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6 Smart Shop Projects

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#156, OCT/NOV 2011



**New Bench Design
Low Cost, Easy to Build**



**Editor's Pick for
Faster Sanding**



Drill Press Upgrade



**Rock-Steady
Lathe Stand**



**Multi-Purpose
Sanding Table**

Knockdown Sawhorses

Taming Dust Collector Bags

Turning A Wine Glass

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Profile Shown:
Round Over
(#99-760)



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INTERIOR / EXTERIOR



6 Smart Shop Projects

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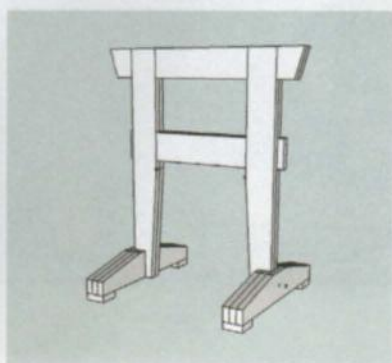
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Workbench Tour

Get a closer look at our Box Beam Bench (p. 30), with the storage option, at
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Gluing Tips

We've got a bunch of useful tips on spreading glue at
AmericanWoodworker.com/WebExtras

American Woodworker

#156, October/November 2011

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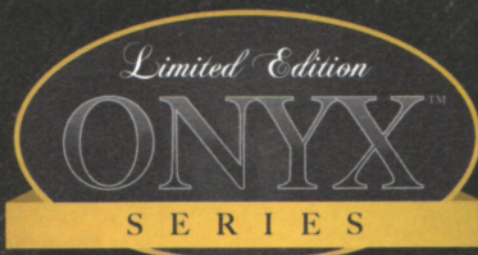
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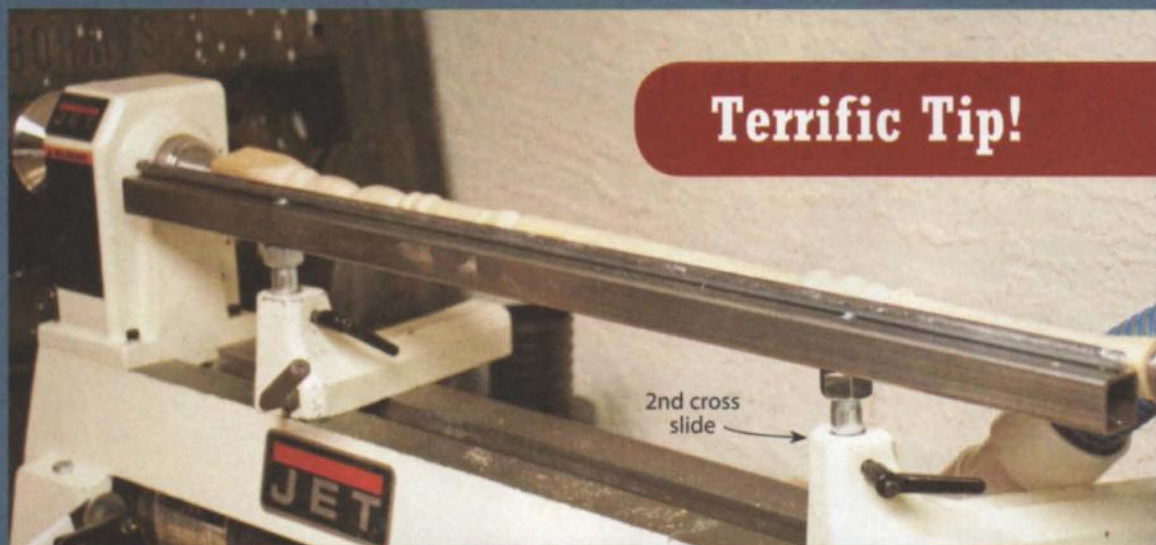
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Terrific Tip!

Long Tool Rest

FOR TURNING SPINDLES, there's nothing like having a really long tool rest. You never have to move it! I made my own with parts from the hardware store.

This rest is just a length of square steel tubing with a steel rod fastened to its top. The rod's rounded surface makes it easy to slide your tools back and forth. The rest has two 5/8" dia. posts—like most factory-made long tool rests. You'll need to buy an extra cross slide for mounting the second post.

To make the tool rest, cut the tube and the rod to the desired length. Drill a 5/8" hole near each end of the tube.

Using a drill press, drill 1/8" dia. holes every 4" to 5" along the rod's length. Support the rod with a V-block and use a fence to make sure the holes stay in line. Counterbore each hole to accept the 8-32 screw heads.

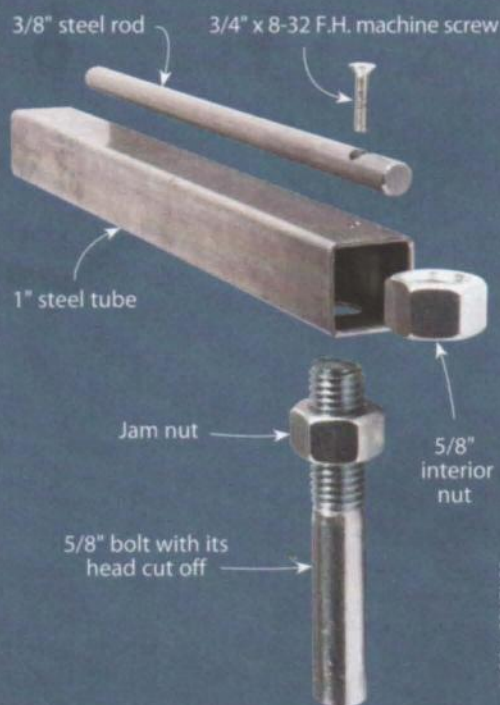
Clamp the rod in position on the tube, about 1/8" from the front edge (the edge that will be nearest the spindle). Drill through the rod's holes into the tube. Tap the tube's holes for the 8-32 screws. Screw the rod to the tube. Fill the counterbored holes with epoxy to create a smooth bearing surface.

Two of the 5/8" nuts slide into the tube to receive the posts. You'll have to file or grind down two faces on these nuts so they will fit. To make the posts, cut off the heads of two 5/8" x 4" bolts; file off any sharp edges. Thread a jam nut onto each bolt and insert the bolt into the tube. Thread the bolt into the interior nut, then tighten the jam nut.

Irwin Rappaport

Shopping List:

- Two 5/8" x 4" hex-head bolts
- One piece of 1" square steel tubing
- One piece of 3/8" round steel rod
- Four 5/8" nuts
- A handful of 3/4" 8-32 flat-head machine screws.



Veritas® Quick-Release Front Vise

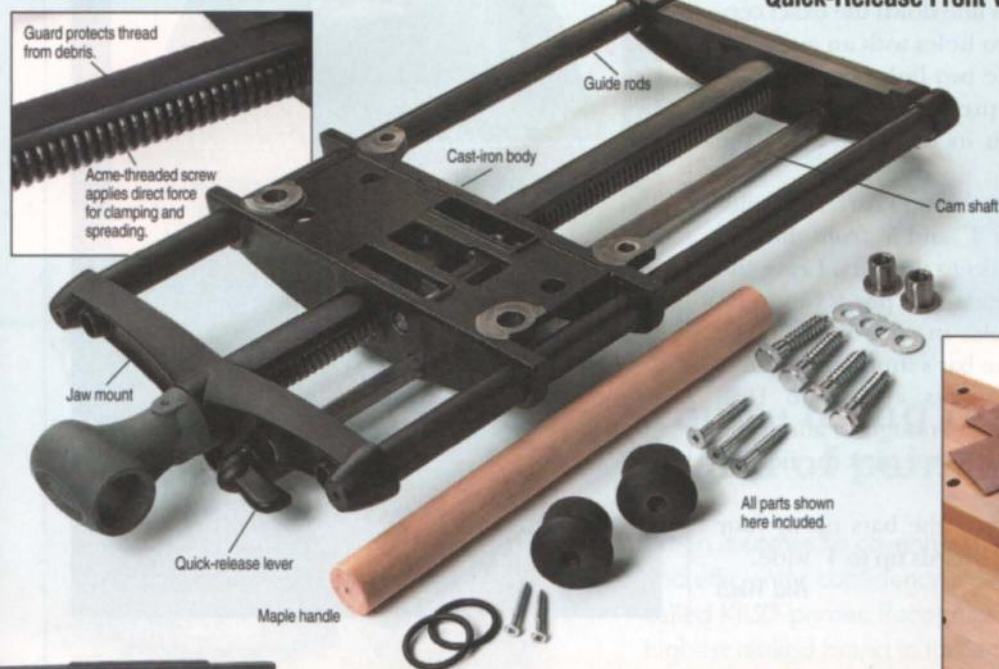
Using the same quick-release mechanism as our tail vise, our front vise has a simple on-off cam lever to engage or disengage the Acme-threaded screw, allowing it to apply up to 400 lb of force in either clamping or spreading applications. The screw mechanism provides 12 1/4" of overall travel (less the thickness of your wooden jaw and bench apron). Tight body tolerances result in minimal jaw sag, even at full extension. An extruded aluminum screw cover keeps debris out of the screw mechanism and prevents the workpiece from contacting the lubricated screw. Straightforward to install in new construction or as a retrofit to an existing bench, the vise requires an unobstructed mounting area on the underside of the bench top at least 12" wide by 16" deep (with a 2" thick bench apron and a 1 3/4" thick jaw). The body is ductile iron with zinc-alloy endplates, steel shafts and guide rods, and a maple handle. Mounting instructions and hardware included. Made in Canada. Patent pending.

Available separately, the optional pair of top-grain leather jaw liners serves to pad the vise jaws, helping to improve their grip as well as reduce workpiece marring. Measuring 20" wide by 5" tall, the liners are shaped to fit this front vise, but can be used with any front vise mechanism with guide rods 10" apart or less. Installation instructions included.

05G34.01 Quick-Release Front Vise \$289.00

05G34.03 Leather Jaw Liners, set of 2 \$ 19.50

Shipping and N.Y. sales tax extra.



Quick-Release Front Vise

Workbench and wooden jaws not included.

Quick-release mechanism permits fast adjustment in both directions.

Two-position, positive-stop quick-release lever

Mounts easily to the underside of a workbench.

Leather Jaw Liners

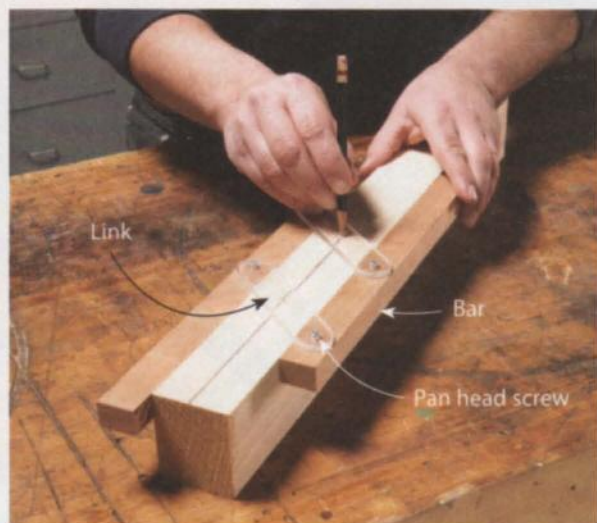


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JASON ZENTNER

Centerline Marker

SOMETIMES IT'S FUN to build a gadget just because it's a neat idea. There are many ways to draw a centerline, for example, but this method is very clever. It doesn't require any measuring or trial-and-error adjustments.

To build the marker, you'll need two hardwood bars $3/4"$ x $1"$ x $12"$, two Plexiglas links $1/4"$ x $3/4"$ x $4-1/2"$ and four #6 pan head screws $3/4"$ long. Start by making the links. Scribe a line down the exact center of one link and mark two holes with an awl, $1/2"$ in from each end. Stack the two links together and drill the holes using a drill press. (The holes should be just barely large enough in diameter to let the screws slip through.)

Mark centerlines along both wood bars. Drill pilot holes for the screws that are $1"$ and $5"$ from the end of each piece. Fasten the links to the bars. Leave the screws a little loose so the links can pivot. Close the bars together and mark holes in each link directly above the line formed by the bar's inner edges—this is the precise center of the links, end-to-end. Drill holes on these marks just large enough to admit the point of a sharpened pencil. Countersink the holes if you wish.

To mark a centerline, snug the bars up to your stock. The marker works for boards up to $4"$ wide.

Bill Wells



JASON ZENTNER

Speed-Square Assembly

I FOUND YET ANOTHER USE for my trusty speed squares. Just clamp one or two of them inside the corners of a cabinet when you're gluing it up. This guarantees that the corners will be square.

Charles Mak



Router Sitter

I DON'T LIKE TO LAY MY ROUTER on its side with the bit exposed, so I built a stand for it. It's just a $3/4"$ x $8"$ x $8"$ board with a $2"$ dia. hole in the center. The board sits on $2"$ tall legs. I added shelf liner to the top of the stand to keep the router from sliding.

Serge Duclos



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Vacuum Attachment Tree

VACUUM ATTACHMENTS are a challenge to store. They come in so many shapes! I made this device to keep them all together, within easy reach. It's just a long chain with shorter lengths of chain branching out from it.

Each branch has a 3" to 4" length of 1/2" dowel fastened to its end. The fastening system is simple: I used pliers to open the chain's last link, then squeezed it tightly around the dowel.

To hang an attachment, I just turn the dowel parallel to the chain and pass it through the attachment's hole.

Mark Thiel



JASON ZENTNER

Magnetic Helping Hands

THE THOUGHT OF EMPTYING my dust collector's plastic bag used to make me cringe. Many times I'd go through my entire repertoire of colorful language two or three times, and that darn bag still wouldn't stay in place while I put on the strap clamp.

I solved this by holding the bag in place with rare-earth magnets. The bag stays put, leaving me with two free hands to position the strap. I just leave the magnets in place until the next bag change.

Mike Cyr

Homemade Hose Adapter

HOSES AND DUSTPORTS come in so many different diameters that you can go crazy trying to match them up.

Sometimes, you can find a hose or adapter that will fit *inside* a dustport, but its smaller diameter reduces airflow. To maximize airflow, it's better to fit a hose to the *outside* of the dustport. For that hookup, you'll have to customize. Here's an example.

