} ” \)-wide dado instead.

Then cut an \( \frac{1}{8} ” \)-deep rabbet on your mating piece that allows the two pieces to nest together. You can easily tweak the size of the rabbet to get the joint fitting just right.

— Steve Shanesy

Use a Hand Plane for Dados

Another way to get perfect dados is with the help of a smoothing plane. If you can sharpen and set up a plane, this approach is for you.

First, cut your dado so it is slightly undersized. I’ve found that the dado made by dado stacks is always a few thousandths of an inch less than the width you require. To cut a slightly undersized \( \frac{3}{4} ” \)-wide dado, I merely install all the chippers for a \( \frac{3}{4} ” \) dado. This has always worked, regardless of the brand of dado stack (Forrest, Freud and others).

Then I just plane down the mating piece on both sides to sneak up on a perfect fit. Make sure you set your plane to make the finest shaving possible, and this should work for you.

— CS

Stop Bridging Your Screws When Using Butt Joints

There definitely are ways to improve your butt joints if you find gaps appearing. Screws and biscuits – used correctly – can make the joint tighter and more durable if you know how to use them.

While dovetails and mortise-and-tenon joints are excellent options, we know that a lot of woodworkers use screws to simply pull butt joints tight. There’s nothing wrong with that, but using the correct screws and techniques will ensure that your joint actually is tight.

Lots of woodworkers are using sheet-metal screws and drywall screws to assemble projects. These fasteners will work, but there’s a reason woodworking screws exist.

The thread-free part of a wood screw shank (under the screw head) allows the threads to bite into the second wood piece, while the first piece (the one being attached) is able to pull tight against it. If there are threads over the entire length of the screw shank, the threads will bite into the wood in the attaching piece and will stop the first piece from seating tight when the screw head reaches the wood surface. This is something called “bridging,” and you’ll never get a tight joint.

Using a standard wood screw with a partially-threaded shank will solve a bridging problem, or you can make sure the clearance hole in the attaching piece is large enough to keep the threads from catching in the wood. Either way, your joint will end up tight and solid.

— David Thiel

Improve Butt Joints with Pocket-hole Screws, Biscuits

We like pocket-hole screws to build utility cabinets and frames because no other joint is as fast or requires as little clamping.

But there is one downside with pocket-hole
screws when you are joining a shelf, top or bottom to a side. It can be quite difficult to hold the shelf in perfect position as you drive the screws home. If the piece shifts even the slightest bit, you’ll have a shelf that is cockeyed with an ugly, obvious gap on one side—not a good thing.

To get around this, we combine biscuits and pocket-hole screws to get the best of both worlds. The extra time needed to add the biscuits is very minimal. First, cut your biscuit slots in your shelf and side piece. Then cut the pocket holes in the underside of the shelf.

Put glue and biscuits in the biscuit slots and put the shelf in place. Then you can drive the pocket-hole screws home. Why do we like this method so much? Well, there are three reasons:

- The biscuits hold the shelf in place as you drive the screws so it cannot shift and your case will be perfectly square.
- The pocket-hole screws hold the shelf and side pieces together as the glue dries. This is especially helpful with the middle part of the shelf, which is difficult to clamp if you use only biscuits. The pocket-hole screws pull the pieces together across the shelf without a single clamp.
- If you are a cheapskate, you can remove the screws once the glue is dry and reuse them.

—CS

The Best Way to Clamp Miters in Casework
Joining your cabinet’s sides and face frame with a miter is a classy way to dress up an ordinary box—and it is a signature of contemporary furniture design. But accomplishing this joint without an ugly gap somewhere along that miter is another story. Many people spend lots of money on corner clamps and clamping jigs. Or they construct convoluted cauls. My solution is tape. Yes, tape.

I was shown this technique of cutting straight and clean joints and taping them together when I worked in a large production cabinet shop where time was money. I’ve used this technique on mitered joints that were 10’ long and it worked flawlessly. It also works great for gluing compound miters.

To cut a clean miter using your table saw, set the blade to 45° and clamp an accessory fence to your saw’s rip fence. The accessory fence should be made using a softer wood, such as poplar or pine. A harder wood will ruin the sharp tip of your miter. Raise the blade while it is spinning until it kisses the accessory fence. Now you can cut your miters.

The real trick to dead-on miters is how you glue them. As shown in the photos above, tape the outside of the joint together, spread glue on the joint and then fold the parts to assemble things. Band clamps or more tape will hold the parts tightly together as they dry. PWM

—Jim Stack
Making legs for a table is more complicated than most imagine. When I built my first Shaker table I cut the legs from a slab of 8/4 cherry. Everything looked great until I applied the finish. Two of the legs looked good, but the others stuck out like a sore thumb. The front and back faces of the legs looked different than the sides. I had just learned the difference between flatsawn and quartersawn figure.

The End Tells the Story
To understand this important point, take a look at the photos below, left. The key to understanding this puzzle is in the end grain of your legs. If you look at the photos of the flatsawn leg, the growth rings run left-to-right through the leg. On two sides of the leg, the tree's growth rings are parallel to the face – known as flatsawn or tangential grain. On the other two sides of that leg, the growth rings intersect the face of the leg at a 90° angle – known as quartersawn or radial grain.

Flatsawn and quartersawn grain look different. We expect the four surfaces to appear the same. After all, they are the same size and are from the same piece of wood. If they don't look the same, it's distracting, especially on a piece of furniture.

The trick to getting around this problem is either to select your lumber carefully before cutting or to cut it in a special way. In essence, you want the growth rings to travel at a 45° angle from corner to corner (or an angle that’s close to that). If you study the photos you’ll see why.

Creating Bastard Grain
The first step is to trim your board so the face grain is as straight as possible – angled grain looks odd on a leg. Use a yardstick to mark a straight line that is parallel to the grain lines and near an edge of your board. Band saw to that line, clean up the cut on the jointer and rip the board as wide as possible.

To help visualize the growth-ring pattern on the end grain, make a cardboard template that has a hole cut in it that matches the thickness and width of your legs, plus 3⁄8" on all four sides. Place the template on the end grain and rotate it until the growth rings run from corner to corner. Mark this shape on the end, and use a sliding T-bevel to measure this angle and then set your table saw’s blade to the same angle. Rip the board to this line and square up the stock using your jointer and table saw. Finally, use your planer to reduce the leg to its finished thickness.

A template helps you visualize the correct growth-ring orientation for the legs. Turn the template until the growth rings run from corner to corner. Mark that on the end grain. Set your table saw’s blade to match the angle marked on your wood. Rip this edge off the leg.
THE 16 DUMBEST

Mistakes

How to fix the problem at hand and never make the same mistake again.

by Christopher Schwarz

Comments or questions? Contact Christopher at 513-531-2690 ext. 11407 or chris.schwarz@fwmedia.com.
For the record, I want it known that I had everything clamped down tight when I turned on the drill press to mix a gallon of dark brown glaze. What happened next is somewhat of a legend in our shop.

The drill press was set to run too fast, and the quill was down too low. Within seconds, the wall of the shop, all the tools within 10 feet and most of my exterior surfaces looked like we had all been dipped in chocolate at the Snickers’ factory.

That was six years ago. We moved the shop six miles up the highway, replaced almost all the machinery and we still find little bits of the dried glaze clinging to things just about every week.

Ask any woodworker about the dumbest mistake he or she has made and a look of pain will pass over his or her face. In our shop you’ll hear stories of entertainment centers not deep enough (the wall behind it had to be punched out to make room for the stereo components) or kitchen cabinets where the knob on the very last drawer was installed off-center, resulting in making a new drawer front.

Some of these mistakes can be fixed after the fact. All of them are avoidable. The following is a list of the 16 dumbest woodworking mistakes common to the craft. If a problem can be fixed, we show you how. But most of all, we tell you how to keep out of trouble in the first place.

1 You Measure Carefully, but Everything on Your Project is a Bit Off

**Problem:** As you proceed though the project, small errors creep into the assemblies – errors you cannot explain. Things aren’t lining up by $\frac{1}{32}$” or so, even though you’re measuring carefully.

**Next Time:** Stop where you are and gather all the measuring devices you’ve used on a project. Your tape measure, your combination square, your table saw’s fence scale and your steel rules should all measure the same.

Find the problem (it’s usually the tape measure or the table saw’s scale) and adjust the tab on the end of the tape measure or the scale on the saw until they match your other measuring tools. If a steel ruler and a combination square don’t agree, one of them has to go. Before you start a project, calibrate all your measuring tools. Plus, be aware that when ripping on your table saw, regular-kerf blades and thin-kerf blades have a different-sized kerf. Pick one blade for ripping and set your fence’s scale to that blade.

2 Remember the Kerf

**Problem:** When cutting a joint or trimming off some extra waste, you forget to include the saw kerf in your measurement so your final workpiece is off by $\frac{1}{8}$” or $\frac{3}{32}$”.

**Next Time:** To avoid the problem, just remember what my grandfather always said: Never measure the waste piece; always measure your keeper piece. This bit of advice keeps you out of trouble when the saw kerf is involved.

For additional insurance, when marking the face of a board for a cut, carry that mark onto the front edge of the board. Put the board in position on the saw and line up the mark with the blade.

3 Ending Up on the Wrong Side of the Line

**Problem:** You mark your mortise or crosscut, but you bore or cut on the wrong side of the line.

**Next Time:** To avoid the problem, get in the habit of marking your waste area with cross-hatches. It

To prevent errors from creeping into your projects, be sure to calibrate all your measuring tools against one another before you begin cutting.
When boring a hole for a through-mortise, we ended up on the wrong side of the line. Time to get the plug cutter.

Starting your tape measure at 1” can make you more accurate. But it also can cause you to burn an inch if you’re not careful. Measure things twice.

There are limits to what you can squeeze out of one of these boards (usually about \( \frac{1}{32} ” \) to \( \frac{1}{16} ” \) depending on the size and profile of the moulding) before things don’t look right.

5 Off by an Inch – Might as Well be a Yard

■ **PROBLEM:** You’re measuring a board with your tape measure to cut it to length. You make the mark and the cut, but your board is exactly 1” too short. The culprit usually is one of two things: You were holding the beginning of the tape at the 1” mark for a more accurate measurement. Or you were looking at the wrong number when you made your pencil mark. This second mistake is common when you have the tape measure in your left hand (reading upside down) and the pencil in your right.

■ **NEXT TIME:** There are several ways to avoid the problem in the future. First, measure everything twice (we had to say it). Second, use your combination square or (even better) a 24”-long metal hook rule to mark out shorter cuts instead of your tape measure, which is less accurate anyway.

6 Gappy Joints

■ **PROBLEM:** You glue up your case or assembly, and there are ugly gaps between the joints.

■ **NEXT TIME:** There are several causes, but usually it’s because you didn’t clamp up the project without glue first. Joints should close with minimal clamp pressure. If you have to really twist the clamps down hard, you’ve got some ill-fitting joints to correct first. Always perform a dry-assembly and closely inspect your joints.

■ **QUICK FIX:** This error is why they make wood putty. Unfortunately, it’s your best bet.

7 Parts are Not Where They Should Be

■ **PROBLEM:** You’re gluing up a cabinet, a drawer or any assembly and you get one of the parts placed wrong – it could be upside down, on the wrong side or the wrong face of the board is showing.

■ **NEXT TIME:** Here’s how to avoid it: Use a cabinetmaker’s triangle to distinguish left, right, front, back, inside and outside at a glance. Here’s how: Say you’re building a drawer. Once you get your parts cut out, put the sides together and then place the drawer front on the end so it makes a “T.” Draw a triangle that spans the three parts and points to the front of the drawer. Put the back piece against the sides in a “T” formation and draw another triangle that spans the three pieces and points to the
front of the drawer, as shown at right. Now you'll always know how the pieces should be oriented without labeling each joint.

The same cabinetmaker's triangle works with doors, too. Always mark the triangle on the outside face of the board and always have it point up to the top of the case.

QUICK FIX: If you use a slow-setting glue or hide glue (which is reversible with hot water), the obvious solution is to take the thing apart and try again. But, unfortunately, these problems usually are discovered when it's too late.

8 Two Left Feet

■ PROBLEM: You're milling the dados and rabbets in a case side, drawer or other box and you forget that you have left- and right-sided pieces. So you make two left-handed or right-handed parts.

■ NEXT TIME: Again, the cabinetmaker’s triangle can help you avoid this problem. And here's another tip: You should stack your left and right pieces in different piles as you work.

9 You Drill a Large Hole that is too Small

■ PROBLEM: You bore a hole with a Forstner or hole saw that is too small, and locating the center for the next size up is hard because of the existing hole.

■ NEXT TIME: You're working too fast; slow down.

■ QUICK FIX: It's easy. Cut a square plug you can pound into the round hole. Mark the center on the plug and cut your new hole.

10 Your Doors Don’t Fit

■ PROBLEM: Your doors are too small or crooked to fit in their opening.

■ NEXT TIME: To avoid this problem, rip your stiles and rails 1/8" wider than your cut list calls for. Then you can square and trim the door easily to size.

■ QUICK FIX: To repair your immediate problem, trim the doors so they're square—even if this results in gaps (called “reveals”) between your case and doors that are too big. Now you can fix your problem with moulding. Mill some 5/16"-thick x 3/4"-wide flat moulding and cut a profile on one edge that matches the style of your project (a bead goes well with traditional furniture; a bevel looks good with more contemporary pieces).

If you're building a face-frame cabinet, miter and nail the moulding to the doors. Voilá again. Your doors are bigger.

11 Your Pencil Line is Too Fine To See or Too dark to Remove

■ PROBLEM: We all hate erasing and sanding off the pencil marks on a project, and some of us mark really fine lines to make that part of the job easier. Unfortunately, it's easy to overlook a fine pencil line and miscut. So we make the lines darker, which dents the wood and is difficult to remove.

■ NEXT TIME: Hold your pencil at a low angle and don't keep it too sharp when marking parts for identification (see the photo on page 20). This makes lines that are easy to read for quick reference, but don't dent the wood.

■ QUICK FIX: Remove all pencil lines using a rag soaked with denatured alcohol before sanding.

12 You Ruin one of the Critical Parts to Your Project

■ PROBLEM: This is painful for woodworkers to discuss. After machining a part so it's almost done, something happens and the part is ruined.
Making replacement parts is easier if you plan for the problem in advance. First, always run out extra stock in all the thicknesses you’re using (thickness is the most difficult dimension to reproduce). For the critical parts in a project, always make an extra one. For a table, make an extra leg. For a set of doors, make an extra stile and a couple extra rails.