My shop vacuum's hose is about 1/4" larger than my miter saw's dust port. To make an adapter, I measured the inside diameter of the hose, set a compass to this size and drew a circle on a 3/4" piece of plywood. Next, I measured the outside diameter of the dustport. Using a Forstner bit about this size, I drilled a hole in the center of the circle. Then I cut out the circle on the bandsaw, making a ring.

Well, the ring didn't quite fit the dustport. Its hole was a bit too large, so I cut the ring in half and sanded a little off the ends of each piece. I also wrapped a layer or two of duct tape around the dustport to slightly increase its diameter. Eventually, I got a tight fit, with hairline spaces between

the ends of the ring segments.

Next, I made the ring fit tight inside the vac hose. It was close, but a bit too small. To reduce the hose's diameter, I cut two slots in it on the bandsaw. Compressing the hose and ring with a hose clamp produced a perfectly tight fit. Unlike a taped connection, this one won't come loose!

Tom Caspar



JASON ZENTNER

NEW

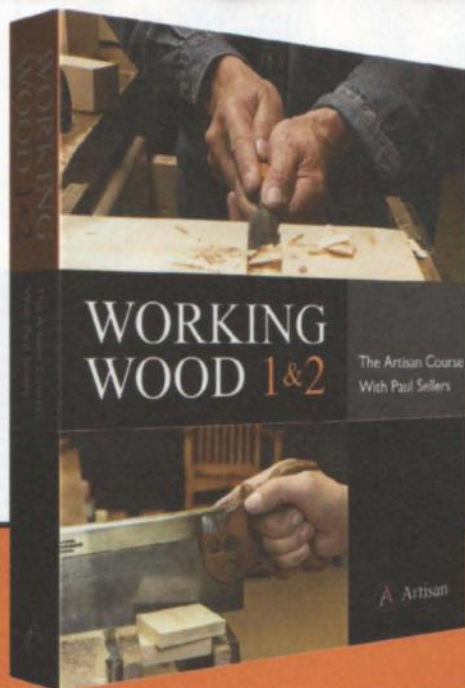
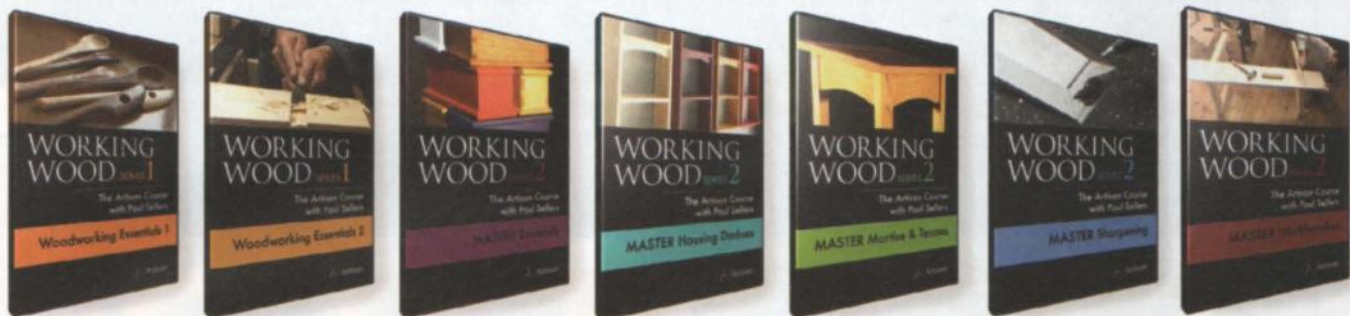
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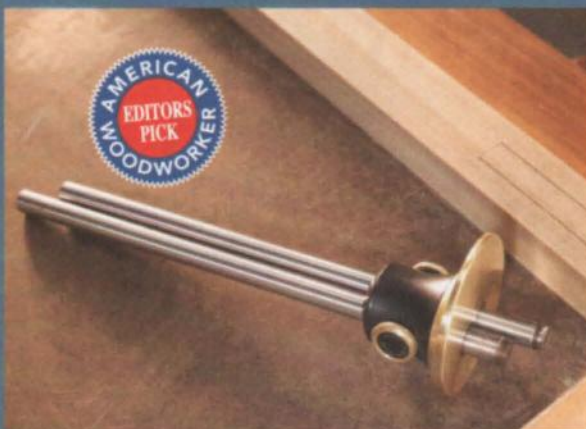
Twice-as-Good Marking Gauge

WHAT'S BETTER THAN a single-rod marking gauge? A gauge with two rods, that's what. Veritas has made a very nice single-rod gauge for years; their new double-rod gauge is a big improvement.

The Veritas single-rod gauge has long been recognized for its remarkable ability to scribe crisp, clear lines going with the grain and across the grain. It's terrific for laying out dovetails, but not as handy for laying out mortise and tenon joints. With a single rod, you lay out one side of the joint, then reset the gauge for the other side. If you skip a piece or make a new one, you have to start all over again. Now, with two rods, you can lay out both sides at the same time, like a traditional mortising gauge.

The rods can be adjusted independently, of course. Each rod has an internal O-ring that provides light but constant friction for easy setting. And each rod has its own thumbscrew to lock the setting.

At the end of each rod there's a round hardened-steel cutter. But it doesn't rotate, as you might expect—it's fixed. A round cutter will stay sharp much longer than a knife or a pin (the cutting edges found on other types of marking gauges) because the wear isn't concentrated on one point—you've got the entire circumference of the cutter to work with. That's really important, because a marking gauge must be sharp to work well; for the best



JASON ZENTNER

accuracy, it has to make a line as fine as one made by a razor blade.

For the last 30 years, Veritas has been making tools that are notable for their high quality and thoughtful design. This new dual marking gauge is no exception. It's got that substantial, engineered feel that will make it the kind of tool you'll pass on to your grandchildren.

SOURCE

Lee Valley & Veritas, leevalley.com, 800-871-8158, #05N70.01, Dual Marking Gauge, \$59.

Dream Dado Set for Contractors Saws

EVERY WOODWORKER DESERVES a good dado set, but if you own a portable saw or a contractors saw, you may be missing the party. With their limited power, these saws should be equipped with a 6" set rather than an 8" set. Many 6" sets lack the features of a top-notch 8" set, however. That's why Infinity Cutting Tools, the maker of the high-end 8" Dadonator dado set, has introduced the new 6" Dadonator Jr. It has all the good features of a large set.

The Dadonator Jr. has 24-tooth outer blades and 6-tooth chippers. All of the teeth are made from C4 carbide, which holds a sharp edge longer than the lower-grade carbide found on many 6" dado sets. The Dadonator Jr.'s teeth are also quite large, which means you can have this set sharpened more times than a dado set with small teeth. All of the teeth on the blades and chippers have a negative hook angle to prevent kickback and a Hi-ATB grind to minimize tearout in cross cuts.

This set comes with a full range of chippers: four 1/8" wide, one 3/32" wide and one 1/16" wide. A set of shims for fine-width adjustments is also included.



JASON ZENTNER

SOURCE

Infinity Cutting Tools, infinitytools.com, 877-872-2487, Dadonator Jr., SDB-600, \$190.

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FOR LARGE SURFACES, the 6" random-orbit sander reigns supreme. Its disc is about 40% larger than the disc of a 5" sander, and its motor is more powerful. A 6" sander gets a mind-numbing job done much faster.

Recently, I had a chance to try the new Bosch 6" sander. I was expecting the same herky-jerky performance that many other random-orbit sanders have, but, to my amazement, the Bosch was silky-smooth. It didn't grab at all, even when I pushed hard. Although the sander has two handles, I could operate it with one finger!

I also expected a good deal of vibration. Nope—none at all. Sander vibration is a sore point for me—sometimes I feel like I'm still sanding half an hour after turning off a machine. Bosch has solved this problem by placing eight foam blocks between the outer shell and the guts of the sander. They work remarkably well.

The ROS65EVC-6 has a 4mm orbit, which is fairly aggressive. (Sanders with smaller orbits cut slower, but leave smaller loop marks). It accepts either 5" or 6" discs (a 5" pad is included); optional pads include extra-soft,

soft, hard or PSA. It also comes with a micro-filter dust canister and an adapter for a vacuum hose.

As nice as it is, a 6" sander isn't really a replacement for a 5" sander. A 5" machine is still the best choice for vertical surfaces—because it's lighter—and narrow boards or edges.

SOURCE

Bosch, boschtools.com, 877-267-2499, #ROS65EVC-6, Large Random-Orbit Sander, \$229.



Big Capacity, Nice Features



HOW WIDE can your miter saw cut? How deep? With this new 12" slider, the DWS780, DeWalt has some pretty amazing answers: 16" across and 6-3/4" deep.

Let's put an asterisk after that, though. Using the standard fence, you can cut 13-7/8" horizontally. When you need more capacity, you remove this fence, place some 2x6 pieces on the saw's bed, and slide the workpiece back to a "rear" fence. This arrangement allows you to cut up

to 16" at 90° and 12" at 45° on material up to 1-1/2" thick.

DeWalt has also introduced another new feature that helps you figure out where to position the blade when you need to make a very deep cut. It's a latch that locks the head onto a sweet spot on the saw's rails. With the rail-lock latch engaged, you can make a cut up to 6-3/4" deep on material up to 1-1/2" wide—essentially a 2x6 on edge.

DeWalt didn't forget that people still make small cuts, too. They squeezed the left and right sides of the 780's fence as close to the blade as possible, to support those offcuts that usually wind up zinging past your ear.

The DWS780 tilts 49° to the right and left. It swings 60° to the right and 50° to the left. Its turntable has detents at 0°, 22.5°, 33.9°, 45° and 49° in both directions. With many saws it's almost impossible to lock in an angle that's really close to one of these detents because it just slips into the detent when you lock the turntable. That's not a problem with the 780. It has a detent lockout feature that allows you to fine-tune any angle.

The DWS780 has LED lights on both sides of the blade. They help you align a cut by casting a shadow on the workpiece. Unlike lasers, LED lights won't go out of adjustment, nor do they need to be re-positioned for blades of different thicknesses.

SOURCE

DeWalt, dewalt.com, 410-847-9220, DWS780, 12" Sliding Miter Saw, \$599.

■ CLAMPING

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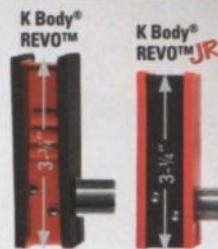
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Bora's Pistol Grip Clamp can bail you out many times, particularly when doing delicate repair work, where the weight of a standard clamp can pull parts out of alignment. A Pistol Grip weighs only half as much as an F-style clamp of the same length.

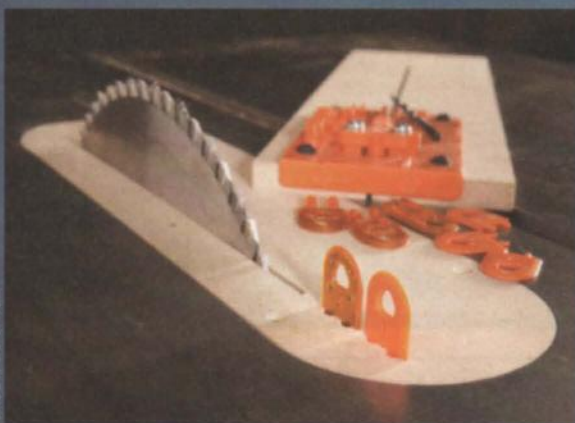
Pistol Grips are available in five sizes: 6", 12", 18",



24" and 36". The 6" and 12" models have a 2-1/2" depth capacity; the rest have a 3-1/2" capacity.

SOURCE: Affinity Tool Works, LLC, affinitytool.com, 866-588-0395, Pistol Grip Clamps, \$14 - \$37.

Simple Saw Safety



EVERY TABLESAW used to come with a splitter—a tall, thin piece of steel positioned behind the blade. By holding the kerf open, a splitter helps prevent kickback and keeps the blade from burning the wood. If your splitter is missing, here's a solution: Add a short one to your zero-clearance throat plate. Micro Jig makes a quite sophisticated version, complete with an installation jig.

The MJ Splitter SteelPRO uses two offset splitters that

apply opposing forces. The forward splitter holds the workpiece against the fence. The rear splitter pushes the waste piece away from the fence. If the board's binding force is too strong, the rear splitter pulls out and sticks in the kerf, holding it open while you finish the cut.

Both of these splitters come in four different offsets. You can fine-tune the deflection force by rotating or swapping them. Rotating one splitter changes the offset by .003"—the thickness of a sheet of paper.

The MJ Splitter SteelPRO is available for both 1/8" kerf and thin-kerf blades. Thorough installation instructions are included, but I'd advise watching the instructional video first (it's on the Micro Jig website). I tried the system on a variety of woods and was pleasantly surprised to find that burning and binding were virtually eliminated.

Note that the MJ Splitter SteelPro doesn't include a throat plate. It will not work with some blade guards and may require an overarm-style guard.

SOURCE

Micro Jig, microjig.com, 855-747-7233, SP-2 PRO (1/8" kerf) and SP-TK PRO (thin kerf), \$35; combo kit, \$63.

A Better Handsaw

YOU'RE AT THE LUMBERYARD, trying to fit a 10-ft. cherry board into your hatchback. It's OK to cut it in two, but with what? Most woodworkers would naturally think of a power tool, but truth be told, a good handsaw will do the job almost as fast. The new Irwin Universal Handsaw is just that saw.

Irwin calls it a "universal" saw because it's equally good at ripping and crosscutting. The saw's teeth are ground three ways in a patented design and are impulse-hardened. The result is an 11tpi blade that cuts very quickly, without binding, even in thick hardwoods. Re-sharpening is impractical, however.

I've looked long and hard for a saw to use in the shop for crosscutting long, roughsawn boards.