13 Fasteners Too Long

**PROBLEM:** One of us (who shall remain nameless) once nailed a project to his father’s bench with a pneumatic nailer. The nails were too long. Nails and screws that emerge where they are not supposed to emerge is sadly common. With screws this happens when you countersink too deep or the clutch is set too high on your cordless drill.

**NEXT TIME:** You can measure your fasteners and keep them organized to avoid this problem, but we have a better solution. Before you fire a nail or drive a screw, hold it up to the work. Fasteners should be slightly less than twice as long as the material they’re passing through. For example, when joining $3/4”$ material, use $11/4”$-long screws.

When driving screws, always measure your countersinks and start with a low clutch setting.

14 The Color of Your Finish Isn’t What You Expected

**PROBLEM:** Surprise surprise, the stain color on your project looks nothing like the stain color on the can (or in your head).

**NEXT TIME:** Good finishing requires making a sample board beforehand. As you are sanding or planing the parts of your project, take one of your extra boards, and sand or plane it the same way. This means sanding them using the same equipment, the same amount of pressure and for the same amount of time. Use this as your sample board.

Stain the board and add your topcoat finish of choice. Then take your sample board into the room where the project will be located. Daylight, fluorescent and lamp light all make stain colors look surprisingly different.

**QUICK FIX:** Get out the can of stripper or the appropriate solvent. You’ll never be happy with a bad-looking finish.

15 When You Glue Up a Panel

The Edges Don’t Close Up

**PROBLEM:** You joint the edges of the boards you are planning to glue into a panel but there are gaps between the boards’ edges. You check the jointer’s fence and it reads $90^\circ$ to the bed.

**NEXT TIME:** Even if your square says the fence is at $90^\circ$, it might be a little off at other places on the fence. Or your square is off. Either way, there’s an easy way to fix the problem: geometry. Use the power of complementary angles to make perfect tabletops and other flat panels.

For every joint in the tabletop, mark one board to edge-joint with its face against the fence, then joint its mate with the face facing away from the jointer’s fence. Even if your jointer is off by some whopping degree, the two angles will cancel each other out and result in a tight fit.

**QUICK FIX:** If you glued up the panel, rip it apart along the joint lines and start over.

16 More Panel Problems:

The Boards Slip at Glue-up

**PROBLEM:** You’re gluing up a tabletop. As you apply clamping pressure, the boards slip up and down, and refuse to line up.

**NEXT TIME:** To avoid the problem in the future, consider using dowels, splines or biscuits to line up the boards during critical glue-ups (though they will not add any strength to the joint).

**QUICK FIX:** If you’re in the middle of a glue-up, grab handscrew clamps and clamp them across the joint lines at each end of the panel. Then apply pressure with your bar clamps.

Have we missed some of the dumbest mistakes? E-mail your mistakes to chris.schwarz@fwmedia.com and it might appear in a future issue.
Here are the best tricks we’ve published over the last 25 years.

Truing Your Squares

I didn’t have to drop the last framing square I bought to knock it out of square – it came from the store that way. So I chalked that up to Murphy’s Law, took it back and got another one from a different manufacturer. It too was out of square! While whining about this problem to a fellow woodworker, he looked at me like I was dumb and said, “You mean you don’t know how to true up your square?” Ten minutes later I was in my shop testing out his advice with a hammer.

First determine which direction the square is out of true – to the inside (89°) or outside (91°). Use a pointed steel punch (an old nail set also will work) and a good-sized hammer to strike the square at either the inside or outside corner of the square, and check it again for squareness. Striking to the inside corner will widen the square, while striking to the outside corner will constrict the square. If it isn’t fixed the first time, simply hit it again.

Now when I drop my framing square I don’t get nearly as frenzied. I just head for the punch and hammer.

David Thiel
senior editor

‘Dog-Bone’ Frame Clamps

There are some amazing specialty clamps for gluing miters, and we’re also amazed by some of the prices. It’s no trick to spend $40 apiece for mitered corner clamps. And because most frames have four corners, you can spend $160 very easily. By stealing some much less expensive hardware from a commercial application, we’ve come up with a much cheaper miter clamp that works great for picture frames. Tight-joint fasteners, often called “dog bones” in the trade, are commonly used to pull countertops together, but by shortening the length of the bolt and making a routered cut-out on the back of the frame corners you can make a pretty simple corner clamp for less than a buck.

The routing template is the only bit of difficulty, but once that template is made it’s simple to clamp up the corner until the glue is dry. Then release the dog bone clamps and they’re ready to use the next time you need to glue up your next set of miters.

Steve Shanesy
editor and publisher

Tarnishing New Brass

Have you ever seen shiny new brass on an old piece of furniture? It just doesn’t look right. What I do is tarnish the new brass to give it an antique look that better suits the furniture it’s attached to. Pour a little ammonia in the bottom of a glass caserole dish. Place a brick, or similar object, in the bottom of the dish to elevate the brass above the ammonia. Put the brass piece on top of the brick and cover the container to keep it airtight. Ammonia vapors are harmful so do this in a well-ventilated room. The process takes only a few minutes; the amount of tarnish on the brass is regulated by the amount of time the brass is exposed to the vapors.

Frank Neimeyer
Horseheads, New York
Add Dust Collection and a Handy Shelf to Your Contractor Saw

Here is a simple solution to two issues: the need for a convenient place to put the rip fence and miter gauge when not being used (as well as push sticks, featherboards, etc.), and a way to close off the underside of a contractor-style table saw to provide a surface to mount a dust port. I used a piece of ¾” medium-density fiberboard (MDF) cut to 32” x 24”. Unbolt the saw from the stand and raise it about 1” using sawhorses and shims. Slide the MDF between the saw and the stand, and mark the location of the mounting holes through the stand. Remove the MDF and drill slightly oversized mounting holes at the marked locations. Cut a hole for the dust collection port at this time. Now slide the MDF in place and bolt the saw to the stand. Longer mounting bolts may be necessary. Fasten ¼” x 1” strips to the edge of the MDF to provide a lip to help prevent items from sliding off. Finally, screw the dust collection port to the underside of the MDF.

Thomas Sage
Waukegan, Illinois

Sturdy, Fold-away Work Horses

Here are some useful sawhorses for woodworkers like me, who have limited room to work, and even less room dedicated to storage. I cannot claim design rights for these because I got the general configuration from a workman who came to my house several years ago to install a water purifier. His were made using 1 x 4 material, over which he placed a piece of plywood to make a temporary work table. They seemed strong even in that thin material, so I decided to build mine using 2 x 4s, which suited my needs more adequately.

Certainly they can be configured to suit other, more particular, requirements. I don’t know what the weight capacity of these sawhorses is, but I have used them for several years now for all sorts of purposes. In fact, two adults have stood atop the horses without incident with 2 x 8s laid over them to make a platform.

Ralph Scheeler
New Orleans, Louisiana
Sharpening Dull Router Bits

Most shops have two types of router bits – dull and sharp ones. It’s easy to tell the difference because the sharp bits ease through the wood while the dull bits labor. Sometimes a good cleaning is all the bit needs. Any good blade solvent will rid bits of pitch and resin.

Once the bit is clean I like to use a fine monocryalline diamond stone with a couple drops of water to hone the flats of the carbide. Count the number of strokes taken on each flat, then repeat this process with the other carbide surface on the bit. Diamond stones will sharpen carbide or high-speed steel. I only use carbide cutters because they stay sharp longer. Don’t attempt to sharpen spiral router bits – send those to the sharpening shop.

Scott Phillips
Piqua, Ohio

Forstner-powered Dovetail Pins

Chiseling and paring away the waste between dovetail pins can be largely eliminated by using a Forstner bit to remove the waste. Set up a Forstner bit (the diameter equal to your drawer side thickness) in your drill press and set the depth stop to just shy of the bottom layout line. Drill into the rear face of the piece, then simply pare the remaining waste for a perfect fit. This trick saves a lot of time.

Robert Poole
Vancouver, British Columbia

Draw Accurate Lines Around Corners

Many years ago my carpenter square mysteriously disappeared at the start of my basement finishing project. So I started using a butt hinge to mark lumber. It worked better than I had hoped. My carpenter square is still hiding from me, but I still use a 3 1/2" x 3 1/2" full-mortise butt hinge for transferring my layout marks for trim work.

The real advantage of using a hinge is that it allows you to bring lines around corners, such as when you’re marking out a tenon, with minimum error. When choosing a hinge for this purpose, select one without a finial (which will get in the way of your line) and one without a lot of slop between the leaves and the hinge pin. The tighter the hinge, the more accurate your layout lines will ultimately be.

Milo Meyers
Seattle, Washington

Double-duty Dovetail Jig

I was intrigued with Nick Engler’s Ingenious Jigs article from December 2001 that showed you how to make a jig for cutting perfect dados in the sides of case pieces. After my last project, where the routing was the most repetitious and boring part of the piece, I thought there should be an easier way. I wasn’t happy with the dados made using my router table, radial arm saw or table saw. I don’t like to take the time to make a jig, even though some have been proven helpful and many times reusable.

In looking around my shop, my eye alighted on my commercial dovetail jig. It had all the properties of the jig from the article: a good, straight, sturdy hold-down clamp with a wide throat to accommodate wide boards or even multiple boards needing the same dado. The clamp that holds boards in the jig makes a perfect fence for my router. When running multiple boards, I did take the precaution of clamping the pieces together with another clamp to prevent them from slipping in the jig, as many times slight variances of wood thickness will allow this to happen.

Robert Keefe
Lexington, Kentucky
Make a Rabbet Block Plane

I recently converted a common #220 Stanley block plane into an effective rabbet plane. I think a block plane's comfort, low profile and blade angle can provide precision for paring tenons, rabbets and bevels of raised panels (and it's significantly cheaper than the typical rabbet plane).

To begin, drill a \(\frac{5}{16}\)“ hole through the side of the plane. Next, carefully hacksaw an intersection from the plane throat to the hole (making sure the lower cut is shy of the final line). File until the blade seats flush on the new section of plane bed. To accommodate the lateral shift in the blade, use a metal grinding wheel to make a recess on the side of the blade. Then file a wider blade slot and one adjustment groove slightly longer. Next, to improve shaving removal, file a smooth ramp on the corner of the lever cap. Lastly, turn a larger knob for better two-handed control. With all the money you save, you can buy another #220 and modify the other side.

Stephen Campbell
Westhampton, Massachusetts

A Mortise Cleaning Tool

When mortising I found it difficult to remove waste left at the bottom of the mortise by my hollow-chisel mortising bit. Prying it out with a bench chisel often damaged the shoulder of the mortise and was not kind to the cutting edge of the chisel. I needed a tool with a right-angle cutting edge that would allow me to scrape the bottom of the mortise right up to the corners, then pull the chips out. I figured out how to make one from a \(\frac{7}{32}\)“ Allen wrench. Here's how:

With a hacksaw, cut the short leg off at a 45° angle, leaving about \(\frac{3}{4}\)“ of length on that leg, then grind the face of the cut flat. Next, grind the top of the short leg flat to create a 30° cutting edge at the intersection with the first cut. The exact angle isn't critical. You just want it sharp enough to cut well, but sturdy enough to withstand the prying action. Go easy with the grinding, cooling the metal frequently in water. If you overheat it while grinding, it will lose its temper and your tool will dull quickly in use.

For a handle, drill a \(\frac{3}{16}\)“ hole at least 1“ deep in a piece of \(\frac{3}{4}\)“-diameter hardwood dowel, then tap the Allen wrench into the hole. This tool works well for cleaning mortise slots \(\frac{1}{4}\)“ wide and up. For larger mortises, make one with a larger Allen wrench.

Mike Callihan
Burnsville, North Carolina
A Double-duty Disc Sander

I make a lot of wooden toys and find my disc sander indispensable for both shaping and smoothing small parts. Unfortunately, this calls for the use of both coarse and fine discs, and I have only one disc sander. My solution is to mount both #80-grit and #150-grit paper to the disc at the same time. A circle of one grit is attached to the center of the sander’s platen, while the other grit surrounds it as a ring.

To make the discs, I stack two sheets of standard 9” x 11” sandpaper upside down on a scrap panel. Using a compass, I mark out a 4 1/2”-diameter circle within a 9” circle, then knife through the lines. I stick one set of these perfectly matched discs to my sander’s platen. When the sandpaper wears out, I simply replace it with the complementary set of sandpaper.

Dan Reeve
Swanville, Maine

A Bit of a Marking Knife

If you enjoy making your own woodworking tools, as I do, here’s a good-quality marking knife you can create from a humble used-up spade bit and small scrap of wood.

To make the knife, begin by grinding a 3/4” spade bit to a V-shaped tip as shown, then grind the bevels on one face of the bit. When grinding, quench the metal occasionally in water or oil to prevent bluing it and drawing the temper. Then hone the bevels and opposite face of the bit to a mirror polish on sharpening stones. Then use a hacksaw to cut the round shank about 2” long.

To make the handle, first cut a piece of stock to about 5/8” x 1” x 5”. (Here’s a chance to use some of that exotic scrap you’ve been hoarding.) Drill a 2”-deep hole into one end, then shape the handle for a smooth, comfortable feel. Epoxy the shank into the handle and you’re done – you’ve got a beautiful, functional marking knife that probably will outlive you.

Peter Giolitto
Epsom, Surrey, England

Low-tech Grinder Angle Gauges

Setting up the proper angle on a grinder toolrest can be a fussy business. To simplify matters, I make angle gauges from Popsicle sticks. I scribe the end of a stick to the desired angle, then sand to the line using a disc sander. I drill a hole in the opposite end and note the angle on the stick with a permanent marker. My gauges all hang on a metal shower curtain ring near my grinder.

Craig Bentzley
Chalfont, Pennsylvania

Hang Pictures the Easy Way

After having moved several times, I thought I had mastered the art of hanging pictures and mirrors using masking tape, rules, pencils and guesswork. Recently I happened upon an idea that eliminates all of these. It’s a simple device made from 3/4” pine, a 3/4” roofing nail and a piece of rubber band (to keep the nail from falling out).

Place the frame’s hardware (wire, hanger and frame edge) over the nail head. Next, holding the handle, position the picture without moving the tool and press the nail head into the wall with your thumb. The nail leaves a small dimple – the exact spot to place your nail or picture hook.

Art Misicka
Roanoke, Virginia

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Art Misicka
Roanoke, Virginia
Shop-made Squaring Sticks

The best way to check the squareness of an assembly is to compare its diagonal measurements to make sure they match. The quickest and most accurate way to do this is to use squaring sticks.

You can easily make your own squaring sticks from straight-grained scrap as shown. Simply saw a mating tongue and groove into the edges of two $\frac{3}{4}$-square sticks. This joint keeps the sticks aligned in use. The 40° miters at the ends allow easy insertion into case and frame corners. When comparing diagonals, use a small clamp to hold the sticks in lengthwise position. Then, using the same set of sticks, measure the other diagonal. If the assembly is square, the length should be the same. I make pairs in various lengths to suit different sized projects.

Roger Winers
St. Paul, Minnesota

Better Bit Storage – Yes, You can Mix Different-sized Shanks

I recently built a router table that included drawers with drilled holes to accommodate my ever-growing collection of nearly 100 router bits. The problem I faced was how to properly organize them. I like to store bits according to their use – straight bits, flush-trim bits, edging bits, etc. – but some have $\frac{1}{4}$"-diameter shanks and some have $\frac{1}{2}$"-diameter shanks. I wanted to arrange the bits in proper order regardless of their shank size.

My solution was to drill $\frac{1}{2}$"-diameter holes for all of the bits and then use shop-made wooden “bushings” as inserts for the $\frac{1}{4}$"-diameter bits as needed. To make the bushings, I cut short lengths of $\frac{1}{2}$"-diameter dowel, then bored a $\frac{9}{32}$"-diameter hole in the center using my drill press.

The easiest way to do this is to first bore a $\frac{1}{2}$"-diameter hole in a piece of thick scrap clamped to the drill press table. Then, without moving the scrap, you can insert a section of dowel into the hole and replace the $\frac{1}{2}$"-diameter bit with a $\frac{9}{32}$"-diameter bit. You now can drill a hole easily in the center of the dowel, holding it with pliers or a clamp to prevent it from spinning. It’s wise to make a good supply of these for future use.

Jack Stauffer
Lewisburg, Tennessee

Scraper Honing on the Square

When I sharpen a scraper, I like to hone the edge on a sharpening stone before burnishing it to create a burr. Holding the scraper perfectly perpendicular to the stone’s surface can be a little tricky. Rather than trying to accomplish this freehand, I take a piece of scrap (about $\frac{3}{4}$" x 2" x 4") and cut a kerf about two-thirds of the way along its length with the band saw. Then I slip the scraper in the kerf and hone away, using the scrap piece to keep the scraper upright.

Burt Kenton
Arlington, Tennessee
RoutingDados with Shims

Routing dados and grooves across boards typically involves making two passes with a straight router bit while guiding the router against a straightedge. The problem is that resetting the guide for the second cut is time-consuming and leads to errors in the width of the cut. A quicker and more accurate approach is to make the second cut by placing a shim of the proper thickness against the body of a T-square clamped against the workpiece, as shown at right.

Percy Blandford
Stratford-upon-Avon, England

Wrapping Grain Around Boxes

One of the nicest features a small box can have is when the grain runs uninterrupted around all four corners. Not only is this visually pleasing, it also adds structural integrity because wood movement will be consistent at the corners. It’s a mystifying trick for some, but it’s not difficult. Begin with stock that is 1/4" thicker than twice the thickness of the box walls and 1/4" longer than the length of two contiguous parts, as shown in Step 1. Label the outermost surfaces for future reference, then resaw this stock and plane the two resawn pieces to final thickness, removing as little wood as possible. Next, crosscut each piece to yield two contiguous pieces, as shown in Step 2. Label the pieces near the ends for later reassembly in the orientation shown. After mitering the ends and assembling the box as shown in Step 3, one pair of diagonally opposed corners will display a bookmatched joint and the other corners will display a continuous flow of grain.

Geoffrey Noden
Trenton, New Jersey
Dust Collection at the Lathe

When I was turning lots of pens and small items for holiday presents, I came up with this dust-collection hood. It’s simply a 3”-diameter schedule 40 PVC “Y” connection that I cut in half and mounted to a wooden base that attaches to the lathe bed. It can be slid back and forth if needed for longer objects, but it really excels with items less than 6” long. For more efficient suction, I filed a radius on the sharp internal edge of the “Y.”

Greg Strately
Truth or Consequences, New Mexico

Crosscut Set-up Block

When crosscutting multiple short workpieces on the table saw, the typical approach is to clamp a set-up block to the rip fence on the infeed side of the blade, then register the workpiece against the block before moving the workpiece forward into the cut. Using a set-up block (instead of the rip fence) to register the workpiece prevents the resulting offcut from jamming between the fence and blade, and being thrown back at you.

However, even when using a large set-up block, I found that I still had to reach between the fence and the blade to retrieve the offcut. This isn’t a safe maneuver unless you shut off the table saw after each cut, which wastes a lot of time.

To solve the problem, I made the adjustable set-up block shown below. It simply consists of a notched block that is glued and screwed to a runner that rides in my table saw’s miter gauge slot. A gauge bar that passes through the notch is locked in the desired position by a thumbscrew that runs through a threaded insert in the block above the bar.

To ensure the longevity of this jig, I inlaid a brass strip into the gauge bar and recessed a brass disc into the underside of the notched block to prevent the end of the thumbscrew from marring and galling the brass strip.

Craig Bentzley
Chalfont, Pennsylvania

Precise Hinge Placement

When installing butt hinges, it’s hard to know exactly where to drill the holes. Here’s a method I use: I attach one leaf of each hinge to the door and then spread a five-minute epoxy (or cyanoacrylate) on the other leaf. I tape a layer of plastic between the leaves to keep the epoxy from bonding it in a closed position, then slip the door into its frame and shim it into position within the opening. When the epoxy has cured, I open the door and install the wood screws.

Devore O. Burch
Fort Worth, Texas
**Get Glue in Tight Places**

I was repairing an old saw handle that had a small but deep crack that resisted glue injection. I was puzzling over how to fix it when I landed upon the idea of drawing epoxy into the crack using vacuum pressure.

I dug out the kitchen vacuum food bagger, put a blob of epoxy over the crack, then put the handle in the plastic bag and sucked the air out. The epoxy disappeared into the crack like magic, after which I quickly removed the piece from the bag and wiped off the excess before it set up. The technique works very well for any project small enough to stick in the bag, including broken plane totes and small turnings.

Wayne Anderson
Elk River, Minnesota

**Custom Sanding Blocks for any Moulding**

Hand-sanding curved surfaces on moldings, handrails and other work is difficult to do efficiently, and it can be brutal on the fingers. I’ve learned that using a mirror-image sanding block makes all the difference. To make a sanding block that you can shape to suit your needs, begin with a thick piece of rigid foam insulation (available at home-supply stores) or Styrofoam you saved from the packing material around your latest piece of stereo equipment. The block should be as thick or wide as the section of moulding you want to sand.

To shape the block, first lay a piece of #220-grit sandpaper grit-side up against the surface to be sanded. Then rub the sanding block against the paper in a straight line until it conforms to the shape of the surface, as shown below. After that, simply wrap a fresh sheet of sandpaper around the sanding block to sand your workpiece, this time grit-side down. It’s amazing how much more efficient and comfortable this is than if you use your fingers as a backer.

Linda Denny
Houston, Texas

**Your Drill Press Is a Clamp, Too**

The drill press will accomplish many jobs such as routing, buffing, drilling, sanding and turning. The drill press can also be used as a vertical clamp when it’s difficult to use conventional clamps, like gluing a lamp to a lamp base. Just lock the table in position at the desired height, lower the chuck to apply pressure and lock the quill in place while the glue sets.

Dick Dorn
Oelwein, Iowa

**Remove Finish From Grooves**

I had trouble removing paint from inside the grooves of a chair I was refinishing. So I saturated a string with chemical stripper, wrapped it around the grooves, and worked it back and forth to loosen the paint. This method helps concentrate the remover in hard to reach areas, and it doesn’t run off, or dry and harden.

Lane Olinghouse
Everett, Washington
Honing Spokeshave Blades

I was trying to hone a spokeshave blade by hand for the first time and was having a hard time holding it at the proper angle. I typically use a honing jig for sharpening plane irons, but the spokeshave blade was too short to fit into the jigs I own.

So I got to thinking and came up with the idea to remove the iron and chipbreaker from a jack plane, loosen the screw and clamp the spokeshave blade between the iron and the cap iron. This projected the spokeshave blade out far enough for honing. This configuration won't withstand a lot of pressure, but it's strong enough to hold the blade in place for me to hone it.

Dan Donaldson
Canton, Michigan

Ancient Idea Extends a Clamp’s Reach

Recently, I found myself needing to clamp down a patch on a tabletop, but it was out of the reach of my deep-throat clamps. Recalling a trick a pal showed me years ago, I grabbed a long, stout piece of hardwood and a short piece of thick dowel. Placing the dowel near the edge of the table where it could serve as a fulcrum (an ancient idea), I laid one end of the stick on top of it with the other end on top of a protective clamping pad over the patch. Clamping the stick ahead of the dowel transferred pressure to the patch. If you don’t have a section of dowel, a triangular piece of stock will work as a fulcrum, too.

Matt Lackerman
Eureka, California

Bookmatching Legs With a Simple Swap and Twist

Whenever I make a piece of furniture with four identically shaped legs, I arrange them to display bookmatched grain when viewed from any side of the piece.

To accomplish this, I begin with a piece of stock that is the length of the legs and square in section. In thickness and width, the stock should equal twice that of a single leg, plus $1\frac{1}{4}$" for milling. For best symmetry and harmony, use a piece where the growth rings run diagonally across the end of the piece, which results in consistent bastard grain on every face of each leg. Next, scrawl a triangle in chalk on one end of the stock, then rip the piece into quarters to make your four individual leg blanks.

Using the triangle as a reference, reconstitute the original piece of stock and label the matched faces on the ends of the leg blanks as shown in the drawing. Next, rearrange the individual leg blanks to display the bookmatched faces on the outsides. This is done by switching the position of two diagonally placed legs and rotating the other legs 180°, as shown. If you maintain this relationship of the legs in the piece of furniture, the grain on each pair of legs will be a mirror image when viewed from any side of the piece.

Geoffrey Noden
Trenton, New Jersey

Honing jig
Spokeshave
blade
Plane iron
Plane cap iron
Honing jig
Stout hardwood stick
Dowel
Clamp pad
First, switch the position of the two diagonally placed legs
Then rotate the position of the other legs 180°
Draw a chalk triangle to help reposition legs after cutting

$2X + \frac{1}{4}$"
$2Y + \frac{1}{4}$"
Means to a Perfect End

If the ends of fairly narrow pieces of stock must be routed to a molding profile, it’s difficult to keep the cutter in-line. Because of the minimal surface to provide guidance for the router bearing or fence, the cutter may wander and ruin the work.

You can get clean cuts on the good parts by clamping scrap pieces on the outside edges. This provides the enlarged bearing surface necessary. Should the cutter wander at start or finish, the damage will be on the scrap wood, leaving the good parts perfect.

Percy Blandford
Stratford-upon-Avon, England

A Chisel for Dovetails

Bevel-edge chisels are intended for paring inside angles of less than 90°, such as corners of dovetails. However, they can be up to \( \frac{1}{16} \)" thick at the edge, so they will not go closely into the acute angle. It’s better to modify your \( \frac{1}{4} \)" square-edge chisel by grinding its edges to nearly no thickness at the edges. It will go right into the acute angle, when needed, and is still suited for other cuts.

Percy Blandford
Stratford-upon-Avon, England

Low-tech Cockbeading

A small cockbead makes a neat finish to the edge of a board such as a drawer front. But beading planes are things of the past and suitable router bits are expensive. I find I can do an acceptable job with a slot-head screw in a piece of scrap wood. I use a #10 gauge steel screw, but you can use a size to match the intended bead.

Drive the screw into the scrap wood so the head projects the width you want the bead. Turn the screw so one side of its slot acts like a little plane iron. This makes the groove and you can round the outer edge with an ordinary plane. Finish off with sandpaper.

Stanley Clark
Tampa, Florida

This Clamp is a ‘Pipe Dream’

My hobby is making wooden toys. I find that making a number of the same model toy at the same time is easier and faster; however, I’ve had a problem with clamps. I need spring clamps and C-clamps, and I need a bunch of them.

I tried rubber bands, but they didn’t work well. Then I found a piece of 3" Schedule 40 PVC drain pipe leftover from a household project, and I cut it into \( \frac{1}{2} \)" and \( \frac{3}{4} \)" sections. I next cut a small section out of the individual rings and tried them out. They worked beautifully. A 3" clamp can be spread to hold a 4\( \frac{1}{2} \)" lamination. You can buy PVC in lots of different sizes, and I’ve found it to be quite economical.

Warren Wingerter
New Orleans, Louisiana

Another Method of Transferring Patterns

Fabric shops sell a toothed wheel for transferring paper patterns to cloth. These toothed wheels are also very handy for transferring patterns to wood. Tape the pattern down to prevent slippage and roll the wheel along the lines. Then wipe powered chalk or talcum powder over the pattern – it passes through the tiny holes to mark the wood. Because there are often patterns on both sides of a sheet, you can make permanent plywood, hardboard or heavy cardboard patterns for future use, without cutting up the originals.

Don Kinnaman
Phoenix, Arizona

Know When to Stop Sanding

When sanding glued-up panels with a belt sander, it can be difficult to know when the joint is leveled. I used to stop every few seconds to run my hand across the boards to see if the panel was flat yet. Now I draw a serpentine line down each glue line with a soft lead pencil. When the pencil line is completely gone, so are the irregularities of the glue line and I know the joint is level.

Michael Burton
Glorieta, New Mexico
Laying Out Large Curves and Arcs

This simple jig results in a sharp, clean lay-out line when drawing large curves and arcs. It consists of two parts that I call the “bow” and adjustment “arrow.” The bow is made from stock \( \frac{3}{16} \) to \( \frac{1}{4} \) thick and \( \frac{3}{4} \) wide. The length can vary depending on the size of the curve needed. The one I use the most is 32” long. Cut a thin slot in each end, run nylon string between the notches, and secure it with a knot at each end. Make the 12”-to 14”-long adjustment arrow from \( \frac{3}{8} \) to \( \frac{3}{4} \) stock. Narrow one end of the arrow, and cut slots every \( \frac{1}{2} \)” to permit different curvatures of the bow. To use the device, place the arrow in the bow with the string in a notch that bends the bow into the curve you want. Note that by changing the position of the arrow in relation to the center of the bow, different shapes can be created.