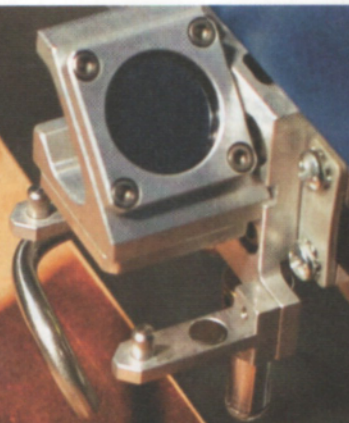
Using a miter saw for this job can be iffy—a twisted or kinked board can kick back if you're not careful, so I'd rather do it by hand. I tried the Universal on a number of planks and was amazed at how little effort it took to get through them. I'm sold!

SOURCE

Irwin Tools, irwin.com, 800-464-7946, #1773466, 20" Universal Handsaw, \$22; #1773465, 15" Universal Handsaw, \$19.



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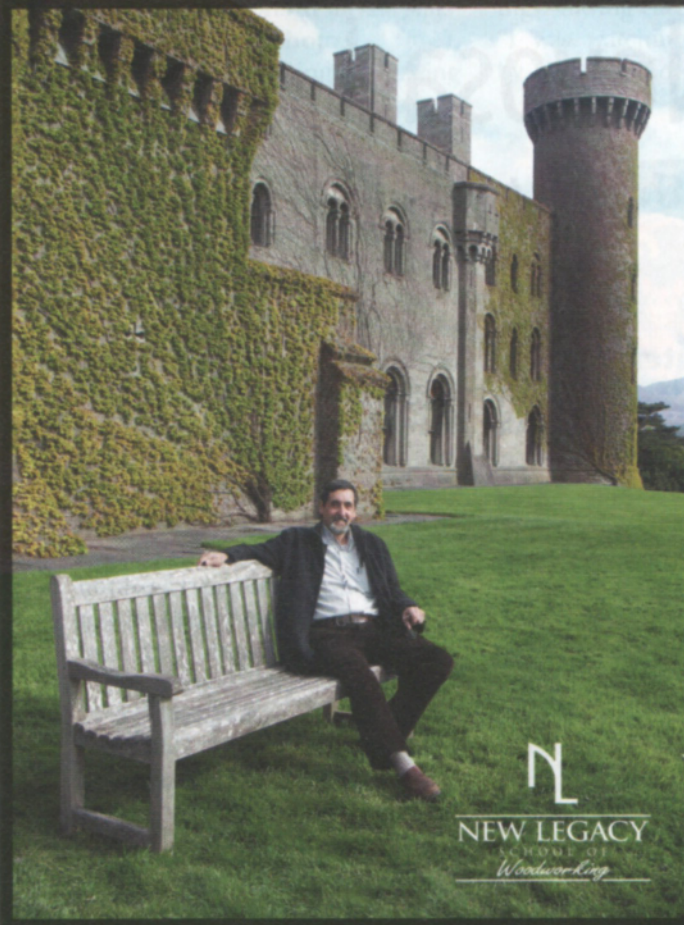


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NEW LEGACY
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Gregg Novosad

Blending fine art with high technology.

by Spike Carlsen

WHEN MOST OF US THINK ABOUT MARQUETRY, we picture an old-world craftsperson sitting at a workbench meticulously cutting, fitting and assembling hundreds of pieces of veneer by hand. But step into the workshop of marquetry master Gregg Novosad and you'll discover something quite different: computers and laser machines. Step into his mind and you'll discover an entirely new way of thinking about woodworking.

From computer guru to computerized craftsman

In 2000, after 15 years as a computer consultant, Gregg sold his consulting firm and began pondering his next career move. He'd been profoundly affected by the architecture and artwork he'd encountered during trips to Europe and Scandinavia. He'd also had success tackling built-ins, millwork and remodeling projects over the years. So woodworking seemed a natural choice. Experiences from his youth influenced this decision

as well. The art department at his high school was instrumental in forming his artistic sensibilities. Woodshop class, along with his father's carpentry acumen and stash of woodworking equipment, had provided familiarity with tools. Looking for a niche where he could best use his talents, Gregg turned to marquetry.

Old world design meets new world technology

Gregg's computer and marquetry skills soon merged. His designs



Fit for A King (detail)

and artwork are computer-generated and programmed into a laser machine, which cuts the intricate shapes that typify his pieces. One of his first—and most ambitious—pieces with laser marquetry was *Fit for a King*, a dining room table with an intricately patterned top which includes unique quotations at all 12 place settings (see photo, above). “Nothing like creating something with 8,000 pieces to try out a new technique,” Gregg muses.

Once the pieces are cut, assembly begins. Gregg prints a life-size image of the design and tapes it to a layout table. On top of that, he positions a piece of sign-transfer film, sticky-side-up. Then he places the individual marquetry pieces onto the transfer paper, using the pattern below as a guide. When the marquetry design is completed, Gregg flips it over and glues it to the casework.

Programming each pattern, border or medallion is labor-intensive, so Gregg uses them over and over again, with different combinations of wood. He often provides an open space—on a magazine cover, ribbon or medallion—so he can easily insert different names without having to rework

the entire piece. He also offers a design-your-own, mix-and-match “menu” from which customers can select a table style, border and pattern to customize their own pieces.

Every picture tells a story

Gregg is a proponent of story-lining—having each piece tell a story. “I was watching a documentary by Robert Redford in which he

was talking about screenplays. He explained that you introduce characters, present a conflict and then resolve that conflict,” Gregg says. “I decided to apply that concept to my furniture.” *Rascal Rodents* depicts a gang of mischievous mice chewing through the cabinet’s veneer and removing clamps despite the “leave clamps on till glue sets” sign (see photos, below). Open the cabinet and you’ll find a marquetry mouse snared in a trap.

Birds of Fray, inspired by Alfred Hitchcock’s “The Birds,” exemplifies Gregg’s penchants for both story-telling and attending to details (see photos, page 22). It depicts the four members of his family warding off attacking birds which are attempting to pull and peck the work apart. A hummingbird pulls strands of hair from his daughter’s head while she tries to pull back strands of marquetry that another bird is unraveling. His son uses a dart gun to scare off other birds. Most of the 19 birds on this buffet were inspired by those found on historical pieces crafted by masters of marquetry.



Rascal Rodents (details)



Rascal Rodents



Birds of Fray

Birds of Fray contains 4,000 pieces and took 400 hours to build. "This piece was on my 'Bucket List,'" Gregg recalls. "When I finished it I felt I'd finally arrived. On most pieces I like to try out three or four new techniques—a new material or finishing technique or computer program. On this piece I experimented with twelve."

Gregg occasionally includes a "Where's Waldo" element, challenging people to find hidden things. "It makes them carefully examine the entire piece." Gregg's favorite trick is to challenge others to find 17 planned "defects" on one of his cabinets. "It takes some people forever, but a couple of kids once found them all in 46 seconds."

Dinky workshop, massive efficiency

Since Gregg's pieces are covered with marquetry, the casework is made from plywood and MDF—materials that are stable, smooth



Birds of Fray (details)

and easy to assemble. He uses moldings to cover exposed edges and basic veneers for the insides. "There's nothing complex about it," he explains. "It's no different than building a kitchen cabinet."

Gregg's 10' x 30' basement workshop is spartan. "Whenever I teach a class and we discuss workshops, I'm always in the bottom 10%," he explains. And he likes it that way. Organization is the key. Gregg's bandsaw and laser machine are permanent fixtures, but other machines and supplies are on wheels. Gregg uses a hallway for temporary storage and his pool table room doubles as a space for the vacuum bag he uses for gluing. In his garage is a tear-

down spray booth for finishing small pieces. If a piece is too large for that space, he sends it out.

To build the thick, glass-smooth finish he prefers, Gregg uses a finish that can be applied with a squeegee, lightly sanded and then reapplied. His favorite product is a clear bi-component polyurethane finish made by ICA. "Unfortunately it costs over \$100 a gallon and can only be purchased in large volumes," he says. A good alternative—one that takes more time to apply, but can produce "similar results—is lacquer, a finish Gregg often uses as a final topcoat. He also uses lacquer as the primary finish for certain projects.

Everyone needs a business plan

Gregg may be an artist and computer wiz, but he's also a businessman. He keeps meticulous records of how long each process takes and is constantly striving to find better and faster ways of doing different tasks. When asked how long it took to make a specific table, Gregg stated that 37 of the marquetry pieces for that project could be positioned per hour.

His years as a computer consultant have given Gregg a clear sense of the importance of strategic planning—and he's a proponent of strategic planning even for weekend woodworkers. "If you can't visualize your next three projects, your next project should be visualizing your next three projects," he says. Why? "Once you know where you're headed, your radar goes up; you take in information that will help you reach your specified goals. You'll save time and you'll become a better woodworker, faster."

Having a plan isn't enough.



Need of Repair (detail)



Need of Repair

According to Gregg, "You should write it down and keep track of your progress." He keeps sketchbooks with drawings of ideas and photo clippings of inspirational pieces. His workbook binders contain notes on costs, time required per procedure and a section on "what did and didn't work."

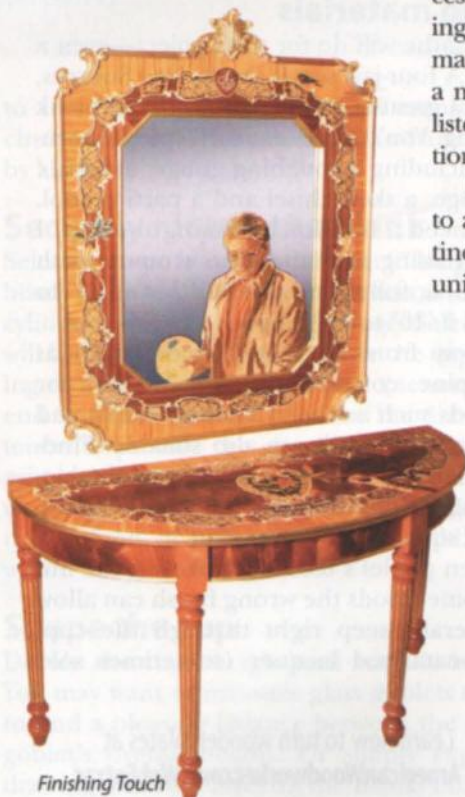
Gregg offers another suggestion regarding the learning process to woodworkers. "Before taking a class, try tackling the subject matter at home first. You'll become a much more engaged and active listener. You'll know what questions to ask."

From dreaming up the design to applying the finish, Gregg's distinctive pieces are a product of his unique way of planning, working

and executing. "If you're going to take the time to make something custom, it should be obvious that it's custom, not something you can go out and buy," he explains. No problem there. 

See more of Gregg Novosad's work at [facebook.com/pages/Click-Divine/135900856483920](https://www.facebook.com/pages/Click-Divine/135900856483920)

Spike Carlsen is the author of *A Splintered History of Wood: Belt Sander Races, Blind Woodworkers and Baseball Bats* and the newly released *Ridiculously Simple Furniture Projects*. His upcoming book, *The Woodworking Answer Book*, will be available in the spring of 2012.



Finishing Touch



Finishing Touch (detail)

Turned Wine Goblet

Sharpen your end-grain hollowing skills.



DRINKING FROM A WOODEN GOBLET is a unique experience, because its weight and feel is distinct from goblets made of other materials. But is it practical? Of course! With the right wood and finish, it's perfect for anyone who loves wood!

Tools and materials

Almost any lathe will do for this project—even a mini lathe. A four-jaw scroll chuck (see Sources, page 27) is a great asset for mounting the blank for hollowing. You'll need standard spindle turning tools, including a roughing gouge, a detail/spindle gouge, a skew chisel and a parting tool. You'll also need a tool for hollowing the cup. I recommend using a round-nose scraper (with either a side- or full-round profile) that's 1/2" to 1" wide and 5/16" to 3/8" thick.

Steer away from really soft woods such as basswood, pine, cottonwood, etc. and look for harder woods such as cherry, walnut, maple and oak. Many exotic woods are also suitable. Finding large enough turning blanks may be the biggest challenge—I like to start with blanks that are 2-1/2" to 3" square.

A wooden goblet's usability turns on the finish. With some woods the wrong finish can allow wine to literally seep right through the cup. Epoxy, pre-catalyzed lacquer (sometimes sold



Learn how to turn wooden plates at
AmericanWoodworker.com/WebExtras



1 Securely mount a blank with a turned tenon into a scroll chuck. A secure mount comes from the tenon's large gripping surface and its shoulder, which rests on the top of the chuck's jaws.



2 Cut in below a line marked to indicate the cup portion of the goblet to provide clearance for shaping the bottom of the cup.



3 Shape the bottom portion of the cup with the detail/spindle gouge. Switch to the roughing gouge to refine the cup's flatter upper portion.



4 Drill the cup to within 1/2" of final depth, using a Jacobs style chuck mounted in the tailstock.

to turners as "melamine") and varnish are good choices that seal the wood well and are not affected by alcohol.

Securely mount the blank

Select a square blank that's about 9" long. Mount the blank on the lathe between centers and turn it to a cylinder using the roughing gouge. Select which end will be the base and which will be the cup. Use a parting tool or a skew chisel to turn a tenon on the base end to fit the scroll chuck. Size the diameter of this tenon to provide the chuck's jaws with an effective grip over a large surface area. Remove the blank and mount your scroll chuck onto the headstock. Then, using plenty of pressure, mount the blank securely within the jaws (**Photo 1**).

Shape the cup

Decide the cup's height and mark it on the blank. You may want to measure glass goblets that you like to find a pleasing balance between the cup and the goblet's overall height. Or simply experiment by drawing different lines on the blank. I like a 40-to-60

ratio between the cup and the overall height.

Begin the rough shaping by cutting in below the line to provide clearance (**Photo 2**). Do not cut in too far—about half the diameter of the cylinder is as deep as you should cut at this point. Reducing the diameter too much will leave too little support for hollowing the cup.

Roughly shape the outside of the cup. Its bottom is normally rounded like the side of a bead (**Photo 3**). Don't cut in too far as you refine the shape—leave plenty of stock at the bottom for support during the hollowing process. Switch to the roughing gouge to shape and refine the sides of the cup. They may be straight as shown here, or gently rounded.

Hollow the cup

It's much easier to hollow the cup if you drill it out first (**Photo 4**). Use a 1/2" to 3/4" drill bit to create working room for the turning tools. Drill to a depth about 1/2" less than the ultimate final depth, to allow refining the bottom of the cut.