Here’s another simple device you can make if you want to draw a curve exactly parallel to a curve drawn with the “bow and arrow” jig. Simply turn a \( \frac{1}{4} \)-thick disk with a radius equal to the distance you want between the two parallel curves. Drill a hole in the center just big enough to accommodate a pencil tip. With the pencil inserted, hold the disk against the bow and allow it to turn as you move it. The line will be parallel to the curve of the bow.

Robert Colpetzer
Clinton, Tennessee

A Better Birdsmouth Planing Block

A block with an acute-angled “V” cut in it is not a new idea for holding thin material on edge over the benchtop. It might be screwed to the benchtop or made removable with dowel rods in the block going down squarely into holes in the benchtop. Even before wear takes place, the block is liable to rise under the pressure of planing. You can cure this by arranging the dowel pegs at a slight angle, so planing pressure has a tightening effect on them.

Make the block and drill for the pegs, then use it as a template or jig for drilling the benchtop, before gluing in the dowels.

Will Atkins
Chicago, Illinois

An Improved Hold-down for Your Bench Hook

I had to replace a badly worn bench hook and made the new one with one end undercut. It gives me a better grip on thin stock and round pieces, such as dowel rods.

The board is hardwood, with a base of \( \frac{3}{4} \) x 5” x 13”. The ends, 1 1/2” square, are secured with glue and 1/2” dowels. The undercut is about \( \frac{3}{4} \)” deep with a 60° bevel.

Percy Blandford
Stratford-upon-Avon, England
A Third Hand at the Workbench

Add a helping hand to your bench. This simple jig wedges against your workbench's leg to support big or long workpieces, such as a door. Clamp one end of your work in your vise and rest the bottom edge of the other end of your work on this jig.

These quick supports are easy to adjust and can be made from a good 2 x 4, a small strip of wood and a few screws. The size and angle can be adjusted to fit your needs.

If your project is shorter than your bench (falling between the two supports), you can add a 2 x 4 running from leg to leg as a crossbeam support. For even extra support you can screw the cross beam to the helping hands.

Dan Lindsey
Girard, Pennsylvania

The Center of Our Attention

It's easy to locate the center of any circle with a carpenter's square. Place the square over the circle in the first position as shown by the solid line, with the outside of the heel of the square touching the circle at point B1. Then mark the points A1 and C1. Turn the square over and place it in the second random position as shown by the dotted line. Mark as before and join the A to C points. The point where these two lines intersect will be the center of the circle.

Thomas LaMance
Prewitt, New Mexico

Glue and Clamp Odd-shaped Pieces

Dry-assemble the pieces in the center area of a piece of plywood that extends at least 1\(\frac{1}{2}\)" beyond the outside edges of the assembled pieces. Trace the outline onto the plywood; then remove the pieces. Cut the plywood in half, and band saw the outline. Cut off an extra \(\frac{1}{4}\)" on one side of the center cut so that the plywood forms do not bind and prevent the pieces from clamping tightly together. After applying glue and assembling the pieces, place the plywood forms around the assembly and clamp across the outside edges.

C.E. Rannefeld
Decatur, Alabama
Pinch Clamps for Flat Panels

The problem with not using splines, dowels or biscuits when joining boards edge-to-edge is that it’s difficult to keep boards even so that a flat surface results. I recently solved this problem by making simple pinch clamps out of 1x2 scrap, as shown below.

Cut out an opening using the table saw or band saw. Make it the same size as the thickness of the boards you’ll be joining. I have several of these handy when I am edge gluing. When I have applied the glue to the boards and placed them together, I press the clamps over the end of the joint to ensure that the boards stay aligned during clamping. Chamfer the ends of the clamps to ease their application. The pinch clamps will work if the boards are of different thickness. I slip the clamps off before the glue dries, or I use wax paper, so they don’t become permanently adhered to the boards I’m gluing.

Roopinder Tara
Willow Grove, Pennsylvania

Drafted for Accuracy

To set up the miter gauge on your table saw to exactly 15°, 30°, 45° and 60°, first purchase two drafting triangles, one 12”, 45°/90°, and one 14”, 30°/60°. They’re available at most large office-supply stores. With one edge of the triangle against the miter gauge, and the other lined up along the miter gauge groove (parallel to the saw blade, of course), you can use these to double-check and fine tune the desired angle. To get the 15° setting, you need to use both triangles side by side. These triangles are also handy for checking blade tilt angles, including 90°.

Joseph G. Zweck
Madison, Wisconsin

Decimals to Fractions

Good Woodworking, a woodworking magazine in Great Britain, published this math tip from Tom Palermo. We thought it good enough to repeat.

To convert a decimal, multiply it by the denominator for the fractional resolution you want (e.g. 16). Then take the closest whole number of the answer and that’s the top part (numerator) of the fractions. For example: To convert .46 to 32nds of an inch, multiply .46 by 32, making 14.72. The closest whole number is 15, so the answer simply is \( \frac{15}{32} \).

Splitting Odd Fractions

It’s easy to divide an even fraction in half. You can almost do it in your head. Odd fractions, however, seem much more difficult, but they can be just as easy using the following process.

To find half of \( \frac{5\frac{1}{16}}{2} \), first divide the 5 by 2, leaving 2 and ... just forget about the rest. Then add the numerator and denominator of the \( \frac{1}{16} \) together (7 + 16 = 23). You know that the denominator of the fraction you’re working for will be 32nds, so take the 23 and make it the numerator, \( \frac{23}{32} \).

Add the whole number, and the answer is \( 2\frac{23}{32} \). Simple.

Bud Deunk
Fairview Park, Ohio

‘New Math’ Slashes Fractions

I read “Splitting Odd Fractions” in the September 1999 edition, and I have a much simpler system to cut any fraction in half in your head. This revolutionary system eliminates fractions and has been used for a long time. It’s called the metric system. Everything is in decimals and can be added or subtracted in your head. To convert from millimeters (mm) to centimeters (cm), just move the decimal point one place. I’ve found the metric system superior to our English system, and I don’t know why it’s not accepted. All scientific and technical businesses use it, why do woodworkers hate the system?

H.R. Wheeler
Fallon, Nevada
Wedge That Edge

I wanted to glue a solid wood edge on a plywood tabletop so that I could shape the wood edge with a router. Instead of buying the rather expensive special three-screw clamps made for this job (and I needed many of the clamps), I used an assortment of clamps that are in most every shop plus small wooden wedges made from scrap wood. The throat of the clamp should be the width of the edge plus about an inch so that the clamp and protective block will clear the glue line.

If you worry about gluing the protective block to the panel, put wax paper under it. Leave about 1/4" clearance between the edge strip and the clamp frame, and gently tap in a wedge. It will hold nicely. The method will work with most any type of clamp.

J.B. Marshall
Silver Spring, Maryland

Plane Very Thin Stock

Most planers are designed to thickness material to about 1/4", and then the blades start getting too close to the planer bed for comfort. But by adding a simple jig to your planer you can run most material down to about 1/8" thick.

Cut a piece of melamine-coated MDF to the width of the feed tables and about 4" longer than the bed of your planer. Then attach 1" x 2" cleats to the bottom of the board to serve as stops against the infeed and outfeed table edges.

With the jig in place, the knives only run a risk of cutting into the melamine. Carefully choose the material you run to this thickness because some woods with knots and erratic grain patterns can shatter when planed too thin.

Don Kinnaman
Phoenix, Arizona

Modified Handscrew

By making V-cuts in the end of one of my handscrew clamps I created this handy drill press aid for drilling the ends of round stock. Cut out the notches on the band saw and line them with inner-tube rubber or #60-grit garnet paper to prevent slippage. Best of all, the clamp can still be used for other purposes (just don't put quite so much pressure on the tip).

Simple Rule(r) for Simple Division

Finding the center of a board or dividing it into equal parts is as easy as grabbing a ruler – and there's no math required. It's an old trick but still a good one. Lay the ruler diagonally across the board. For seven equal widths, align the ruler on the 0" and 7" marks across the board and mark off the intervening inches. Need to find the center? Keep the rule at 7" diagonally and mark at the 3 1/2" location. It's that simple.

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Choose the ‘Right’ Triangle for the Job

For benchwork, we can mark things at 90° with various squares, but if we get outdoors to lay out the foundations of a workshop, the base for a playhouse, or just a plot of land, squareness becomes a different problem.

The corner of a 4 x 8 sheet of plywood is usually square and used to mark anything within its range, but many outdoor projects are bigger than that, so the best method to use to get a large square corner is the 3:4:5 technique. In a triangle with the sides in the proportion 3:4:5, the angle between the two short sides is 90°. So: 1) Choose units in which one short side, usually the “3,” is longer than the finished length you want. As an example, choose 5'. Stretch a baseline string 20' (four “units”) between pegs or nails. 2) From the corner point of the triangle, stretch your tape measure 15' (three units). 3) From the other point measure 25' (five units) with another tape measure. 4) If you don’t have two tape measures handy, a five unit (25’) and a three unit (15’) string starting from the “A” and “B” corners will meet on a direct line to the A corner point, which will be square to the baseline. You can then measure other positions from these square lines.

Percy Blandford
Stratford-upon-Avon, England

Another Center-finding Trick

Many people don’t own a center square because they don’t need to use it every day. If you need to find the center of a circular object, you can improvise a center square using other tools. Set a bevel square to 45° and position it across the corner of a roofing square so its blade bisects the angle. If you arrange this against the round object and pencil along the blade in two or more positions, the lines will cross at the center.

If you are unsure what to use to set the bevel to 45°, use this magazine. Fold a corner of this page back on itself and the fold will be at 45° to the edges.

Percy Blandford
Stratford-upon-Avon, England

Painting Stilts Speed Finishing

Many projects require finishing on two sides, as well as along edges. You have to finish one side, let it dry, then finish the other. Speed up the work with painting stilts. Make the stilts by cutting a small triangle, square or circle of 3/8" plywood and driving 6d finishing nails all the way through. It helps to sharpen the nails first on a belt sander or grinder – the sharper the point, the smaller the mark it will leave on the back of the project. After finishing the underside of the piece, set it on the stilts and finish the remaining surfaces. Leave it on the stilts if you want to add more coats. When dry, lift the project off and there will be only small prick marks on the underside.

David F. Black
Barnwell, South Carolina
Non-binding Box Lids

Lots of woodworkers who enjoy making boxes prefer to build the box and lid in one piece and then cut the lid off on the table saw after the glue has cured. This offers a good grain match and eliminates any alignment problems.

Unfortunately, when the box is separated from the lid, the blade will sometimes bind on the last cut. Wedges can be placed in the saw kerf, but this is often awkward and possibly dangerous.

A better idea is to use dabs of hot-melt glue to attach blocks to the inside surface of the box over the location of the lid joint during assembly. When the box is cut apart, set the saw blade to cut about 1/16" deeper than the thickness of the box side. The box itself will be parted, but the blocks will hold the kerf open. The blocks can then be knocked off and the inside surface sanded.

Popular Woodworking editors

A Square for Sheet Goods

Counting on the squareness of a framing square while laying out a cabinet can be an exercise in futility. And if you have a square engineer’s square, it might be only 18" long.

You can make your own accurate and adequately sized layout square from a piece of 1/4”-thick hardwood plywood. Simply cut a triangle with one edge 49" long, and the adjoining right-angle edge at 24" long. Next make the stop by cutting a 1/4” x 3/4”-deep groove down the center of the 1” edge of a 1” x 3” x 24” piece of solid wood.

Drill four clearance holes through one leg of the groove, 1/2” in from the grooved edge. Then slip the 1/4” plywood blade into the groove and put a flathead screw through the hole nearest the right angle corner, through the blade and into the opposite side of the stop.

Next square up the blade to the stop by drawing a line using the square on a flat piece of plywood. Flip the square over and check your line. By moving the loose edge of the blade in and out of the stop you can achieve a square angle, then fasten the other screws in place.

Popular Woodworking editors

A Better Bench Hook

The traditional bench hook has many uses. Made from 3/4” plywood that is 12” wide by 18” to 24” long (though any dimensions will be fine), it has a 3/4” x 2” x 12” cleat attached to each end on opposite faces. The bottom cleat hooks onto the front edge of the workbench, while the stock is held firmly against the other cleat for cutting or for “shooting” the ends of boards with a plane.

You can improve your bench hook by making saw cuts in the top cleat at 45° and 90° for a “mini-miter box.” Turn it over and glue a sheet of #100-grit garnet paper to the other side. This is useful for hand-sanding small pieces, or you can set small pieces on the sandpaper base to keep them from slipping while you use a power sander.

Don Kinnaman
Phoenix, Arizona
Squaring on the Table Saw

One of the biggest problems I have in my shop is squaring a large board that I’ve glued up from strips. Even with jointing, the two straight edges may not be exactly parallel, so you can’t flip it over to reference the cut from both sides. I developed the following method to ensure a square board.

Use a framing square and mark one end of the board square to one side, and mark the edge you use as a guide. Measure the distance from the outside edge of the saw teeth and the outside edge of the saw table (X). Place a square against the reference edge, and mark the distance (X) from the first line you marked.

Clamp a straightedge on the second line. (The clamps must be placed to the right of the straightedge.) Now flip the board over and let the straightedge butt against the right side of the saw tabletop. The straightedge and the tabletop will serve as a fence to guide the piece straight, and you will have excellent control. Do the same for the other end using the same reference edge.

Jan C. Plemmons
Jacksonville, Florida

Make Cope-and-stick Doors With Fewer Router Cuts

When cutting rails and stiles for cope-and-stick doors, I cut them in pairs from wider boards to reduce the number of cuts needed and increase my accuracy. If the stiles and rails are to be 2 1⁄2" wide, I first cut 5 1⁄2"-wide boards to length.

Then I mark each board with an identifying number or symbol to keep them together. I then rip the stiles to width, but I leave the rails at 5 1⁄2" wide and then cope the ends using a cope-and-stick set in my router table. A wider board is easier to cope on the router table and it saves time by cutting the number of coping passes in half. Another benefit is there’s less chance of tear-out. If any tear-out does occur on the ends, you can rip the piece to have the tear-out on the fall-off section because of the extra width.