Use a thick round-nose scraper to open the cup (**Photo 5**). To work with the grain, you must work



5 **Begin hollowing the cup** by making sweeping cuts with a thick round-nose scraper, working from the sides of the pilot hole back towards the rim. Make ever-deepening cuts to open the inside.



6 **Work near the rim** to establish the wall thickness. Make the same sweeping cuts, working from the inside out.



7 **Finish hollowing the cup** by making light passes from the bottom to the top edge with the scraper tilted toward the cut. Then sand the inside of the cup and the upper part of the outside.



8 **Ease the transition** between the cup and the stem by adding a bead detail. Sand the detail. Then establish the final shape at the base of the cup.

from smaller to larger diameter. In this case, that means working from the center of the cup towards the sides and top edge—"pulling out" rather than "pushing in," as with face-grain bowl turning.

Open the cup in stages, gradually reducing the wall thickness more towards the top of the cup than the sides (**Photo 6**). Work to a wall thickness near the top of $3/16"$ to $1/4"$ —you'll be able to further reduce the wall thickness as your end-grain hollowing skills improve.

Switch to the detail/spindle gouge to further refine the shape of the bottom on the outside of the cup. Reducing the outside diameter around the bottom and at the base of the cup provides a better sense of the wall thickness when you refine the interior walls—but be careful about reducing the outside shape to its final diameter, as you still need some support to finish hollowing the inside.

Switch back to the round-nose scraper to finish turning the inside of the cup (**Photo 7**). Work to achieve the best surface you can prior to sanding by using a technique called "shear scraping." Work from the bottom and up the sides with the scraper tilted to

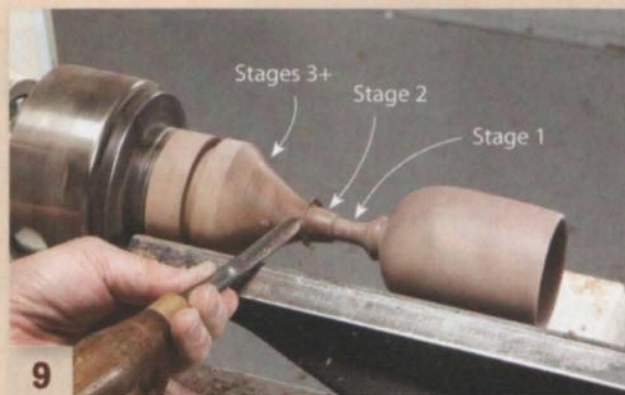
the left, in the direction of the cut (around 45°), making light, consistent movements across the wood's surface.

When you're satisfied with the surface finish from the turning tools, finish-sand the inside of the cup and the flat part of the outside. Start with 120 grit and work through 320 grit. Note: Waiting to sand the cup after the goblet's stem has been turned to a small diameter is a bad idea—it courts disaster.

Shape the stem and base

Finish turning the bottom of the cup (**Photo 8**). The stem can flow right into the cup, or you can add a detail at the transition point. Finish-sand the bottom of the cup.

Establish the goblet's height by cutting in with a parting tool about $1/4"$ deep on the chucked end of the blank. Then slowly create the stem and the base by clearing away the remaining waste in short segments, finish-sanding as you go (**Photo 9**). When the stem and base are nearly complete, decide whether to add a detail (**Photo 10**). Finish-sand any remaining areas to 320 grit.



9 **Cut in slightly** at the base to establish the goblet's overall height. Then turn the stem in stages, working from the cup to the base and sanding completed areas as you go.



10 **Complete the base** and add details, using the detail/spindle gouge and the skew chisel.



11 **Refine the rim** of the base by making an angled cut on the bottom edge, using the long point of the skew chisel.



12 **Part the goblet** from the waste material after cutting into the underside of the base at a slight angle to create a concave bottom surface, so the goblet will sit flat.

Parting off

Cut a small chamfer at the bottom edge of the base (**Photo 11**). This cut creates a subtle shadow line that slightly lifts the base. Prepare to part off the goblet by alternating between removing the waste with a parting tool and shaping the underside of its base with the skew chisel or the detail/spindle gouge. Create a shallow undercut from the rim towards the center, so the goblet will sit only on the rim (**Photo 12**). Continue the slight undercut until you part off the completed goblet into your hand. Sand the underside of the base by hand or with a soft flexible pad mounted in a drill or rotary tool.

Apply a durable finish

Use an alcohol- and liquid-resistant finish. Of the three options mentioned earlier, I prefer the working properties, durability, look and feel of a high-grade varnish finish, even though it dries slowly and takes a long time to fully cure.

Create an excellent wiping varnish by mixing equal parts of Behlen's Rock Hard Tabletop Varnish (see Sources) and odorless mineral spirits. Apply at

least five light coats inside the cup and three to four coats on all other areas. Allow each coat to dry for at least eight hours and lightly sand between coats. Wait 20 to 30 days before using the goblet, to allow the finish to adequately cure. I often go by the sniff test: If I detect any solvent odors inside the goblet, it needs more curing time. 

SOURCES

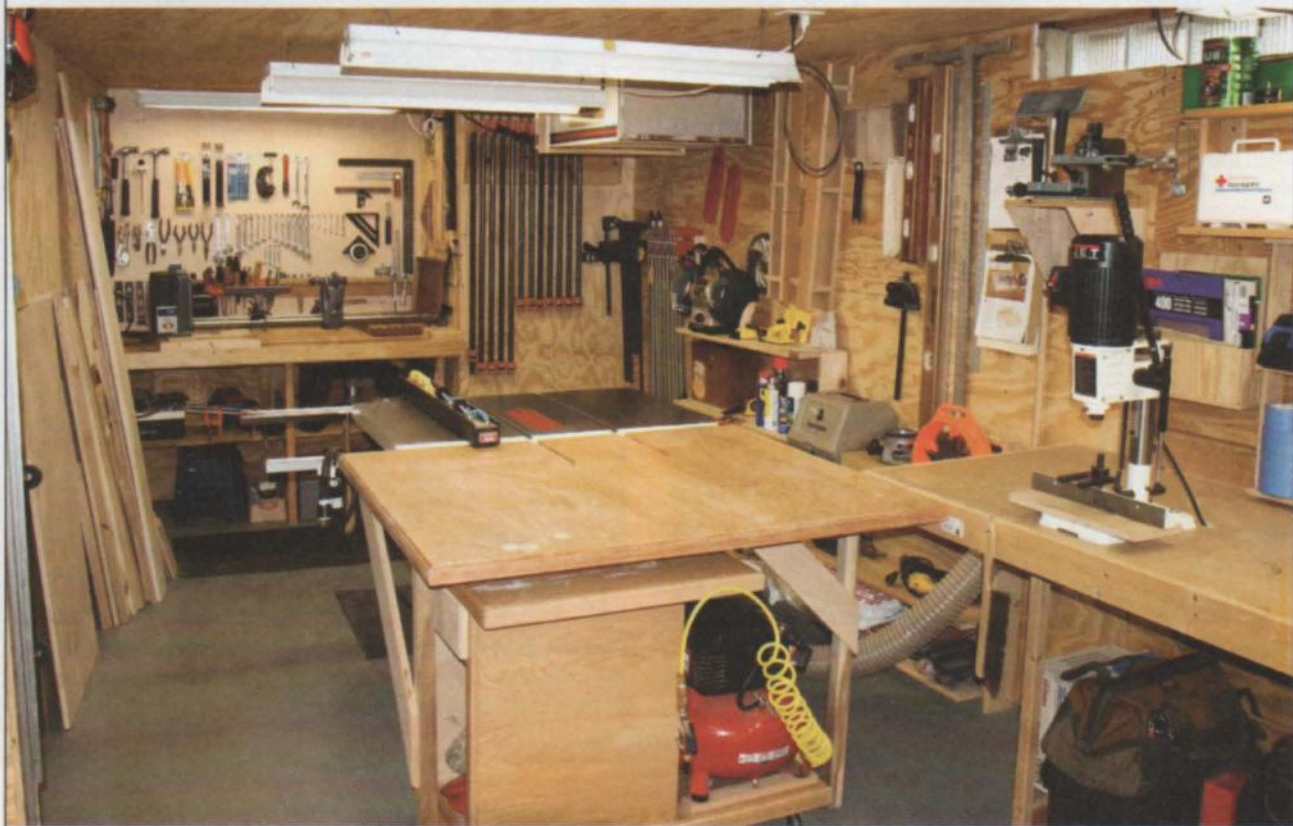
Oneway Manufacturing, oneway.ca, 800-565 7288, Oneway Talon Chuck, #2985, \$232.

Woodcraft, woodcraft.com, 800-225-1153, Behlen's Rock Hard Tabletop Varnish, #18Z42, \$21.69 per qt.



Alan Lacer is a woodturner, writer and instructor who lives near River Falls, WI. To see more of Alan's work visit alanlacer.com.

Little Shop of Dreams



This small space houses a big passion for woodworking.

WHETHER I'M IN THE MIDDLE of a new project or just want a place to escape, my 400 sq. ft. basement shop is a great place to build or brainstorm. All of my projects have been “born” there, products of my dreams and imagination—and more than a little perspiration! It’s a comfortable retreat during Minnesota’s summer heat and humidity and a bright, cozy and inviting place to work during the winter. I can sneak down to it anytime during the day or night—I love spending time there.

I can’t make my shop any bigger, so I’ve tried to maximize the space that I do have. My table-

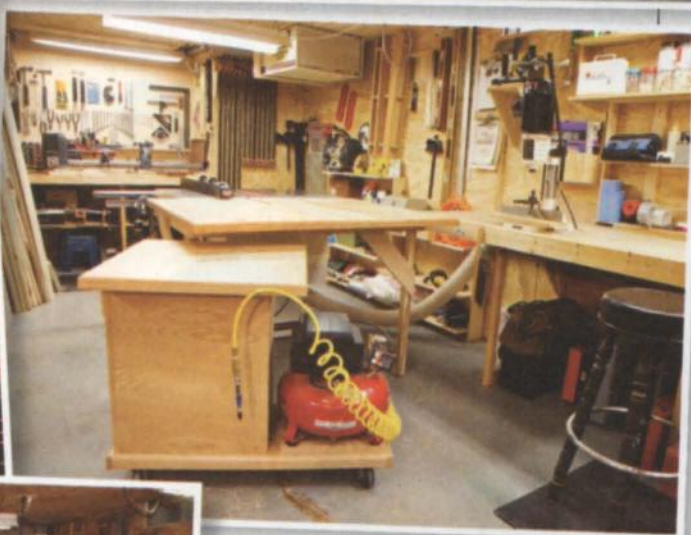
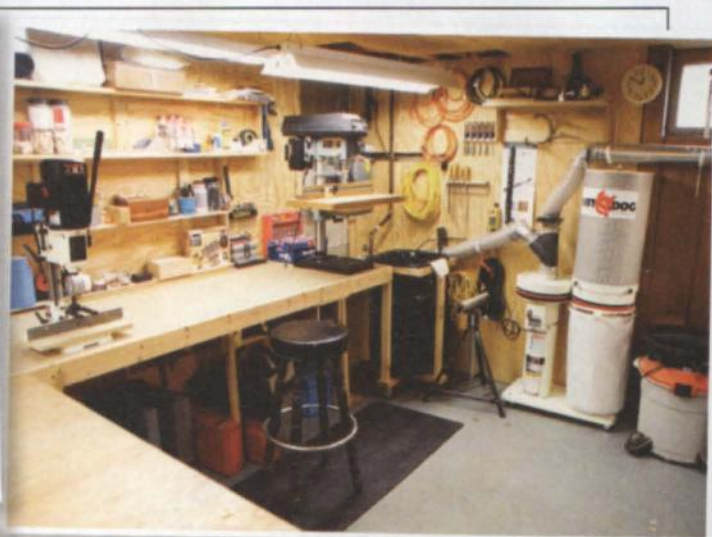
saw is centrally located and the periphery is fitted with benches, tools, clamp storage and as much shelf space as I can fit in. As you can see, I primarily use bench top tools rather than large floor models.

My dust collector is dedicated to the tablesaw and chop saw, the shop’s two biggest dust-producers, with blast gates to direct the airflow. I keep the remote control tucked in my shop apron for starting the collector when I’m at the business end of either tool. Cutting longer stock at the chop saw requires the use of an adjustable roller support.

I covered the walls and ceiling

with 1/2" plywood rather than sheetrock, so I can attach brackets, racks and shelves in any location and move them as the need arises.

The saw’s outfeed table extends almost five feet, allowing it to double as an island workbench. Nestled underneath is a rolling cart that houses my air compressor and also serves as an auxiliary work surface. To ease handling sheet goods and boards from station to station, all the surrounding benchtops are the same height as the tablesaw. And even though open shelving requires a bit more housekeeping, I like the



visibility and accessibility.

A basement shop has several challenges that require lots of planning. Since there is no exterior entrance, everything from heavy tools to sheet goods and lumber must go up and down the stairway. I get around this hassle by cutting large panels and long lumber to rough sizes at the lumberyard or with a temporary set-up in the garage.

To overcome the lack of natural light, I've installed numerous fluorescent and incandescent fixtures, with plenty of task lighting at specific locations. My shop has one small operable window, so I

can let in some fresh air, but getting good ventilation is an ongoing challenge. To help control airborne dust, I've installed a ceiling-mounted air filtration unit.