Then, by ripping the rails to finished width, (or a little wider if you want to joint them) and keeping the pairs together, you know they are the same length. This also works well with the stiles, because even a small difference will keep them from being square. By using normal router or shaping practices and backer boards, tear-out should be nil.

Charles Townsend
Longview, Texas
A Simple Jig to Find the Middle

This is another trick that’s so useful it’s been turned into commercially available jigs. But simple is still the best.

There are many times we require a line exactly in the center on the edge of a board, as when marking dowel positions. This simple shop-made tool will scratch a center line on the edge of any board within its capacity. It consists of two pieces of dowel rod projecting from a piece of wood and a nail with its point projecting midway between them. In use, you twist the tool over the wood so the dowels bear tightly against it and move it along while pressing down to make the nail point scratch the work. If you make the space between the dowels 1 1/2", you can draw center lines on wood from about 1/2" up to 1 1/4" thick. A pencil can be substituted for the nail, and a larger jig can be mounted to a router for making accurately centered mortises.

Percy Blandford
Stratford-upon-Avon, England

Add Magnetism to Your Shop

Magnets have been around a long time, but it wasn’t until recently that a new breed of magnet was developed that is extremely useful in the workshop.

Neodymium iron boron magnets (more commonly known as rare earth magnets or REMs) have properties and powers far beyond those of “regular” magnets. For example, a 1/4”-diameter x 1/8”-thick rare earth magnet lifts a 2-pound block of steel; an 1/2”-diameter magnet lifts a 10-pound block; a 3/4”-diameter magnet holds a 20-pound block of steel; and a 1”-diameter magnet lifts a 35-pound block!

They are called “rare earth” magnets because until recently it was difficult to separate and refine the raw elements used to give these magnets their almost magic power. Created under pressure in an oriented magnetic field, then fused and heat-treated, these magnets have exceptional resistance to demagnetization, and they have outstanding stability and power. As a woodworker you might recognize the term from a few years ago when Porter-Cable introduced its Magna-Quench cordless drill/drivers that used rare earth magnets. The magnets’ surprising strength has now made them useful in many other ways.

We came across rare earth magnets in a Lee Valley Tools catalog and ordered some to try them out. We’ve been using them in projects and around the shop ever since. We’ve listed a number of shop and woodworking uses for rare earth magnets that we’ve come up with below, and hope you’ll let us know of any others you’ve found.

Popular Woodworking Magazine editors

15 Workshop Uses for Rare Earth Magnets

1. Attach your chuck key to your drill press
2. Attach blade wrenches right to your saw
3. Make catches for doors in small projects
4. As connectors for toy trains and puzzles
5. Glue one to a stick or car antenna to retrieve a table saw nut from the sawdust
6. The same stick will chase router bits, screws and small tools from under workbenches
7. Check for nails in “found” wood
8. As tool hangers in shop cabinets
9. Make a dust collection hood that fits on all your machinery (no matter what diameter hose required) by using the magnets to attach the hood to the machine
10. Make your own high-power magnetic featherboards
11. Locate metal studs in walls
12. Attach plywood faces to a metal vise
13. Attach shop drawings or cutting lists to the machine you’re working at
14. Reverse the polarity on two magnets for spring-open lids in boxes or cases without handles or pulls
15. Make a powerful nail/screw holding wristband as seen in the catalogs using a magnet and a strip of Velcro

Scrapwood Corner Clamp

All shops have scraps of hardwood plywood. We don’t want to throw out even 10” to 12” square chunks because we might need them later. Here is your need right now.

This is a corner clamping aid to be used with C-clamps, handscrews or bar clamps. It will squeeze the corners of bookcases, picture frames or other projects. The hole on the inside corner permits perfect fit of a 90° mitered joint, and prevents any oozing glue from sticking to the aid.

The notches on the top and side are for positioning C-clamps for a tight fit, or they can be used with bar clamps to pull the corners on each end toward each other. Make these aids from two or three thicknesses of 3/4” plywood in sizes to suit your own needs.

Don Kinnaman
Phoenix, Arizona
Fold a Band Saw Blade With One Hand

When you buy a band saw, the owners manual provides lots of good information about the machine. What often is missing is how to handle the blade. Folding a band saw blade for storage is either an injury-defying task or a magic trick. For those of you who aren’t magicians yet, we offer this illustrated how-to.

1. Grasp the blade in one hand (gloves are an OK idea) with the teeth facing away from your body. Your arm is twisted in toward your body 270° from its natural resting position. Place your foot on the lower portion of the blade, holding it against the floor.
2. Rotate your hand 180° so the blade forms a figure eight.
3. Rotate your hand another 180° in the same direction as the first time, and push down to collapse the blade straight down toward the floor.
4. As the circles meet, use your other hand to adjust the three hoops. Then simply grasp the conveniently sized folded blade for storage.

David Thiel
senior editor

Relief from Awkward Fall-off

When cutting a circle or an odd shape from a square piece of lumber on a band saw, you’ve probably dealt with the annoying corners that try to pull the material out of your hands as they catch on the saw’s table. Then there’s the additional annoyance of the blade binding in a weird curve. A few extra cuts can almost eliminate these problems. Make relief cuts in from the edge of the material right up to the edge of the finished shape. Space the cuts about an inch apart and parallel to one another. Then, as you make the cut on the shape itself, the fall-off will do just that – in small, manageable pieces and without binding the blade.

Popular Woodworking Magazine editors
**Setting Bits with a Combination Square**

I’ve found that a combination square is a useful tool for checking the projection of a cutter through a router base or the top of a router table. Most combination squares will still lock when the blade end is withdrawn from the square surface of the square’s stock up to about \(\frac{3}{4}\)”, which is often as far as you want a bit to project anyway. The blade can be positioned by measuring from the end of the stock with an accurate ruler. The broad surface of the stock will stand steadily on an inverted router while extending over the bit opening.

**Percy Blandford**
Stratford-upon-Avon, England

**Crosscut Short Pieces Without Making Missiles**

A stop block provides the most accurate and efficient way to crosscut multiple workpieces to the same length on a miter saw. For safety, the “keeper” section of the workpiece is normally held firmly against the stop block and fence, with the “offcut” unrestricted on the opposite side of the blade. However, it’s unsafe to cut short multiples this way because a grip on the keeper piece places your hand dangerously close to the blade.

The solution is to use a stop block and spacer on what would normally be the “off-cut” side of the blade, as shown in the drawing. Set up the cut with a spacer stick placed between the workpiece and the properly positioned stop block. Before making each cut, simply remove the spacer stick while holding the workpiece firmly against the saw fence opposite the keeper piece. This will prevent the “offcut” (which, in this case is actually your keeper piece) from pinching between the blade and the stop block during the cut, which can cause it to be violently thrown. This technique works quite well on a miter saw, and even on a radial arm saw, or a tablesaw crosscut sled.

**Bob Howard**
St. Louis, Missouri

**If You Could Have Only One Finish**

One viewer of “The American Woodshop” really pinned me down recently. He asked what finish I would use if I could use only one. It’s simple: I would dilute a satin polyurethane by 25 percent with mineral spirits and wipe it on with clean cotton rags. It takes three applications to end up with a perfect and durable finish. This technique virtually eliminates drips and runs, plus there are no brushes to clean up. Remember to always wear good finishing gloves and work in a well-ventilated area. Better yet, work outside when the temperature is between 70° and 85°, and the humidity is between 40 and 60 percent. Also, always remember to dispose of the used rags appropriately.

**Scott Phillips**
Piqua, Ohio
Paring With Confidence

I made a table with a plywood panel that fit between the legs. After laying out the notches at the panel’s corners, I cut them out with a jigsaw. To be safe, I undercut them and had to pare them a bit to fit.

After a couple of attempts at careful free-hand paring, I realized that I needed help. So I clamped a thick, square block of wood to the panel, aligning its edge with my cut line. This provided a straight, flat reference surface for the back of the chisel, and it yielded the fine, straight cut that I was after.

Jim Stith
Beulah, Missouri

Sanding Screen Speeds Sharpening

For a chisel or plane iron to be truly sharp, its back must be lapped flat, then polished to a smooth finish. This initial lapping step tends to be the most tedious part of sharpening, and I’m always looking for a quicker way to do it. In the past, I’ve used wet/dry silicon-carbide sandpaper, but I found that it tends to slightly round the back of the tool.

I recently discovered that a #120-grit “sanding screen” – an inexpensive product used for smoothing drywall – works great for the process. Available at home-supply stores, the screen cuts aggressively and the openings allow the honing “swarf” to fall through without building up on the surface. I place the screen on top of a piece of #400-grit wet/dry sandpaper that I adhered to a sheet of plate glass using spray adhesive. After lapping the tool on the screen, I use the #400-grit sandpaper underneath as the next honing surface in a sequence that continues up through finer grits until I have a finely polished surface on the tool.

Tod Herrli
Marion, Indiana

Handy Drill Storage

I don’t know about other woodworkers, but I really appreciate having my drills, corded and cordless, at hand and ready to use. I solved this by mounting a ready-made “scabbard” on the wall right over my bench where most of the drilling takes place. Just be sure to air it out first.

Albert Beale
Littleriver, California

Prevent Your Knobs From Spinning

If you’re building a chest of drawers and using round wooden drawer pulls, here’s how to keep the knobs from turning off the retaining screw. First, turn the screws into the knobs as usual, then drive a tiny nail through the drawer panel from inside, so it enters the knob about 1/4”. Now the knob won’t turn off the screw. If the drawer front is hardwood, be sure to drill a pilot hole for the nail. You can also use small wood screws so they may be removed at a later date.

Lane Olinghouse
Everett, Washington
Add Accuracy to a Miter Gauge

Attach a $\frac{3}{4}" \times 2\frac{1}{2}" \times 28"$ board to your miter gauge (not an original idea), then put a piece of masking tape on the table saw in front of the blade insert. Then cut partway into a board using the miter hold down. Shut the saw off and slowly pull the board back until the board is half covering the tape. Mark a thin line on the tape to indicate both sides of the kerf. Now when you want to make an accurate cut, line up the mark on the workpiece with the mark on the tape. Change the tape that’s stuck to the table when you change the blades.

Bernard H. Derbyshire
Newtown, Connecticut

Silencing the Drums of Waste

To get the most out of my sanding drums, I built a box for my drill press with six interchangeable inserts that accommodate sanding drums from 1" to 3". There’s also a hole in the side of the box for my shop vacuum. By lowering the sanding drum into the box, I get a fresh section of unused sanding surface.

Philip R. Beyers
Redford, Michigan

Perfectly Mated Edge Joints

No matter how often you square up the fence on your jointer, that perfect 90° angle can still manage to elude you. And when you’re using that jointer pass for an edge glue-up, perfect is preferred. We use a method in the Popular Woodworking shop that guarantees a perfect 90° angle each time.

First match your boards for best appearance and mark the faces and joints. Run one piece with the face against the fence, then flip the mating piece so that the good face is away from the fence. When you test the glue joint — even if the fence is off by a fraction of a degree — the edges will be complementary angles to one another and form a perfect glue joint.

If you’re gluing up more than two pieces to form a panel, alternate your board orientation against the fence and you’ll get a panel with perfect joints that is as flat as can be.

Popular Woodworking editors
**Gun Sight for Blind Nailing**

I often had trouble correctly placing an air-driven nail when the lower piece was hidden by the upper, such as attaching the roof of a birdhouse or a shelf on the inside of a cabinet. If I missed the edge of the inside piece, it could ruin the work. I solved this by creating this jig: Two equal-length pieces of thin wood separated by a wood block, creating an opening large enough for the upper piece of wood. When I slide the jig over the upper piece, the bottom part of the jig is stopped by the lower piece and the upper part shows where to place the nail.

Marc Colten  
Alpharetta, Georgia

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**Aluminum Angle Bracket Keeps Crosscuts Accurate**

The extended wood fence screwed to my table saw's miter gauge would sometimes flex, making it difficult to keep pieces perpendicular to the saw blade during crosscuts. The situation became even worse after I cut a tall kerf in the fence one day. To solve this, I added a piece of aluminum angle to the backside of the extended wood fence.

My fence is made by laminating two pieces of \( \frac{1}{2} \)" Baltic birch plywood, rounding over the top back edge with an \( \frac{1}{8} \)" roundover bit, hacksawing a 1" aluminum angle bracket to the same length, then simply screwing the angle to the fence. Now the fence never flexes, regardless of saw kerfs. Make sure that your fence is tall enough so that the bottom of the aluminum angle is higher than the top of your saw blade at its highest setting.

Bill Law  
Cincinnati, Ohio

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**Quick-release Table Saw Guard**

Having grown tired of bolting and unbolting the blade guard of my table saw, I came up with a simple idea that allows for quick removal and installation of the guard with no tools.

All I did was place a strong compression spring on the outside of the two mounting flat washers. This compresses the washers together and they squeeze the mounting flange of the guard, keeping it in place. I sandwiched the convex side of the flat washers together. This provides a slight gap to allow the blade guard to pry the washers apart when installing the guard. To make sure it stays together, I replaced the original nuts with plastic insert lock-nuts. For the inside mount I had to use a slightly longer bolt in order to have enough thread exposure past the mounting flange. This allowed me to install the plastic insert lock-nut.

Tighten the nut and bolt together to achieve a tight grip on the guard. To remove the guard, just remove the throat plate and lift out the blade guard. To install the guard again, remove the insert, use the guard to wedge open the washers and set it in place.

PWM  
F. Chrysanthos  
Etna, California
A \textit{fter reading hundreds of tricks from the 144 issues we’ve published during the last 25 years, I started to notice some common themes that were repeated time and again.}

There were lots of tricks that used garden hose, pegboard, wire hangers, rubber bands and clothespins. But my favorite tricks, by far, were the ones that went something like this: “Sneak into the kitchen/bedroom/bathroom/boudoir and borrow the such-and-such to perform this McGuyver-like feat. But whatever you do, don’t tell your spouse what you’ve done.”

So let us now pity the poor spouses that have had to endure the following assaults on their personal space and personal care products:

- \textit{You’ll Have to Makeup After This One:} R.B. Himes – a consummate creator of tricks – suggests borrowing a mascara brush to apply glue to a deep mortise or any hard-to-reach spot. He also recommends (perhaps from personal experience) that you don’t “borrow it without asking your wife.”