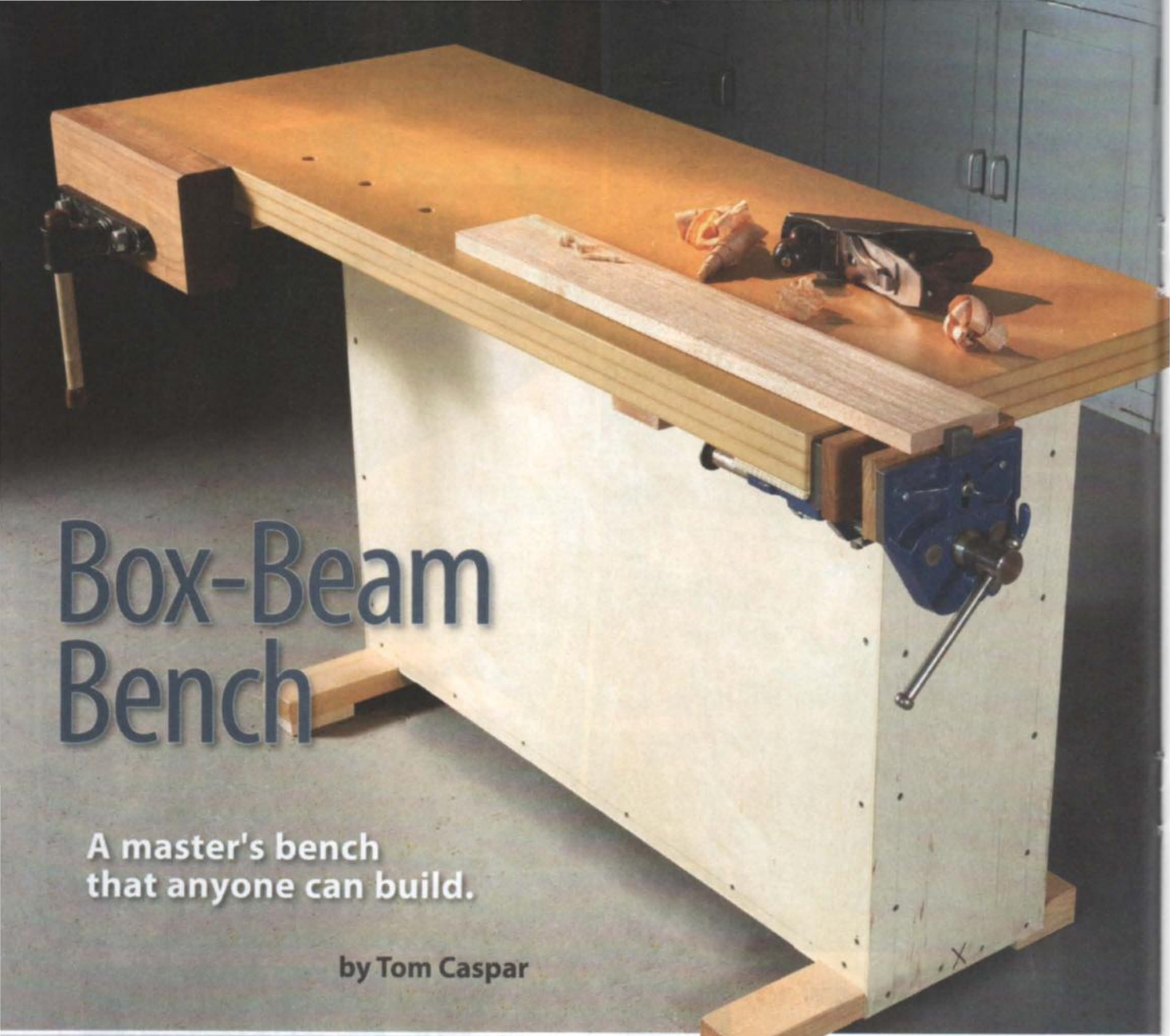
My shop may never compete for the title of "Dream Shop," but that's OK; I think of it as my "Little Shop of Dreams."

*David Fernelius,
Minneapolis, MN.*

Tell Us About Your Shop

Send us photos of your shop, a layout drawing and a description of what makes your shop interesting. Tell us what you make in it and what makes your shop important to you. If "My Shop" features your shop, you'll receive \$100.

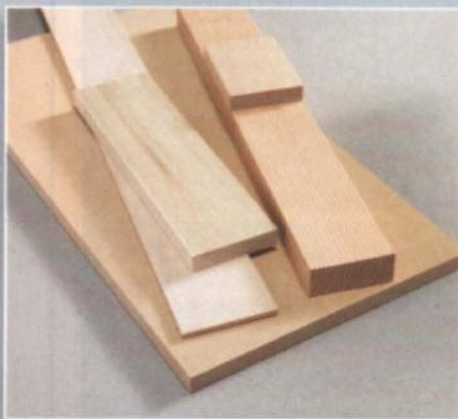
E-mail your entry to myshop@americanwoodworker.com with digital photos attached. Or mail your description with digital photos on a disc to My Shop, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include your phone number. Submissions cannot be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.



Box-Beam Bench

A master's bench
that anyone can build.

by Tom Caspar



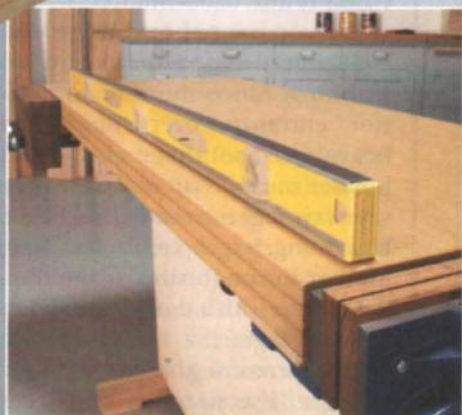
Inexpensive materials

A bunch of 2x4s, a little 3/4" poplar, one sheet each of 3/4" MDF and 1/4" birch—that's all you'll need.



Rigid construction

The base is a box that's skinned with plywood. (The ends and top are removed here). It won't rack, bend or twist.



Absolutely flat top

This is critical for a good bench, but not hard to make. The base is designed to keep the top from sagging.

BUILDING A SERIOUS WORKBENCH is a rite of passage for many woodworkers. It's usually an ambitious project requiring a lot of skill, lumber, time, money and tools—but it doesn't have to be that hard. Here's an alternative.

This bench is every bit as good as one that costs thousands of dollars. It's rigid, heavy and dead flat. Its vises offer all the holding power you need. But you can build it on a budget in a short time. You don't have to make complicated joints or use big equipment. It's a bench for everyone.

How tall should it be?

When you use a plane, a bench should be about wrist height. When you use a router or a sander, it should be about two to three inches taller. This bench works for both hand tools and power tools: You can easily raise or lower it with two removable riser blocks (see center photo, below). It's equally sturdy at both heights.

As designed, the bench is quite low—about right for a hand-tool user who is 5' 8" tall. If you're taller, or if you don't need a low, hand-tool-friendly bench, just make the feet twice as thick or add tall blocks underneath them. (The bench's base is made from a single sheet of plywood, and is about as tall as it can be without cutting into a second sheet.)

Make a flat assembly table—it's essential for building this bench. A hollow-core door placed on a pair of sawhorses works well. Screw some boards to one corner to help keep your work square.

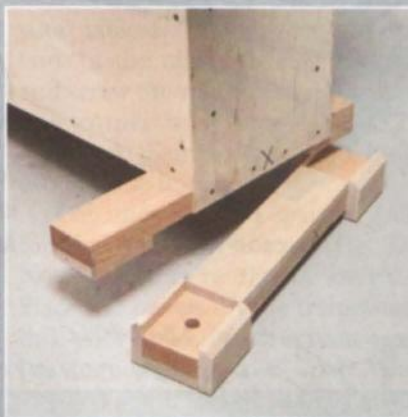


Build a pair of frames on the assembly table. Clamp their sides to the corner pieces to make sure each frame is square.



Clamping room

The top has a big overhang so there's plenty of room for clamping. Its underside is flat, too—there's no annoying lip.



Adjustable height

To raise the bench for use with power tools, just lift each end and scoot an additional foot underneath.



Storage option

You can add a drawer unit later on, if you wish. It passes right through the hollow center of the base.

Fig. A Exploded View

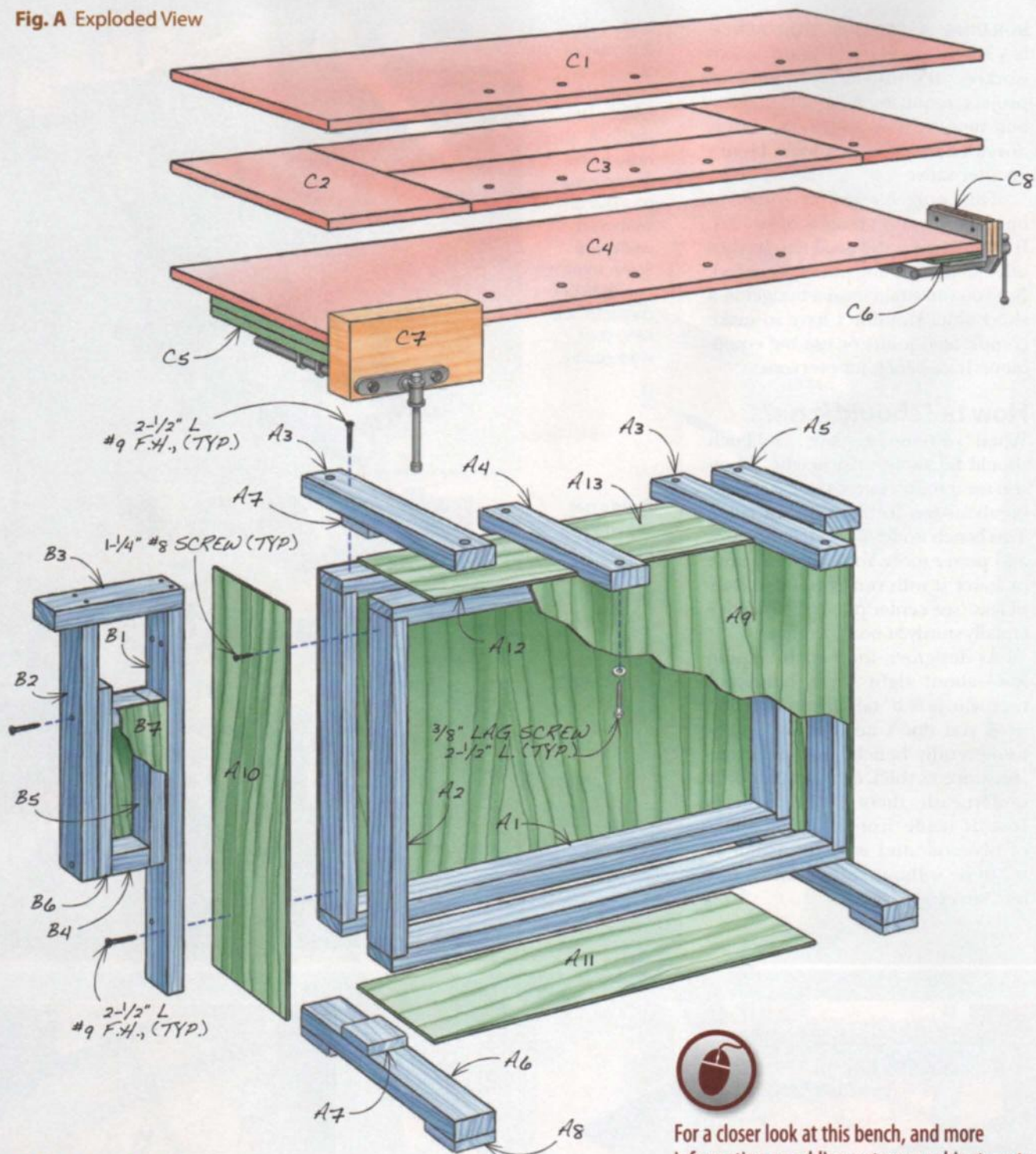
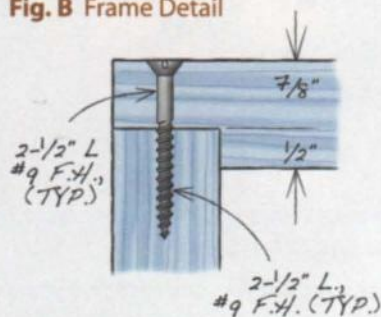
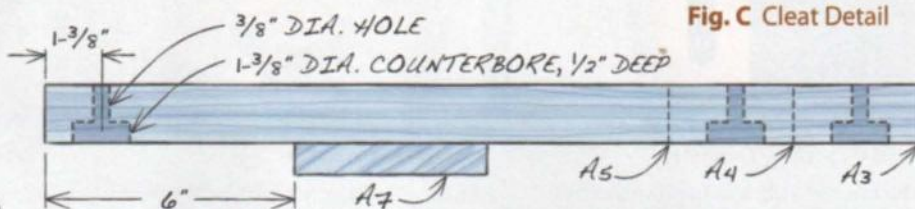


Fig. B Frame Detail



For a closer look at this bench, and more information on adding a storage cabinet, go to AmericanWoodworker.com/WebExtras

Fig. C Cleat Detail



Materials

I've designed this bench to keep the cost way down—so you can afford two very nice vises. All of the materials are available at a home center. I've squeezed the sheetstock pieces out of one sheet of 1/4" birch plywood and one sheet of 3/4" MDF. Most of the solid-wood pieces can be made from fir 2x4s; the others are poplar 1x4s.

The 2x4s must be dry (6% to 8% MC). Dimensional lumber doesn't come that dry, however; you'll have to plan ahead and wait at least six months for the wood to dry out before using it. In addition, the 2x4s must be flat and straight. You'll have to joint or plane the wood after it's dry—the cutting list dimensions allow for this.

If you'd like to get started right away, there are two alternatives to 2x4s. First, you could glue poplar 1x4s together to make the 2x4 material; they're dry enough straight from the store. (You wouldn't have to joint or plane them, either.) Second, you could buy 6/4 (1-1/2") kiln-dried yellow poplar and have a lumberyard joint and plane it for you. Milling the lumber yourself usually yields the best results, though.

If you have the budget and a jointer and a planer, roughsawn poplar would be the best choice for building this bench. That's what I used in all the construction photos.

Build the base

Before you begin, buy the vises (see Source, page 36). Make sure they'll fit in the space allotted (Fig. F). Many different vises will work, but some may require more room. If that's the case, reposition a few bench parts to free up more space.

The key to successfully building this bench is to work on a large surface that is truly flat. I recommend using a 30" hollow-core door (Photo 1). It's inexpensive, easy to move and store, and will come in handy for building many other projects. Fasten two boards to the sides of the door to form a square corner.

Start by milling all the solid-wood parts for the base (A1–A8). Cut them to final length. Using a dado set in

Stiffen each frame with an oversize skin of 1/4" plywood. Glue and screw the plywood to the frame, then rout the plywood flush all around.