- \textit{Atomic-age Woodworking:} Several tricks recommend using the microwave to improve your woodworking. Penny Hermsdorfer insists you can revive dried-out wood putty by placing it on a paper plate, moistening it with a few drops of water and nuking it for 15 to 20 seconds. And Michael J. Burton says you can bend small pieces of wood by first wrapping them in a wet rag and then microwaving them on “high” for a minute.

We once read in a woodworking magazine (not ours, incidentally) that you could shrink biscuits that were too thick by microwaving them. We tried this in the kitchen of our publishing company one morning. Let’s just say the resulting smell got us banned from the lunchroom. And, to make matters worse, the trick didn’t work. The biscuits just got stinky and charred.

And finally, when your old microwave has reheated its last Lean Cuisine, Charles Hunsecker says you should take it apart and dig out the 3" disc magnet located above the unit’s Mag tubes. He
sticks the magnets to the side of his table saw and sticks his saw’s wrenches to that. Yup, we really published that one in 1995.

- **You Better Come Clean:** Household cleansing products are not safe from the crafty woodworker, either. Lane Olinghouse cleans up his hands after a dirty day in the shop using a custom blend of liquid soap and baking soda. This, he claims, leaves his hands “smelling fresh.”

  The late Don Kinnaman – another frequent trickster – used a brush designed for scrubbing floors to make a sanding block that’s handy for lathe work. Not only do you need a scrub brush for this one, but you also need two mousetraps (always the mark of a quality trick). Glue and screw the two mousetraps to the handle of the brush and use the mousetraps to secure the sandpaper sheet as it’s wrapped over the bristles.

  John E. Leeds says you can take the same wooden scrub brushes and cut them up into smaller brushes that are good for applying glue. His solution is so “cost-effective” (read: “cheap”) that he uses them once and tosses them away.

- **A Sip of Sap:** OK, someone needs to ban Lane Olinghouse from the kitchen (see the baking soda trick above). Lane also recommends you use drinking straws to thread doorbell wire through studs. Drill a hole in the stud that’s the diameter of your drinking straw. Now you can pass the wire through without it getting caught on the rough wooden walls of the stud. On second thought Lane, that trick isn’t too bad; you can stay in the kitchen.

- **How to Ruin an Anniversary Gift:** This trick is not for the faint of heart. Howard Moody says you can make small-scale clamps using the type of earrings that use a threaded screw to secure the bauble to the ear lobe. While I’m sure this might work, I wouldn’t recommend you actually decide which pieces of jewelry in the jewelry box have been discarded. You might just wake up one morning and find your $200 Starrett straightedge prop ping up tomato plants in the garden.

- **Stealing Storage Space:** Joy Boyd says that lipped plastic dishpans can be transformed into quick drawers under a benchtop with the addition of L-shaped cleats. Howard Moody (at it again) swipes empty seasoning bottles to hold abrasive powders: silicon carbide, pumice and rottenstone. And Dana Batory uses old silverware chests to cradle auger bits in velvet.

- **The Fingernail Fix:** It seems that emery boards are impossible for woodworkers to resist. Joe DeVoe uses them to buff out defects in his film finishes and to remove spilled cyanoacrylate glue from finished objects. Austin Schmidt uses them on bare wood, usually to sand off burrs on the underside of his scrollsawn pieces.

- **What’s Cooking in the Kitchen?** Keith Mealy uses coffee filters to strain his finishes (not in the kitchen sink we hope). Norman Stewart converts rolling pins into outfeed stands for his machines. He cuts the pins into 1” lengths and threads them onto dowels. And George Baharian grinds the V-shaped tip of bottle and can openers into scrapers.

- **The Pantyhose Patrol:** Perhaps proving that woodworkers will go to any lengths to save a few dollars, we’re always amazed at the tricks that involve pantyhose. One of the most common tricks we see is to use discarded (yeah, right) pantyhose to strain lumps out of finishes or glue.

  But it doesn’t end there. Trickster Howard Moody uses pantyhose to find small objects he’s dropped. Here’s how: Stretch and secure some pantyhose over the nozzle of your shop vacuum and turn the vacuum on. Suck up the area with the small part. The pantyhose will catch the part instead of sending it into the vacuum.

  Chuck Kubin must live in the same neighborhood as Howard. He uses pantyhose as a prefilter for his shop vacuum. He disassembles his shop vacuum and stretches the pantyhose over the filter, ties it off and secures it. This, he insists, keeps “larger particles from clogging the filter.”

**It Doesn’t Work Both Ways**

It’s also a good idea to keep woodworkers from bringing their tools into the kitchen to solve cooking problems. A few years ago, a particularly intrepid reader wrote to us about his brilliant idea for using a router to mix up some cake batter in record time. Before we tell you the end of the story, here’s a little nugget of information that’s important to know: The typical kitchen mixer operates between 150 and 550 rpm to knead bread at the low end or whip cream at the high end. Routers, on the other hand, spin at a whopping 8,000 to 24,000 rpm.

Our best guess is that what happened to that reader in the end was there was a trick published somewhere in a cooking magazine (they love tricks, too) dealing with how to best clean cake batter off kitchen ceilings.
UPGRADE YOUR Workbench

10 ways to make your bench indispensable.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 11407 or chris.schwarz@fwmedia.com.
I hate to say it, but no matter how much time and money you spent building or buying your workbench, it's probably not as useful as it should be. Like adjustments to a new table saw or handplane, there are a number of things everyone should do to tune up their bench. Also, there are several simple improvements that will make your bench perform feats you didn't think were possible.

Most of these upgrades are quick and inexpensive. All of them will make your woodworking easier, more accurate or just plain tidier.

1 Improve Your Topography
Flattening your benchtop regularly is like changing the oil in your car. It's a routine step that will save you headaches down the road. A flat top is essential to accurate work for three reasons:

• When planing, sanding or routing a board, you want your work to rest firmly against your bench; a flat benchtop helps keep your work in place.
• A flat top will divine whether your workpieces are cupped or bowed. If you ever want to remove the cup or twist from a door panel – a common malady – you must have a flat benchtop to know when your panel is finally flat.
• A flat top guides you as you assemble your projects. If you want your latest table, chair or cabinet to not rock, you have to make the legs or base all in the same plane. A flat bench will quickly point out your problems and the best solution.

So how do you flatten a benchtop? The simplest way is to run it through a big drum sander, which you can find in mid-sized cabinet shops. A couple woodworkers I know have paid about $50 for the privilege. The only downside is that you'll have some sanding grit embedded in your bench when it's all over, which can scratch your work in the future. So I don't recommend this.

There is a way to flatten your bench at home by planing it with a router – once you build a somewhat complex carriage system that guides and holds the tool (no thanks).
My way is faster. I flatten my benches with a No. 5 jack plane, an old No. 7 jointer plane and a couple of sticks. The sticks are two pieces of plywood that measure $\frac{3}{4} \times 2 \times 36"$. Traditionally called winding sticks, these will quickly determine if your bench is flat and where it’s out of whack.

First place one of the winding sticks across one end of the bench. Then lay the other stick across the bench at various places along the length of the top. Crouch down so your eye is level with the sticks to see if their top edges are parallel. If they are, that area is flat. If they’re not, you’ll see where there are high spots.

Old-time winding sticks were made using a stable wood, such as mahogany, and were sometimes inlaid with ebony and holly on the edges (a black wood and a white wood) so you could easily see the difference. I prefer plywood because it’s dimensionally stable and cheap. If you need contrast between your sticks, I highly recommend “ebony in a can” (black spray paint).

Mark all the high spots directly on your bench and start shaving them down with your jack plane. Continually check your work with your winding sticks. (For more on these sticks, see “Keep Your Winding Sticks in Focus” below.)

Keep Your Winding Sticks in Focus

When using winding sticks, one of the difficulties is trying to keep both sticks in focus when they are 6’ away from each other. If one of the sticks is blurry it’s difficult to tell if they are in line with each other.

The solution comes from the world of photography. Take a piece of thin cardboard – I use the stuff from the back of a notebook. With your bradawl, punch a small hole (\(\frac{1}{32}"\) or so) in the center of the cardboard. Crouch down in front of your winding sticks and look at them through the hole. Both sticks should now be in focus.

In a camera, when you close the aperture (also called the F-stop), more of the picture is in focus. The same principle works with your eye. If you close the aperture that light passes through, more of what you see will be in focus.

As a practical matter when doing this, check both ends of the sticks by moving your eye left to right, not your head. It’s easier to get an accurate reading from your sticks this way.
When the top is reasonably flat, fetch your No. 7 plane. First plane the top diagonally, moving from corner to corner. Then come back diagonally the other way. Do this a couple times until you’re taking shavings at all points across the top. Finally, plane the length of the bench. Start at the front edge and move to the back edge. When it looks good, check it with the winding sticks.

2 A Deadman Lends a Hand
One of the trickiest operations is working on the narrow edge of a board or door. Securing the work is the No. 1 problem. The traditional solution is what’s called a sliding deadman. I installed the one shown at right in an afternoon and now I wonder how I ever got by without it.

Because the deadman slides across the front of the bench, you can accommodate all lengths of work. And because the ledge can be adjusted up and down, you can hold narrow boards or even entryway doors. With the help of your face vise, you can immobilize almost anything with this rig.

I added the deadman by screwing two rails to my bench that each have a groove milled in one long edge. The deadman itself has a slightly undersized tenon on each end that allows it to easily slide in the grooves. You can download a construction drawing for this project from our web site by visiting popwood.com. Click on “Magazine Extras” to get to the drawing.

3 Add a Leg or Bench Jack
While I consider the sliding deadman to be the cat’s meow, there are simpler ways to support oversized work at your bench.

If you do a lot of work on big doors, a leg jack is probably the best bet for you. Basically you bore $\frac{3}{4}$-inch holes every 4” up the front leg of your bench that’s opposite your face vise. (For example, if your vise is on the left side of your bench, bore the holes in the right leg.) Chamfer the holes (see the next section on dog holes for directions) then insert a $\frac{3}{4}$-inch-diameter dowel in one of the holes. You’re in business.

A leg jack is great for clamping long work, and it takes only about 20 minutes to add to your bench. There are fancier ways to do this, but none is more effective.

This simple bench jack excels at clamping boards that are 8” wide or narrower. Like the leg jack, this is a quick upgrade.
The disadvantage of this jack is that it supports only long work. To hold shorter work, you need to add a second kind of simple jack to your workbench — a bench jack.

For your bench jack, you'll bore the $\frac{3}{4}'$-diameter holes across the front edge of your workbench — every $4'$ or so should be sufficient. Make the holes about $2'$ deep and chamfer their rims.

Next get a $2'$ length of $\frac{3}{4}'$ dowel. To create a ledge for the board to rest on, your best bet is to buy an L-shaped piece of steel from your local hardware store. This $1$ item usually has screw holes already bored in it and is used for reinforcing corners.

Screw this L-shaped steel to the end of the dowel (see photo on page 57). This jig now will allow you to hold narrow boards of almost any length in place so you can work on the edge.

4 Add Bench Dogs
A good system of bench dogs and dog holes makes routine operations easier and impossible tasks a cake walk. And retrofitting a bench with round dog holes is quick and simple.

I like to have at least two rows of dog holes running down my benchtop that are spaced $4'$ apart. On some benches, I've had the dog holes line up with the dogs on my tail vise so that I can clamp things between my tail vise and any dog hole on the bench. But even if you don't have a tail vise you can unlock the power of the dog hole with a product called the Wonder Dog from Lee Valley (see the Supplies box at the end of this article).

The Wonder Dog is essentially a mini-vise that slips into any $\frac{3}{4}'$-diameter dog hole. It allows you to apply pressure in any direction, which is great for clamping round or other irregularly shaped pieces for sanding or planing.

To drill the dog holes, your best bet is to make a jig like the one shown at left. Also grab a $\frac{3}{4}'$ auger bit and a corded drill.

Clamp the jig to your bench and drill the hole all the way through the benchtop. Use a slow speed. After you drill each hole you need to chamfer the rim to keep from ripping up your benchtop when you pull out a dog. The easiest way to do this is with a plunge router.

So chuck a $45'$ chamfer bit that has a $\frac{3}{4}'$ bearing on its end in your plunge router. Insert the bearing into the dog hole, turn on the router and plunge straight down, making a $\frac{3}{8}'$-deep cut, as shown at left.
Add a Tail Vise

If you've got just one vise it's almost always on the front (sometimes called the face) of your bench. A tail vise (located on the end of the bench) is an extremely useful upgrade. The retractable metal dog on most vises allows you to clamp really long workpieces to your bench between the vise's dog and a dog in the benchtop. It's also just plain handy to have a second vise.

When choosing a tail vise, you have three good options, as described here:

- You can buy a traditional quick-release metal vise with a retractable dog for between $65 and $150. It's easy to install.
- You can buy a front-vise screw kit that you just add wooden jaws to. This option can be a bit cheaper (about $70) but requires more labor. The advantage to this vise is that you can add dog holes to the top or front edge of the wooden vise faces.
- You can buy an expensive specialty vise that will do things your face vise won't. The Veritas twin-screw vise ($169) gives you a huge tail vise that can be used for clamping or holding almost any flat work. Or you can buy a patternmaker's vise ($220 - $550) that excels at holding irregular objects at any angle. Both of these vises are pretty expensive, but worth it.

Add a Planing and Sanding Stop

Many woodworkers clamp their work down when they don't have to. In many cases, gravity and the force of your tool will do the job.

A planing stop is essentially a lip on the end of your bench that can be adjusted up and down. When you're going to plane your work you merely put the wood against the stop and plane into it. The force of gravity plus the direction you are pushing your tool holds the work in place.

The same concept works for belt sanding. Just remember which way the sander spins. The front of the sander should point away from the stop. Otherwise the machine will shoot your work across the room, easily puncturing any Styrofoam cooler in its path. Don't ask me how I know this.

The most versatile planing stop is a piece of 1/2"-thick plywood that is as long as your bench is wide. A couple wing nuts, bolts and washers allow you to position and fix the stop up and down, depending on the thickness of your workpiece.

The hardware is readily available at any home center. The part that is driven into the bench is sold as a 1/4" x 20 screw-in insert nut. To install it, first drill a 3/8"-diameter hole in the end of your bench. Coat the hole with epoxy and drive the insert in slowly using a (usually metric) hex wrench. Then
thread a 1\(\frac{1}{4}\)"-long bolt through a \(\frac{1}{4}\)" x 20 wing nut and a \(\frac{1}{4}\)"-hole washer.

The stop itself is made from plywood with two stopped slots that measure \(\frac{5}{16}\)"-wide. Make the slots long enough so your stop can go below the work surface of your bench.

This stop allows you to plane wood of almost any thickness with ease. Unscrew the wing nuts, adjust the stop where you want it and tighten the wing nuts to hold the stop in place.

### 7 Add a Holdfast

Sometimes you need to hold a board on your bench so you can work on its end, such as when you’re chiseling out the waste between a set of hand-cut dovetails. Nothing is as quick or efficient at this job as a quality holdfast.

A holdfast is essentially a hook that drops into a hole in your bench. You tighten it with a screw or rap it with a mallet to lock the work to your bench.

There are three major types that are worth purchasing. The Veritas Hold-down is the Cadillac of the bunch ($52.50). It drops easily into any \(\frac{3}{4}\)" hole in your bench and is tightened by turning a screw on the top. I’ve used this holdfast every day for five years and it has never let me down.

The second option is more economical. Glass-filled nylon holdfasts are cheap ($11.50 a pair from Lee Valley Tools), but you have to reach under your benchtop to operate them.

The third type is a metal hook. Rap the top to tighten it and rap the back to release it. All of the versions I’ve seen in catalogs are cast metal and don’t work well for me. My fellow hand-tool enthusiasts recommend forged holdfasts, which are handmade by blacksmiths. It’s worth asking around in your area if there’s a blacksmith who will do this work for you. Expect to pay about $30, maybe a bit more.

### 8 Add a Sharpening and Finishing Tray

While some people might accuse me of just being fastidious, there are many sound reasons to protect your workbench from sharpening slurry and finishing materials.

Sharpening slurry is made up of bits of metal and abrasive that will dig into your workbench and later get embedded in your work. And finishing materials (dyes, stains and glazes in particular) can rub off on your work for weeks or years if they spill on your bench.

That’s why a tray with a low lip is ideal for typical sharpening and finishing jobs. I make my trays from inexpensive plywood with the lip made of \(\frac{3}{4}\)"-thick scrap pieces – plus glue and screws. The best thing about the tray is that it drops into two dog holes, so there’s no need to clamp it in place. This makes the tray especially good for sharpening because the tray stays put as you work.

### 9 A Top Just for Gluing

Not all of us have the luxury of a separate bench
for assembly, so I end up constructing most of my furniture right on my bench.

Getting glue on the bench is a big problem most woodworkers face. Yellow glue, which is mostly water, isn’t good for your top because you’re introducing moisture in places where it has spilled. And dried glue can easily mar your work.

So I have a removable top that fits right over my benchtop for gluing chores. It’s made using 1⁄8”-thick hardboard (available at your local home center store) and four cleats that keep it securely in place on the benchtop.

Why not use newspaper or a blanket? Well, newspaper makes a lot of waste, and is slow and messy. Blankets, if not perfectly flat on your bench, can actually introduce a little twist in your glue-ups. If you don’t want to make a hardboard glue-up top, the next-best option is to buy a thin plastic tablecloth, available at many home-good stores.

10 Vise Blocks Add Bite

One of the biggest complaints woodworkers have with their vise is that it doesn’t hold the work very well when they clamp using only one side of the jaw. The jaw bends a little bit—especially with wooden vises—and this weakens its grip on the work.

The solution is so simple I’m surprised that I don’t see this more often. Put a block of equal thickness on the other side of the jaw and your problem is solved. I have a set of “vise blocks” in the most common thicknesses I deal with (1⁄2", 5⁄8", 3⁄4", 7⁄8” and 1”). To help me out even more, I drive a 3⁄4” dowel through each block to prevent it from dropping when I release the vise. This quick and simple fix will save you a lot of future frustration.

Until I can afford my 3,000-square-foot dream shop, I have to assemble projects on my bench. This cover keeps my benchtop like new. Make sure the cleats that keep the top in place don’t interfere with your vises.

### Supplies

#### Bench dogs and Wonder Dogs

**Lee Valley Tools**
800-871-8158 or leevalley.com
- Veritas round bench dogs
  #05G04.02, $18.50/pair
- Veritas Wonder Dog
  #05G10.01, $24.50

#### Bench vises

**Lee Valley Tools**
800-871-8158 or leevalley.com
- Large front vise kit
  #70G08.02, $69.50
- Quick-release vise
  #10G04.12, $99
- Veritas Tucker patternmaker’s vise
  #05G09.01, $549
- Veritas twin-screw vise
  #05G12.21, $169

#### Holdfasts

**Lee Valley Tools**
800-871-8158 or leevalley.com
- Veritas hold-down
  #05G14.01, $54.50
- Inexpensive hold-down clamps
  #16F02.10, $11.50/pair

You can find hardboard at your local home center.

*Prices as of 2005.*
A NEW ANGLE ON Compound Miters

Not a joint you need to make every day, but a joint you should make without taking all day.

by Nick Engler

Well, this is embarrassing, I thought to myself. Editors from Popular Woodworking had made a pilgrimage to my shop to take photos of me making compound miter cuts. And I couldn’t remember how to do it.

“Wait just a minute,” I told them. “I’ve got a book right here that tells what to do.” I reached for a copy of “Nick Engler’s Woodworking Wisdom” and read my own instructions on the technique.

Making compound miters – a miter joint that is both angled and beveled – is one of those special techniques that you need only once in a while. When you join the frame members, the boards have a slope so the assembled shape tapers from top to bottom. You can employ compound miters in dozens of projects. Trouble is, it’s not a technique you’re likely to use every day. In between the times when you need it, you’re likely to forget some of the finer points. So this is a “refresher course” in compound mitering, for myself and all of you.

Figuring the Angles

When cutting a compound miter on a table saw, you must set both the miter angle of the miter gauge and the bevel angle of the saw blade. These angles depend on two things – the number of sides in your frame and the slope of the assembled frame. The slope, by the way, is usually measured from horizontal, with the frame resting on a flat surface.

For every frame and slope, there is just one pair of angles, and these angles must be precise or the miter joints will gap. To find these angles, either use some simple equations or refer to a compound miter chart. I prefer the chart method myself, so I’ve included one with this article that lists angle pairs for lots of frame assemblies and slopes. But just in case you don’t see the angle settings you need for your particular project, here are the equations:

- Miter Angle (for all joints):
  \[ \tan MA = \frac{1}{\cos S \times \tan(360 \div 2N)} \]

- Bevel Angle (for mitered joints):
  \[ \tan BA = \cos MA \times \tan S \]

- Bevel Angle (for butted joints):
  \[ \tan BA = \cos MA + \tan S \]

Where: MA is the miter angle; BA is the blade angle; S is the slope; N is the number of sides.

If you’re mathematically challenged, don’t despair at the mention of tangents and cosines. You can work a trig equation by pounding on a scientific calculator. These have special buttons marked sin, cos and tan to simplify the functions.

For example, if you want to figure the miter angle for a four-sided mitered frame with a 30° slope, find the cosine of the slope by entering “30” on the keypad and then pushing the “cos” button. The result should be 0.8660. Next, multiply the number of sides (4) by 2 and divide the result (8) into 360 — the result is 45. Find the tangent of 45

To check your setup, cut enough small pieces to make a complete frame. Clamp a stop to the miter gauge extension so each piece is identical.
a new angle on Compound Miters

Photos by Al Parrish
– that’s right, just push the “tan” button on the calculator. Multiply the result (1) times 0.8660, then divide that number (0.8660) into 1. The answer is 1.1547 – that’s the tangent of the miter angle. To convert this tangent into an angle, press the “INV” (or “inverse”) calculator button, then the “tan” button. Your miter angle is 49.1074°.

Always figure the miter angle first, then the bevel angle. You need the cosine of the miter angle to be able to calculate the bevel. Note that the bevel angle equation is slightly different depending on whether you want to make the joint mitered (with the seam at the corner) or butted (with the seam visible on one side).

On the chart, I’ve rounded the angles to two decimal places. No table saw can measure to a hundredths of a degree, let alone the eight decimal places you’re likely to get from your calculator. But this will help you “guesstimate” where to set the pointer between two degree marks on the miter-gauge scale and the blade-tilt scale.

Cutting the Angles
Now for the easy part – and the part I always forget. Once you’ve set the miter and bevel angles, there’s a nifty trick for cutting both the right and left miters on the frame members without having to change settings. It’s all in how you flip the board.

I prefer to cut compound miters with a long miter gauge extension (a board fastened to the face of the miter gauge) that extends well past the blade. This not only provides better support for your workpiece, it gives you a surface to fasten a stop to so you can make precise duplicate parts.

To make the first cut, place the board against the miter-gauge extension and feed it into the blade, cutting through both the board and the extension. Flip the board edge for edge, so another edge rests against the extension and another face rests against the table. The board ends should remain oriented as they were. Position the board for the second cut and feed it into the blade. If the second cut is near the end of the board, and there isn’t enough wood for you to hold it safely against the extension, move the miter gauge to the other slot on the opposite side of the saw blade. You won’t need to change the settings.

Adjusting the Angles
Before cutting good wood, it’s always a good idea to make some test cuts to check your setup. I cut enough small identical pieces to make one frame, then assemble it with masking tape to check the joints. If the settings are off, one of the compound miter joints will gap. When the gap opens to the outside of the frame, increase the bevel angle. When it opens to the inside, decrease the angle. This may change the slope very slightly, but usually not enough to notice.

Assembling the Frame
The best clamps I’ve found for gluing up compound miters are band clamps. If the slope is fairly steep, wrap the band clamps around the corners of the frame as you would when assembling a box. As the slope becomes shallower, however, the clamps tend to slip up the slope. When this is the case, wrap the clamps around the edges of the assembled frame members, like ribbons on a present. Don’t overtighten the clamps – the frame members will bow. If you can’t get enough clamping pressure without bowing, use additional band clamps and position them as close to the corners as possible. Control the bowing by wedging a scrap between opposite members to act as a temporary brace.

In some compound miter assemblies with multiple sides, I’ve seen members put together in several steps. First assemble two halves, then sand

Tape the pieces together at the corners and inspect the joints. If you find any gaps, adjust the bevel angle in tiny increments and cut new test pieces until the gaps disappear at all the corners.
or joint the adjoining surfaces of the halves for a tight fit, and glue the halves together. This is commonly done when gluing up blanks for lathe turnings where the strength of the glue joints are critical and even the tiniest gap in a joint could spell disaster when the stock is spinning at incredibly high speeds. **PWM**

To calculate compound miter angles, you need a scientific calculator (about $9 at most office supply stores) with SIN, COS, TAN and INV buttons. On some calculators, the INV button is labeled FUNC or the key is blank. If you have a computer and use Microsoft Excel software, you can download a simple Compound Miter Calculator that I wrote from popwood.com. Click on the "Magazine Extras" link.

### Compound Miter Chart for the Table Saw

<table>
<thead>
<tr>
<th>SLOPE</th>
<th>4 SIDES BUTTED MITER ANGLE</th>
<th>4 SIDES MITERED MITER ANGLE</th>
<th>4 SIDES MITERED BEVEL ANGLE</th>
<th>5 SIDES MITERED MITER ANGLE</th>
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Note: The slope is measured from horizontal, with the assembly resting on a bench or work surface.
SECRETS TO A
Silky Smooth Finish

How to get a flawless surface in record time.

by Steve Shanesy

Comments or questions? Contact Steve at 513-531-2690 ext. 11238 or steve.shanesy@fwmedia.com.

To prove just how effective wet-sanding is at giving your project a glass-like sheen, we sprinkled a handful of sawdust on some wet shellac. After rubbing it out, no one in the office could tell that the finish had ever been boogered up. See the story “Out of the Rough” to see how we did this.
Learning to finish your finish, more often called “rubbing out,” will do more to improve the quality of your woodworking than anything else, period. (OK, that assumes you already know how to glue parts together so they don’t come apart.) It’s the secret to a silky, satiny, even mirror-like finish, and it will take away all your stress about dust, lint, hair, even assorted bugs settling into that wet coat you just carefully applied. In fact, you won’t even have to worry as much about applying your finish quite so carefully.

Best of all, it’s dang easy.

Basically, I’m talking about rubbing out your finish. But first I want to assure you that I won’t ask you to spend hours massaging your project with #0000 steel wool. And I’m not going to ask you to buy pumice, rottenstone, or rubbing and polishing compounds. You’ll only need those products if you’re going for the ultimate high-polish mirror finish, which I do with about the same regularity as a visit from Halley’s Comet.

No, all I want you to do is hand sand your finish (not the bare wood, but the varnish, shellac, lacquer or polyurethane top coat) with two or three different grit sandpapers. The process is so simple, you won’t want to tell anyone how you did it because the fantastic results look like it ought to require a lot more work.

What Finishes Rub Best

The method I’ll describe here will work on any common film-forming finish. It is easiest and will produce the best results on lacquer and shellac, but you’ll still get great results with varnish (including polyurethane varnish) and water-based finishes.

Shellac and lacquer work best because the dried film, although hard, is still softer than water-based finishes and varnish (which is almost always sold as polyurethane). This property makes it sand faster, so it’s easier. But in no way let this discourage you from applying these techniques to your varnish and water-based finishes. It works fine with them, too.

Sanding the First, or Sealer Coat

You start finishing your finish after your first coat or sealer coat has been applied and has had time to dry. Drying time will vary greatly depending on the finish you’re using. Basically, it’s dry enough when it doesn’t “ball up” on the sandpaper. For this first sanding, use what’s called a “self-lubricating” #320-grit sandpaper. It’s self lubricating because it has a special powder applied to it that helps prevent sanding dust from sticking in the abrasive grit and clogging it up. One common brand of such sandpaper is 3M Tri-M-ite (available at ACE Hardware: acehardware.com) or Norton 3X (available at Rockler: 800-279-4441 or rockler.com).

To sand, use moderate pressure to sand off the fuzzy-feeling “nibs,” or all the little imperfections that make the first coat rough to the touch. In smoothing this first coat, you are preparing a surface for the application of the next coat. The objective is to begin producing an ideal surface. Think of

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Out of the Rough

First, let the finish dry completely and don’t be tempted to try to fish out that errant hair, fly or dust speck. You’ll only create a bigger problem. Next, lightly sand the finish in the dust-strewn area with #220-grit paper, dry. Try to get the surface as level as possible to the surrounding finish. Next, apply another coat of finish and let it dry completely. Proceed with sanding, wetsanding and presto, you’ll wonder where the sawdust went (as shown below).

Here’s a close-up of the accumulated dust to show just how bad a problem it is.