3



Make the cleats that will tie the frames together. Glue an extra-wide spacer onto each piece, then rout its sides flush with a laminate trimmer.

4



your tablesaw, cut rabbets on the ends of the rails (A1, Fig. B). Glue and screw the rails to the stiles (A2), one corner at a time (Photo 2). Make sure their faces are flush. Build two of these frames.

Cut the plywood panels (A9) for the frames (Photo 3, Fig. D). Note that they're slightly oversize. Place the panels on the frames and drill pilot holes for the screws, spacing them about 5" to 6" apart. Glue and screw the panels to the frames. After the glue dries, use a router and a flush-trim bit to make the panels even with the frames.

Make the cleats (A3, A4 and A5) and feet (A6) by gluing spacers (A7)

Shopping List

Lumber

- 50 linear feet 2x4
- 1 sheet 3/4" MDF
- 1 sheet 1/4" birch plywood
- 8 linear feet of 3/4" x 4" hardwood, not including vise faces

Hardware

- 2 boxes of 1-3/8" deck screws
- 1 box of 2-1/2" deck screws
- 8 lag screws, 3/8" x 2"
- 8 washers, 3/8" i.d.
- 4 lag screws, 5/16" x 3" (for face vise)
- 4 lag screws, 5/16" x 2-1/2" (for end vise)
- 16 washers, 5/16" i.d. (double them up)
- 5 #14 x 2" FH screws (for face vise)

Cutting List

Overall Dimensions: 32-7/8" H x 23" W x 59" L (35" H with optional riser)

Section	Part	Name	Qty.	Material	Th x W x L
Base	A1	Rail	4	2x4	1-3/8" x 3-1/4" x 43"
	A2	Stile	4	2x4	1-3/8" x 3-1/4" x 25-3/8"
	A3	Cleat 1	2	2x4	1-3/8" x 3-1/4" x 21"
	A4	Cleat 2	1	2x4	1-3/8" x 3-1/4" x 18"
	A5	Cleat 3	1	2x4	1-3/8" x 3-1/4" x 15"
	A6	Foot	2	2x4	1-3/8" x 3-1/4" x 21"
	A7	Spacer	6	3/4" hardwood	3/4" x 3-1/4" x 4-5/8" (a)
	A8	Pad	4	3/4" hardwood	3/4" x 3-1/4" x 4" (a)
	A9	Front and back panel	2	1/4" birch ply	1/4" x 27-1/8" x 43" (b)
	A10	End panel	2	1/4" birch ply	1/4" x 11-5/8" x 29-7/8" (c)
	A11	Bottom panel	1	1/4" birch ply	1/4" x 11-5/8" x 36-1/2" (c)
	A12	Top panel 1	1	1/4" birch ply	1/4" x 11-1/2" x 13"
	A13	Top panel 2	1	1/4" birch ply	1/4" x 11-1/2" x 14-1/4"
	A14	Top panel 3	1	1/4" birch ply	1/4" x 11-1/2" x 2-3/4"
Brace	B1	Inner stile	1	2x4	1-3/8" x 3-1/4" x 27-1/8"
	B2	Outer stile	1	2x4	1-3/8" x 3-1/4" x 19"
	B3	Arm	1	2x4	1-3/8" x 3-1/4" x 11"
	B4	Box top and bottom	2	2x4	1-3/8" x 2-3/4" x 2-3/4"
	B5	Box side, short	1	2x4	1-3/8" x 2-3/4" x 10"
	B6	Box side, long	1	2x4	1-3/8" x 2-3/4" x 12"
	B7	Face	2	1/4" birch ply	1/4" x 5-1/2" x 10" (b)
Top	C1	Top	1	MDF	3/4" x 23" x 59"
	C2	Center, end	2	MDF	3/4" x 12" x 23-1/4" (c)
	C3	Center, middle	2	MDF	3/4" x 11-5/8" x 35-1/4" (d)
	C4	Bottom	1	MDF	3/4" x 23-1/4" x 59-1/4" (d)
	C5	Face vise platform	2	MDF	3/4" x 11-1/2" x 13-1/2" (d)
	C6	End vise platform	2	1/4" birch ply	1/4" x 4-1/4" x 9-1/8" (d)
	C7	Face vise front	1	3/4" hardwood	3" x 6-1/4" x 15"
	C8	End vise face	2	3/4" hardwood	3/4" x 3" x 7"
Riser	D1	Foot	2	2x4	1-3/8" x 3-1/4" x 21"
	D2	Spacer	2	3/4" hardwood	5/8" x 3-1/4" x 13"
	D3	Pad	4	3/4" hardwood	3/4" x 3-1/4" x 4"
	D4	Side	8	3/4" hardwood	3/4" x 2-3/4" x 4"

Notes:

- Rip at 3-3/8" wide, then glue to mating piece.
- This is the final size. Rough-cut 1/4" oversize in length and width. Glue to mating surfaces, then rout flush.
- Rough-cut 1/4" oversize in width only.
- This is the rough-cut size. Glue to mating piece with 1/8" overhang, then rout flush.

Fig. D 1/4" Plywood Cutting Diagram

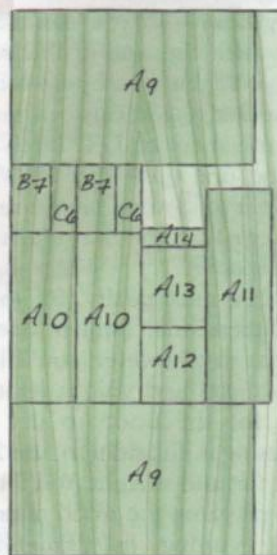


Fig. E 3/4" MDF Cutting Diagram

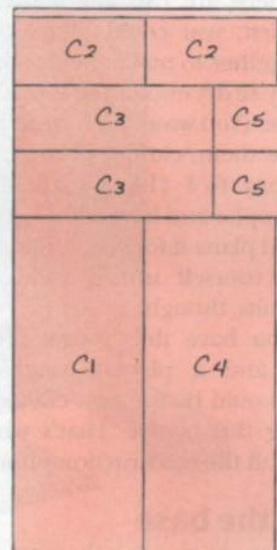
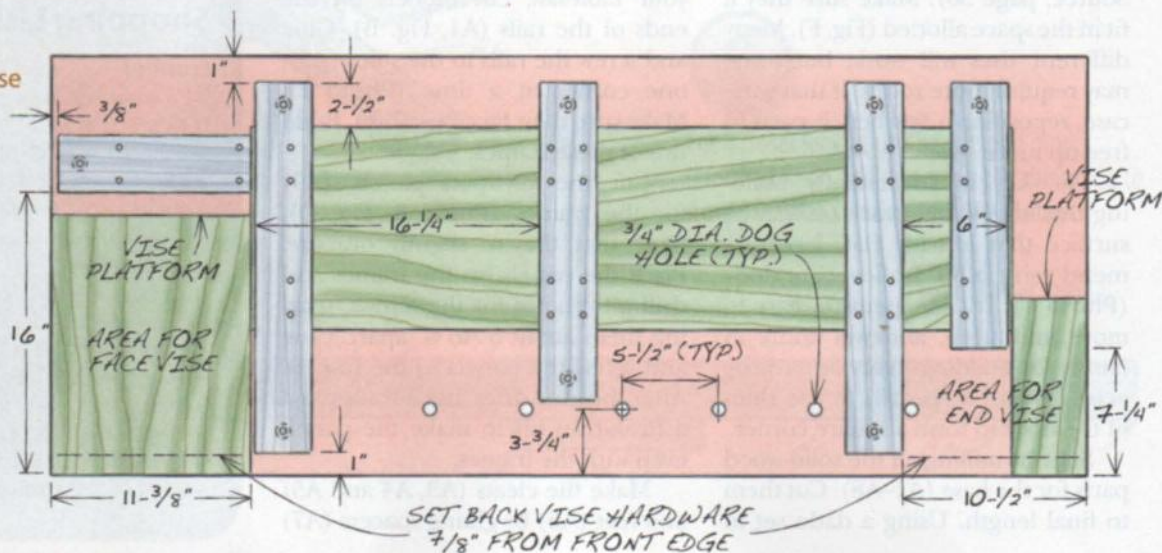


Fig. F
Top View of Base



to each piece (Fig. C). Be sure that the spacers are positioned square to the piece underneath. Trim the spacers flush (**Photo 4**). Drill holes in the cleats for fastening them to the top with lag screws.

Drill and countersink pilot holes in the cleats and feet (see Fig. F for hole locations). Clamp up the base without glue, making sure that the ends of the frames are flush with the sides of the outer cleats and feet. Continue drilling the pilot holes into the frames. Remove all four cleats, then glue and screw the outer ones only (**Photo 5**).

All of the pieces that support the top of this bench must be level with each other. If they're not, the top will eventually sag. (It's made from MDF, which isn't as stiff as solid wood.) Place the two middle cleats in position and make sure they're level with the outer cleats (**Photo 6**). If your frame members are straight, everything should be fine. If the middle cleats are low, shim them with paper; if they're high, sand or plane them thinner. Glue the cleats in place.

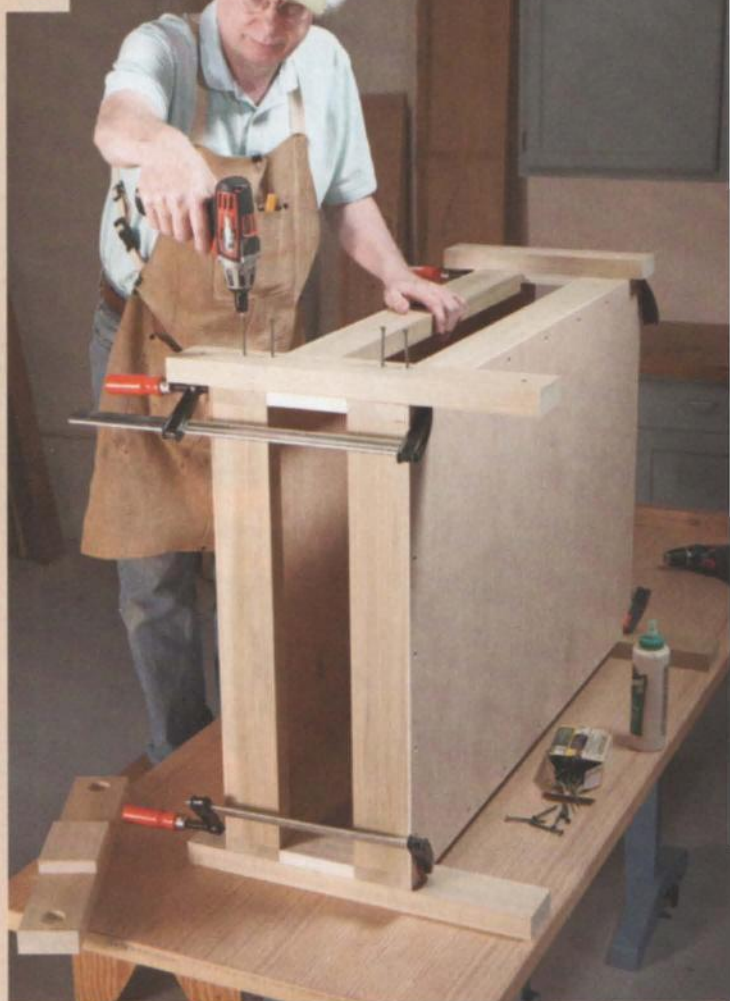
Turn over the base and glue and screw the feet. Glue and screw pads (A8) under the feet, then trim them flush. Cut the end panels (A10), glue and screw them to the base, then trim their sides flush. Cut the bottom panel (A11). Glue and screw it to the base, then trim flush. Turn the base over and add the top panels (A12, A13 and A14).

Add the brace on the left end of the base. Cut all the solid wood parts (B1–B6). Glue the box parts (B4, B5 and B6). Cut the plywood faces (B7) and glue them to the box. Trim flush. Glue and screw the box to the inner stile (B1). Screw the inner stile and box to the base; note that the top of this part sits below the base by the thickness of the arm (B3, Fig. A). Clamp the outer stile (B2) to the box's long side (B6). Place the arm in position and adjust the outer stile until the arm is level. Screw the outer stile and arm in place.

Make the riser blocks (D1–D4, Fig. G). You can make these any height you wish. They should fit tight, so the bench won't wiggle.

Assemble the box beam by gluing and screwing the cleats to the frames. Again, it's essential to do this on the assembly table, so the base stays flat.

5



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Sight across the top of the box beam with the middle cleats in place—before gluing them on. Everything must be level.

6





7 Assemble the top in stages. It's composed of three layers of MDF. Use lots of screws as miniature clamps to apply even pressure when you glue the pieces together.



8 Rout the pieces flush. Remove the screws, then add the next layer. The result is a top that's dead flat—and the box-beam base will keep it that way.

Build the top

Cut all of the top pieces (C1–C6, Fig. E) to size. You'll be building the top in stages, upside down. Each layer is glued to the piece below using 1-1/4" screws as clamps (**Photo 7**). To begin, place the top (C1) on the assembly table, then place the center pieces (C2 and C3) in position and make sure they fit snug.

Draw grids on these pieces to locate the screws; the lines should be 3/4" in from each edge and spaced about 4" to 5" apart. Clamp the four pieces to the top and pre-drill 1-1/4" deep holes for all the screws. Countersink the holes. Remove the center pieces and lightly countersink the opposite side of the holes, plus the holes in the top piece. This guarantees that the pieces will lie flat when you screw them together.

Glue and screw the center pieces, one at a time. Apply the glue with a small paint roller. After the glue dries, trim the edges flush (**Photo 8**). Remove the screws and repeat the same process for the bottom piece (C4) and the platforms for the face vise (C5) and end vise (C6).

Add the vises while the top is upside down. One note on the face vise: The front (C7) must be tapered, top to bottom (Fig. H). This ensures that the top of the vise pinches first as it closes. Make the taper by taping a 1/8" shim under one side of the face, then run the block through a planer.

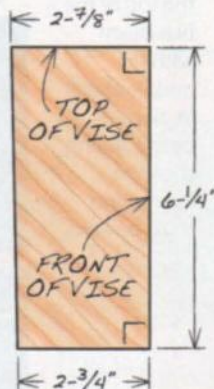
The top of the face vise should be flush with the top of the bench. Drill the mounting holes in the vise face so it sits about 1/16" above the benchtop, then level the vise's top after it is installed. Follow the same procedure with the end vises (C8).

Fasten the top to the base. Drill pilot holes 1/8" deeper than the full length of the lag screws. Drill holes for the bench dog, making sure they don't hit any of the cleats. (These holes must be plumb; make a 1-3/8" thick guide block and use a drill press to drill a 3/4" hole through it.) Finish the top with three coats of oil-based poly. 



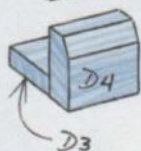
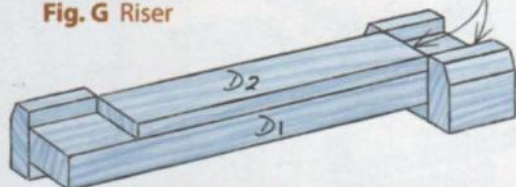
For more information on buying a vise for your workbench, go to AmericanWoodworker.com/WebExtras

Fig. H End View of Vise's Face



ROUND OVER ALL INNER EDGES

Fig. G Riser



SOURCE

Woodcraft Supply, woodcraft.com, 800-225-1153, Large Front Vise, #144805, \$76.99; Handle, 17E52, \$6.99; 7" Quick Release Bench Vise, #152633, \$99.99; Pinnacle Brass Bench Dogs, 3/4" dia., #151101, \$29.99.

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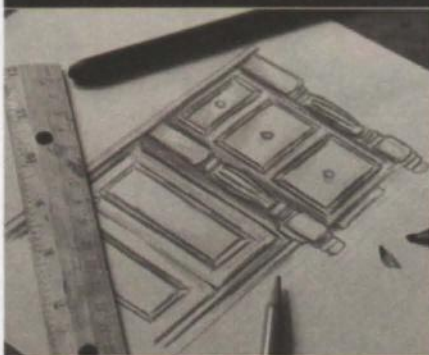
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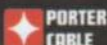
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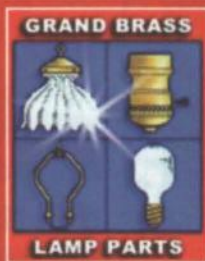
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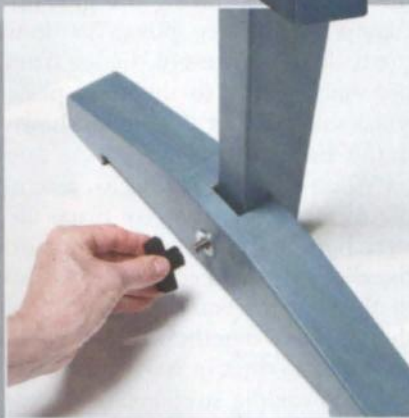
by Tom Caspar

PHOTOGRAPHY: JASON ZENTNER | ILLUSTRATION: FRANK ROHRBACH



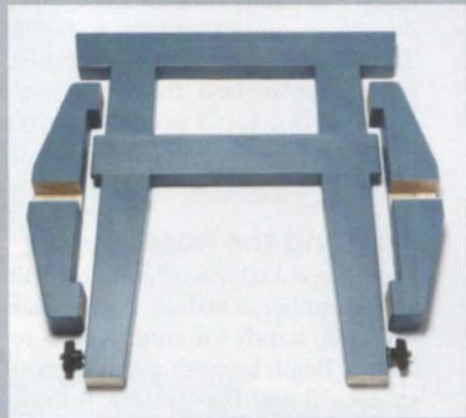
Easy to make

All the parts are just home center 1x4s glued together.



Removable feet

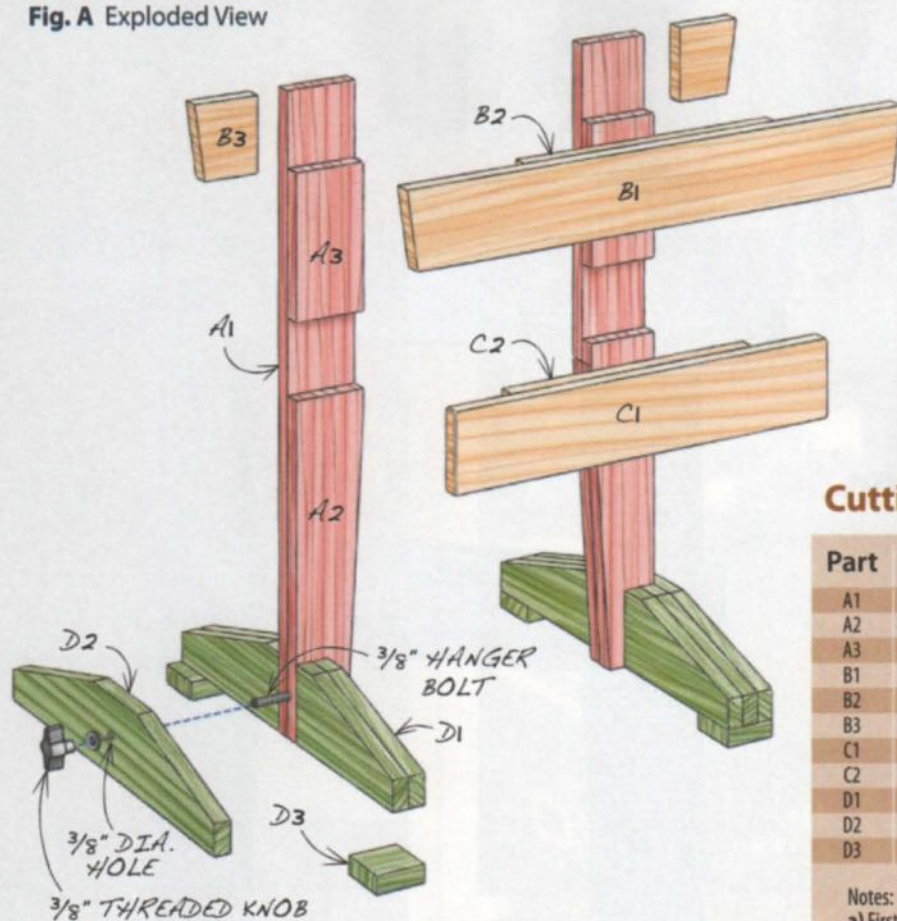
Unscrew the knobs to slide off the feet.



Stores flat

Hang the parts on a wall or put them on a shelf.

Fig. A Exploded View



To download a SketchUp plan for this sawhorse, go to AmericanWoodworker.com/WebExtras

Cutting List

Overall Dimensions:
27-1/2" H x 24" W x 18" D

Part	Name	Qty. for 2	Th x W x L
A1	Leg 1	4	3/4" x 3-1/4" x 26-3/4"
A2	Leg 2	4	3/4" x 3-1/4" x 14-1/4"
A3	Leg 3	4	3/4" x 3-1/4" x 6"
B1	Top stretcher 1	2	3/4" x 3-1/4" x 24"
B2	Top stretcher 2	2	3/4" x 3-1/4" x 11-1/2"
B3	Top stretcher 3	4	3/4" x 3-1/4" x 3" (a)
C1	Mid stretcher 1	2	3/4" x 3-1/4" x 19-1/2"
C2	Mid stretcher 2	2	3/4" x 3-1/4" x 11-1/2"
D1	Foot 1	16	3/4" x 3-1/4" x 8-1/4" (b)
D2	Foot 2	4	3/4" x 3-1/4" x 18"
D3	Foot 3	8	3/4" x 2-1/4" x 2-1/4"

Notes:

- a) First cut miters on both ends of two pieces 12" long, then crosscut them to make four B3 parts.
- b) Rough cut four pieces 17" long to make all eight pieces.

EVERY SHOP needs a pair of trusty sawhorses. I like ones that are easy to build and easy to store away. These sawhorses definitely fit that bill, and nest together quite well, too.

This unique design is within reach of any woodworker and doesn't require many tools to build. The wood is quite common—I used yellow poplar 1x4s from the local home center. You'll need about 200 linear feet of 1x4s to make one pair of horses.

Building the horse

You'll need a tablesaw, handsaw, drill and a number of clamps. A miter saw would be handy for cutting parts to length. Begin by cutting all the parts except A3 and B3—you'll cut these to fit later on. Assemble the parts in the order shown in the drawings on the next page. The basic idea is to glue the pieces in layers (**Photo 1**), then rip both sides to make the

edges perfectly even (**Photo 2**).

Here are a few notes to guide you along the way. In step 12, you'll be gluing a foot so that it fits tightly around a leg. The best way to do this is to place a leg between the foot pieces during the glue-up. Clamp these three pieces to draw them close. To prevent the leg from becoming glued to the foot, place some shims under the leg, as shown in the drawing.

When you're ready to assemble the frame in step 16, place the stretchers in position and measure the distance between them. Cut A3 to this length. You can glue all of these pieces together at once, but it's easier to do it in two stages. Start with the middle stretcher, but leave the top stretcher in place—without glue—so the legs are spaced correctly. Draw all the pieces tight with clamps. For the second stage, glue on A3 and the top stretcher. After

removing the clamps, cut part B3 to exact length.

To install the hanger bolts, first drill a 5/16" hole through each foot. Make sure the hole is plumb—it's best to use a drill press. Clamp the foot onto the leg and continue drilling the hole with a cordless drill. Remove the foot and enlarge its hole with a 3/8" bit. Install the hanger bolt by jamming two nuts together on its threaded end; turn them with a wrench.

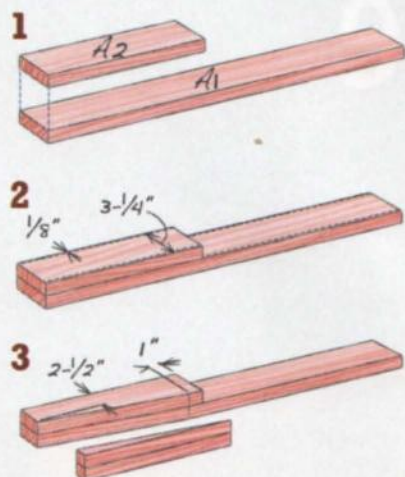
If you finish or paint your sawhorse, leave the feet on. You don't want a film on the part of the leg that slides into the foot. That additional thickness would make the fit too tight—I know, it happened to me!



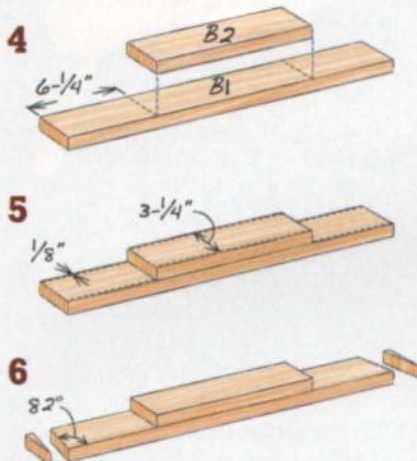
SOURCE

Woodcraft Supply, woodcraft.com, 800-225-1153, T-style knob with 3/8"-16 insert, #142227, \$1.19 ea.

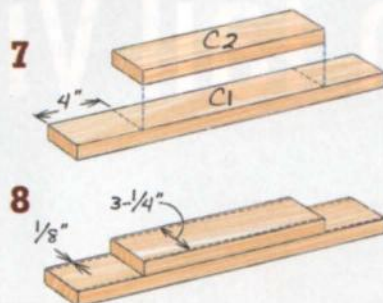
Leg assembly



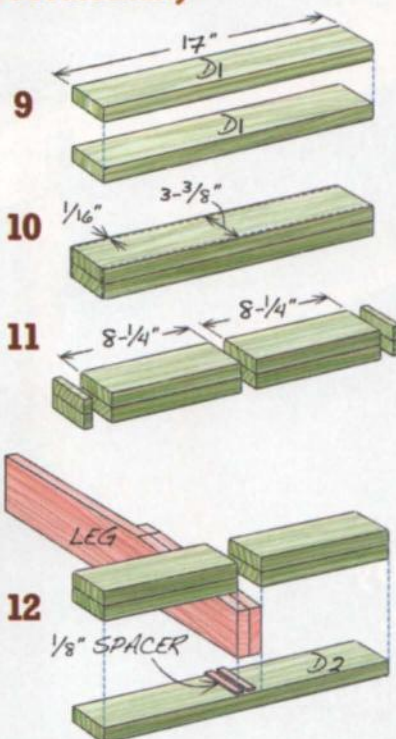
Top stretcher assembly



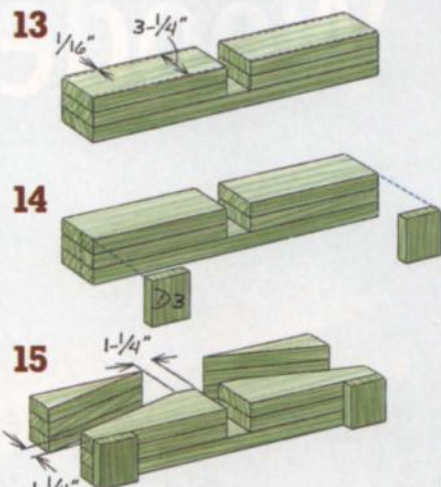
Mid stretcher assembly



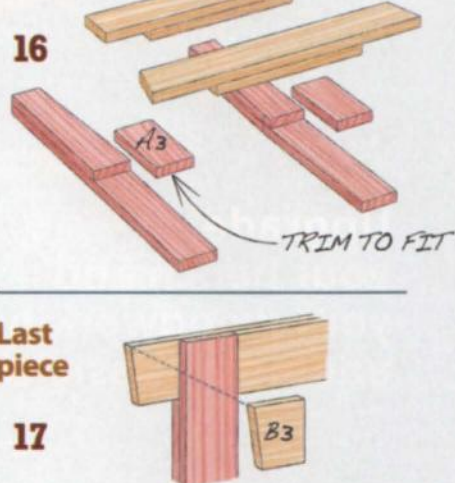
Foot assembly



Foot assembly *continued*



Frame assembly



Last piece



1

Use plenty of clamps to glue the pieces together. Place two clamps across the pieces to help align them. To prevent these clamps from sticking to the wood, place some small blocks, covered with masking tape, between the wood and the clamp.