As you can see it’s much better than new. The massive sawdust defect is virtually eliminated. You never need to worry about finishing in a “dust free” area again.
glass as a perfect surface. If you brushed or sprayed a finish on glass, it would lay out and form a perfectly smooth film.

In addition to sanding off the nibs, you also want to begin “leveling” your first coat of finish. This will include high spots that result from lapping brush strokes, or runs or sags on vertical surfaces. If you finish open-grained woods such as oak, ash, walnut or mahogany, leveling will also begin knocking down the “peaks” of finish created by the “valleys” of the open grain.

A word of caution is in order, particularly if you’re working with a project that has any type of color applied, such as a stain or dye. If you sand too much, you will sand, or “cut,” through the film and likely sand away the applied color. Edges are especially vulnerable and require a delicate touch.

Now that you have completed your first level of surface preparation, dust off the work and apply more finish material. If you are brushing varnish, polyurethane varnish or water-base, one coat is probably enough. If you are brushing or spraying shellac or lacquer, apply at least three more coats. Again, allow sufficient drying time between coats and before the next sanding step.

Wetsanding: A Brave New World
If wetsanding is new to you, you’ll be amazed at how efficient it is when applied to your finish. For sandpaper, switch to #400-grit wet/dry sandpaper. This is a paper with a special adhesive that won’t dissolve in the liquid, and the paper itself will hold up as well.

Wetsanding works because the liquid you use lubricates between the surface and the sandpaper and, more importantly, flushes away the material that is being removed by the sanding process.

When wetsanding, I use a full sheet of sandpaper that has been folded twice. Some finishers prefer to wetsand with a block that has a piece of 1/4"-thick cork glued on the sole. Using a block can help make sure you sand flat continually and, some might argue it helps prevent “cutting through.” But this can give the user a false sense of security (it feels less aggressive so you sand too aggressively).

The liquid I prefer for wetsanding is paint thinner, which is also commonly labeled as “mineral spirits.” You can also use water that’s had a few drops of liquid dish detergent added. Paint thinner works best because it’s more efficient at flushing away the sanded finish residue. We all know that water on wood and wood finishes has some inherent problems, especially if the end grain isn’t completely sealed.

So is wetsanding a tedious, time-consuming chore? Clearly, it adds a couple more steps to the finish process, but if your goal is simply a nice, slicked-up finish, it really doesn’t take all that much extra work. For example, the walnut sample board in the photos is about 18” x 36” and it took me no more than 10 to 12 minutes to wetsand it each time. In some respects, it may save you some time. If you’ve
been led to believe the nutballs who insist you finish in a “dust free” environment, forget it. Let me save you some time because it may take you less time to wetsand than create a “clean” room. You’ll also benefit from not being concerned about goobers falling in your not-quite-dry finish.

Now, depending on the type of finish and sheen you want, you can proceed with another round of applying clear finish and wetsanding a last time, or you can basically call your finish done, except for a final coat of wax. Of course, before you complete the job with a coat of wax, clean all the messy sanding slurry off the work. For this chore, use either paint thinner or VMP naphtha on a clean rag.

On tight-grained woods such as cherry, maple, birch or a softwood like pine, you will have a smooth, flat, closed-pore finish with a medium sheen. With open-grained woods such as walnut or mahogany, the finish will be either an open or semi-open pore finish. The distinction is simply a matter of the degree of wood grain that’s not filled up and leveled off.

To achieve a fully filled finish on open-grained wood that’s not been grain-filled, you’ll need to proceed with another coat of finish and another wetsanding. Follow the procedure as before. By the end of this stage your finish should be complete except for a coat of wax.

Should you want a higher level of sheen on your project, wetsand one last time. However, this time switch to #600-grit wet/dry sandpaper.

It would be at this stage that you would continue working with various levels of rubbing and polishing compounds if you wanted to create a high-polish finish. Frankly, it would take a pretty special project for me to go to that level of a finish.

In fact, I’d even make a strong recommendation that when you decide to wetsand a project, you might even skip wetsanding certain parts of the project altogether. For example, it would be good to wetsand a tabletop but not the legs, or the top of a desk but not the sides. In other words, wetsand only the most prominent and visible features. Generally speaking, it would be very difficult to wetsand the details on turned or carved work.

If you forego wetsanding part of a project, it may, however, be necessary to rub out the entire piece with #0000 steel wool or a synthetic steel wool product like 3M’s Scotch Brite pads. This will impart a consistent level of sheen to the entire project, even though only a portion was wetsanded.

You should also consider using only gloss finish on projects you intend to wetsand. Not only will the gloss finish material make the finish look clearer, but the final sheen will be derived from the wetsanding or rubbing.
STRATEGIES FOR Locating Lumber

Sometimes the hardest part of woodworking is finding the right wood. It could be right in your neighborhood, or just around the corner.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 11407 or chris.schwarz@fwmedia.com.

No matter who you are, unless you own a sawmill, finding the best material for your projects is going to be a challenge. Even professional cabinetmakers are constantly foraging for new sources for wood. The starting point is to get familiar with the lumberyard lexicon. There are terms you need to know so you can get what you need. To help you, we’ve included at right a glossary of the common terms you’ll hear.

You might not be aware of all the lumberyards that carry hardwoods in your area. Some are family operations that rely on word of mouth. Your first step should be to check the Yellow Pages (look under “lumber, retail”) and visit the WoodFinder web site (woodfinder.com), to find suppliers. Some lumberyards deliver even small loads, and others are worth the drive, so don’t discount the stores that are out of town.

If you’re still not having luck finding basic hardwoods such as red oak and poplar, call a local cabinetshop and nicely ask where you can find hardwoods locally. And don’t forget to look for lumber mills if you live near hardwood forests. Some of these mills sell direct to the public.

Not Just in Stores

It might seem nuts to buy lumber through the mail, especially when you consider that you’re buying it sight-unseen and have to pay for shipping. But many of the big mail-order lumber suppliers actually are competitive in price, and the wood is quality.

Another great way to find wood is to join your local woodworking club. Almost every club seems to have a resident wood scrounger who can point you to places off the beaten path. Some clubs even organize purchases of lumber for its members.

Don’t know if there’s a club in your area? Go to betterwoodworking.com/woodworking_clubs.htm to find one near you. We highly recommend joining a club.

Mobile Mills

Whenever Mother Nature is roused, the downed trees in your neighborhood are a potential gold mine of wide, clear stock. It’s just a matter of first moving the “bole” – the straight part of the trunk below the branches that yields clear and stable wood and then finding someone to mill the logs into suitable thicknesses before drying. Luckily, this is pretty easy. Wood-Mizer Products Inc., which manufactures portable band-saw mills, maintains a list...
of sawyers who perform custom-cutting. Contact Wood-Mizer at 800-553-0182 or woodmizer.com. In addition to Wood-Mizer owners, there are probably other sawyers in your area who will do the job. Check with your local woodworking club.

You will have to learn how to properly sticker your green wood for seasoning. It’s not rocket science, but there are some rules. For the basics, check out the “Select Articles” area of our web site.

**Get the Word Out**

There are farmers out there with barns full of lumber. And there are garages stacked high with premium wood left behind by deceased woodworkers. But how do you get your hands on it?

Basically, it’s a matter of putting the word out among your friends, relatives and co-workers that you’re a woodworker and on the prowl for wood. Tell enough people, and you’ll eventually hear from the friend of a friend who wants to dispose of some boards. Sometimes you get lucky.

**Classified Ads, Auctions & Offcuts**

There are a few somewhat surprising ways to find wood. Believe it or not, wood shows up pretty regularly in the classified ads of the daily newspaper and local free shopping papers.

And while you’re poring over the classifieds, keep an eye out for auctions at farms and cabinet shops. When these places go under, there can be good deals on wood (and machines). Bear in mind that haunting auctions is both time-consuming and addictive.

Some people buy lumber through eBay.com, an online auction web site. Shipping can be a real killer ($1 a pound), so tread cautiously and do the math before you buy from online auctions.

Finally, for the true bottom-feeder, there’s always the waste stream. Find out if there’s a pallet factory, furniture manufacturer, veneer mill or construction site in your area. Their waste might be perfect for your woodworking.

We’ve cut up pallets made from mahogany, ash and other desirable species. In fact, most of the projects in “Building the Perfect Tool Chest” (Popular Woodworking Books) were built in our shop using wood discarded from pallets. A cabinet shop that built all of its face frames once sold us their fallow, which was the perfect size for chair spindles. All you have to do is ask. PWM

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**Lumber is Measured in Quarters**

For new woodworkers, one of the most confusing aspects of buying lumber is figuring out the terminology for thicknesses. Rough lumber (which has not been surfaced) is sold in “quarters.” Each quarter represents 1/4” of thickness in its rough state. So four-quarter lumber (written as 4/4) is 1” thick in its rough state; 5/4 is 1 1/4” and so on. When the lumber is surfaced by the mill it loses thickness. That’s why 4/4 lumber is 3/4” thick when it’s surfaced. Here’s a chart that you can use as a quick reference:

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Source: Paxton, The Wood Source

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**The Language of Lumber**

A air-dried lumber: Wood that has been dried from its freshly cut state by stacking it (usually outside) with stickers between.

B board foot: A piece of wood that is 1” thick x 12” wide x 12” long in the rough – or its cubic equivalent.

C case hardened: Improperly dried lumber that is under tension; tends to bow or warp when cut.

cupped: A board with edges higher than its middle.

D dimensional lumber: Lumber that is surfaced on all four sides (S4S) to specific dimensional lumber: 1 x 4s, 2 x 8s, etc. Note that with this lumber the finished thickness and width are less than the stated size. For example, a 1 x 4 typically will measure 3/4” x 3 1/4”.

E end check: Separation of the wood fibers at the end of a board, almost always a result of drying.

F flitch: When a log is sawn into veneer and the sheets are stacked in the same order as they came off the log. Good for bookmatching.

G green lumber: Wood that has been freshly cut from the tree, typically with a moisture content of 60 percent or higher.

grades: Select & Better: Usually highest grade available, a combination of NHLA grades “Selects” and FAS 80 percent to 100 percent clear on the good face.

#1 Common: More knots and defects, each board is about two thirds of shape.

H heartwood: The part of the tree between the pith (the very center) and the sapwood (the whitish outer layer).

honeycomb: A separation of the wood fibers inside the board during drying – it might not be evident from the face of the board.

K kiln-dried lumber: Heat and forced air has been used to reduce the moisture content of the wood.

L lineal feet: A measurement of wood that's 12’ long, regardless of the board's width or thickness – usually used to refer to mouldings.

M mineral streak: A typically green or brown discoloration, which can be caused by an injury to the tree.

moisture content: The percentage of a board’s weight that is water.

P pitch: A resinous, gummy substance typically found between the growth rings of softwoods.

plain (flat) sawn: A method of milling a log that results in the growth rings intersecting the face of the board at an angle less than 45°.

Q quartersawn: A method of cutting a log at the mill that results in the growth rings intersecting the face of the board at 90°. Quartersawing wastes more wood and there is more effort involved. But quartersawn wood is more stable.

R random widths & lengths: While softwoods and cabinet woods such as red oak and poplar can be found as dimensional lumber, many hardwoods cannot. These hardwoods are cut in different widths and lengths to get the best yield and grade.

rift sawn: A method of cutting a log that results in the growth rings intersecting the face of the board at an angle between 30° and 60°. More stable than plain-sawn wood; less stable than quartersawn.

rough: A board as it comes from the sawmill; not surfaced or planed.

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Sources: Paxton, The Wood Source and L. L. Johnson Lumber for assistance with this glossary.
Not every workshop hint is worth trying (or publishing).

Years ago, the syndicated columnist Cecil Adams – author of the “Straight Dope” column – submitted a beauty tip to one of the advice columnists, it was “Dear Abby” I think. He recommended using a mix of lard and sugar as a facial cream. Abby printed the tip, and added that she’d tried it and quite liked it.

Sugar and lard doesn’t actually make a good facial cream. However, we know how Abby feels. Sometimes we open the mail submitted to our “Tricks of the Trade” column and wonder if readers are pulling our leg. Some of the suggested tips are so hackneyed, common or dangerous we think that someone out there (Cecil, is that you?) must be pulling one over on us.

Here then, with some help from the discussion forum WoodCentral (woodcentral.com) are some of our favorite “Worst Tricks of the Trade.”

- **The Problem with Pegboard**: Pegboard is (in my opinion) mostly worthless for tool storage. So woodworkers have come up with other uses for the product. Some use pegboard as a template for drilling holes for shelf pins. The problem? It’s too thin to keep the bit straight for accurate work.

- **Silly Storage Solutions**: Woodworkers have a reputation for cheapness, so there are many schemes to use household containers to store stuff.

  - **Glass containers**, such as baby-food and spaghetti jars, are favorites for storing finishes and screws. While this is inadvisable because of the potential for breaking the glass, we’ve even seen tips that take a bad idea and make it worse. One trickster suggested screwing the spaghetti jars’ lids to the shop ceiling to keep the jars overhead. That way you could mine this unused storage space between joists by populating it with jars. Of course, one wrong move with a long board and you’ll be showered with glass and whatever was in those jars.

  - Other tired or poorly conceived storage ideas: Use film containers to store small parts. Keep your sandpaper in a file-o-fax folder or box for floppy discs (not bad ideas, just ones I cannot bear to read anymore), putting your glue in mustard bottles (I’m even more tired of reading this one), store anything in coffee cans. My dad was snookered by this one and we could never find anything in his shop (but perhaps that was the idea).

- **The Tape Trick**: Wrap masking tape around a drill bit as a depth gauge. It’s a bad idea. Tape moves easily; use a block of wood instead.

- **Better Woodworking Through Chemistry**: Believe us when we say you shouldn’t use a cola drink as a rust remover.

- **Seemed Like a Good Idea**: Don’t cut Styrofoam on your band saw. The waste gets charged with static electricity and it’s impossible to clean up. A knife works just as well.

- **Get a Compass**: Woodworkers seem loathe to buy a compass or trammels, so there are endless ideas for drawing circles and arcs using a nail, string and pencil. Or margarine tubs, coins, coffee cans or CDs. If it’s round, woodworkers will trace it.

- **The Trick we Love to Hate**: Believe me when I say that this one was actually submitted to us: Use a coffee cup to hold your pencils. Yup. When we print that one, you’ll know that we are thoroughly out of ideas.

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— Christopher Schwarz