2

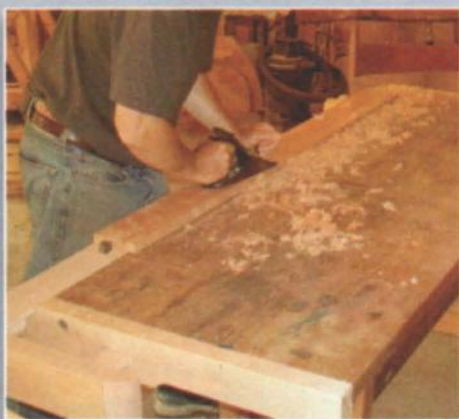
Saw both sides of the glued-up parts. This is an easy way to make the edges perfectly even.

Wooden Tail Vise



**Upgrade
your bench and
your woodworking by
adding a classic vise.**

by Steve Bunn



Clamp horizontally

Clamp long and short boards on top of the bench, fully supported for planing.



Clamp for work

Hold furniture parts for chopping, carving and routing. Hold jigs and fixtures, too.



Clamp vertically

Clamp freely between the jaws. Unlike a face vise, there are no screws or guide bars to get in the way.

YOU CAN DO WITHOUT A TAIL VISE. But you can do much more with one. That's why woodworkers have depended on tail vises for over 400 years. A tail vise can be used to clamp boards of all sizes horizontally or vertically for planing, sanding, carving, routing, gluing, etc. Modern versions employ metal screws and guide plates, but I prefer the traditional all-wood construction shown here, partially because it's beautiful in both form and function, and partially because you don't have to buy any vise hardware, only a thread box and tap, which can be used over and over (see Sources, page 48).

This vise can be mounted on virtually any workbench, although modifying the base is almost sure to be a part of the project. A bench with a trestle-style base and a top that extends beyond it at the front and on the right side, as shown here, is ideal.

Like any clamping device, a tail vise has two main components, a fixed jaw and an adjustable jaw. Both jaws accept bench dogs (see Sources), so that in addition to clamping between the jaws, a tail vise can also clamp above them. This dual capability is the key to a tail vise's versatility.

The fixed jaw is a laminated beam that's glued and screwed to the front of the bench top and reinforced by a solid beam—called an end cap—that's attached to the end of the top. The adjustable jaw opposes the fixed jaw. It's a complex rectangular frame that mounts against and underneath the bench top, supported and guided by another end cap. The screw that operates this jaw threads through the same end cap.

Start with the end caps

The end caps (A and B, Fig. A, page 44, and Cutting List, page 48) anchor both jaws. They also keep the bench top flat. Start with two 1-3/4" x 3-3/4" maple blanks that are about 6" longer than the width of the bench top. Use the table saw to cut a 7/8" wide dovetail-shaped groove on the inside face of each end cap blank, starting 5/8" from the top edge. Tilt the blade 9° to cut the angled shoulders. Then install a dado set to remove the waste. Clean up each channel and drill a single countersunk shank hole for a 3/8" x 6" lag bolt.

The end caps must be wide at the front to support the vise jaws, but they can be narrower at the back. Cut notches on the bandsaw or by making a series of stopped cuts on the jointer.

Dovetail-shaped keys (C, Fig. A) simultaneously hold each end cap tightly against the bench top, yet still allow seasonal movement. Make two key blanks on the table saw with the blade tilted 9° and set at 1" height. Stand a 1" x 4" x 24" blank on its edge and make two passes, resetting the fence between passes to determine the key's width. Make a third pass with the blank on its side to cut out each key. Each key blank should tightly fit the end cap's grooves, but slide without binding. It must also sit flush with or slightly below the cap's face.

Cut the blanks into 4" long keys and use a jig to screw them to the bench top (Photo 1). The jig is simply a 2" wide offcut from one of the end beams with a fence

Start by installing end caps on both ends of the bench. They mount on dovetailed keys that are located using a jig made from an offcut.



The right end cap contains a threaded hole for the vise's wooden screw. A woodthreading kit contains a tap to thread this hole and a thread box to cut threads on the screw.



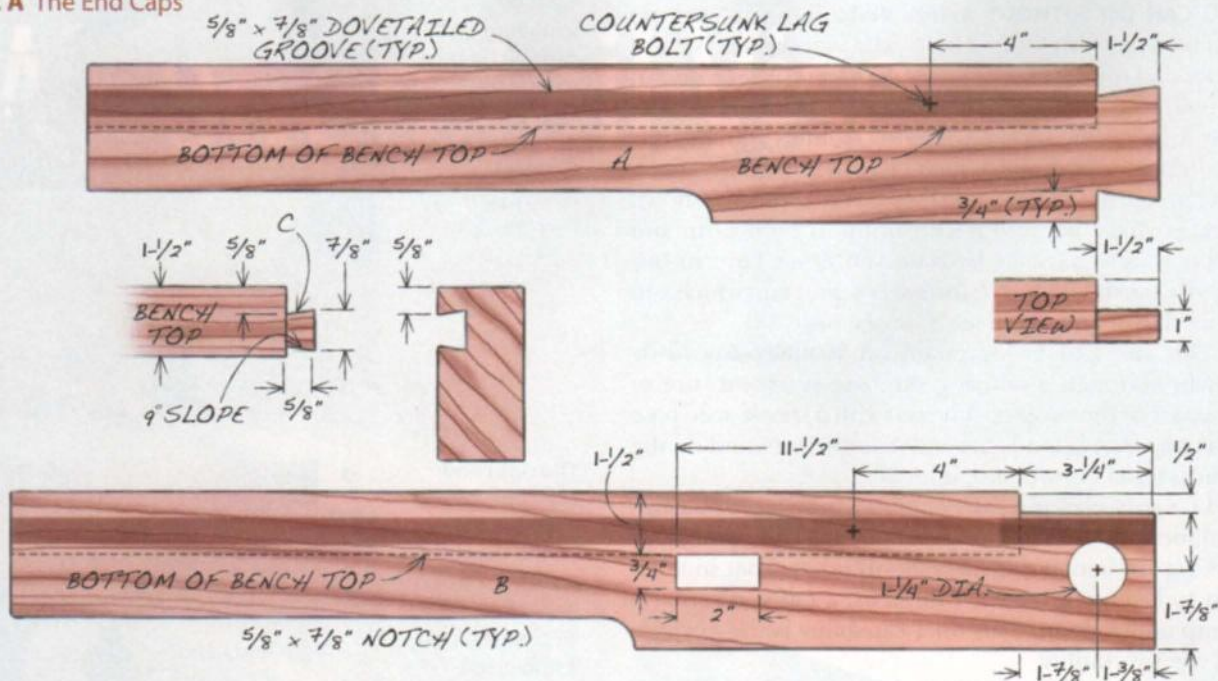
Turn the wooden screw. Finish by cutting a groove for the garter in the collar. The garter locks the screw in the vise's adjustable jaw, but allows it to revolve freely.



Use the thread box to thread the shaft of the wooden screw all the way to the collar. These threads fit the threaded hole in the end cap.



Fig. A The End Caps



glued on top. Slide a key into the jig and position the jig on the bench. Drill a countersunk pilot hole through one end of the key and into the end of the bench. Install a screw. Repeat the process on the other end of the key. Then remove the jig. Space the keys about an

inch apart, starting 1" from the front of the bench top.

Finish and install the end caps one at a time. The left end cap (A) extends 1-1/2" beyond the bench top and is dovetailed to the fixed jaw. Lay out and cut this lapped dovetail on the front of the cap. Rub paraffin in the cap's dovetailed groove and then drive it onto the keys and into position on the bench top. Install the lag bolt and finish by trimming the back end flush.

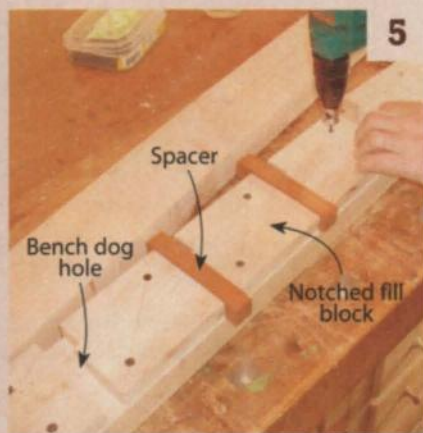
The right end cap (B) extends 3-1/4" beyond the bench top to support the sliding jaw and anchor the wooden screw. Use one of the keys to fill the front end of the dovetailed groove. Mark the center point of the screw and drill a 1-1/4" dia. pilot hole. Lay out and cut the notch at the front and the mortise. The notch allows the adjustable jaw to ride over the end cap as it's opened and closed. Similarly, the mortise accommodates the adjustable jaw's guide bar, which slides under the bench top. Make this mortise large enough for the guide bar to freely slide through. Use a 1-1/2" dia. threaded tap to cut the threads in the bench-screw pilot hole (**Photo 2**). Then follow the procedure described earlier to install this end cap.

The wooden screw

Make the screw (D, Fig. B) from a 24" long maple blank turned to a 3" dia. cylinder (**Photo 3**). Lay out and turn the head and the 2" dia. x 1-3/4" collar. Turn the shaft to 1-15/32" dia. and finish by cutting a 1/4" deep groove in the collar for the garter.

Clamp the turned screw in a vise (the vise on your other workbench) and use a 1-1/2" thread box to cut the threads into the shaft (**Photo 4**). Turning the shaft to just under 1-1/2" dia. keeps the shaft from binding in the thread box as the threads are cut.

Use a V-block and a drill press with a fence to drill a centered 7/8" dia. hole in the head of the screw for the

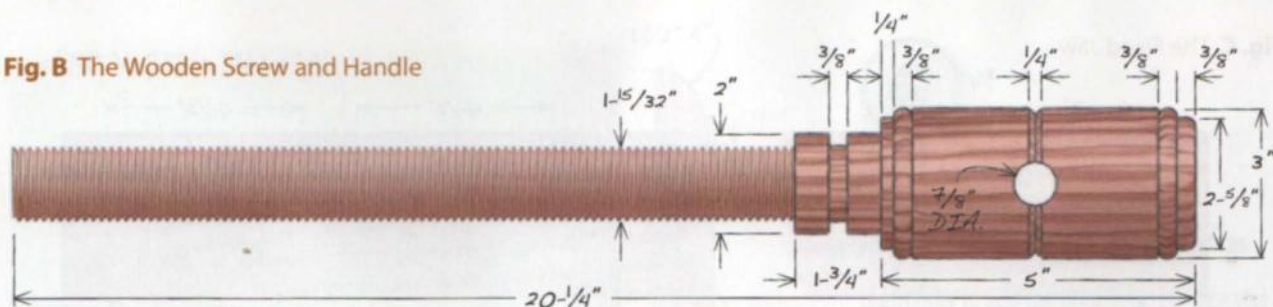


5 Create the fixed jaw by gluing notched fill blocks between two rails. Use screws instead of clamps to streamline the process. The spaces between the segments become holes for bench dogs.



6 Install the fixed jaw with glue and lag bolts, making sure it's flush with the existing bench top. The board glued on the bottom of the fixed jaw supports the Federal-style double-screw face vise.

Fig. B The Wooden Screw and Handle



handle (E). Turn the handle from an 18" long maple blank turned to a 1-1/4" dia. Turn the shaft to 3/4" dia., with a knob on each end. On one end, next to the knob, turn the shaft down to a 9/16" dia. tenon. Remove the handle from the lathe and cut off the knob that's next to the tenon. Clamp this knob in a hand screw and drill a 9/16" dia. stopped hole for the tenon. Slide the shaft of the handle through the hole in the head of the screw and then glue on the knob.

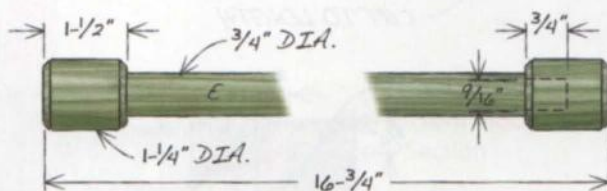
The fixed jaw

Determine the fixed jaw's length by subtracting 16" (the length required by the adjustable jaw) from the overall length of your bench, including the two end caps. For the 80-1/2" long bench shown here, the fixed jaw measures 64-1/2". This jaw contains equally spaced holes for bench dogs (Fig. C). It consists of notched, angled fill blocks (F) that are sandwiched between two rails (G). Make sure to have your bench dogs in hand before you build, so you can size the dog holes to fit.

Mill blanks for the two 1-1/2" thick rails and the 3/4" thick fill blocks. Cut the blanks 3-13/16" wide and allow extra length for trimming. Set the miter fence to 5° and use the tablesaw to cut the fill-block blank into nine 4-3/4" long blocks and two extra-long blocks to go on the ends of the assembly. Cut a 1/4" x 1-1/4" notch in each fill block to allow the head of the bench dog to seat below the top surface. Drill a pair of countersunk pilot holes in each fill block and glue them on one of the rails, using spacers to create 1" gaps (Photo 5). Make sure all the notches face up and to the right. Clamp each block until you drive in the screws; then remove the clamps. After all the blocks are fastened, remove the screws. Then glue and clamp the remaining rail. When the glue is dry, level the top of the laminated jaw and mill it to final 3-3/4" width.

Square the jaw's right end 4-1/2" from the first dog hole. Then square the left end at the assembly's final length (flush with the outside edge of the left end beam). Clamp the jaw to the front of the bench, level with the top and snug against the end beam's dovetail. Transfer the dovetail onto the end of the jaw. Then remove the jaw and cut the dovetail socket in the end. Drill countersunk holes for the three 3/8" x 6" lag bolts that anchor the jaw to the bench, in the middle and 3" from each end.

Install the fixed jaw (Photo 6). Apply glue to the edge of the bench top and to the end cap's dovetail.



Lightly clamp the assembly in position. Then use a dead blow mallet to seat the dovetail joint. Level the assembly with the front of the bench and then tighten the clamps. Drill pilot holes through the three countersunk holes in the jaw and then install the lag bolts.

Modify the base

Adding the two jaws makes the top front-heavy. To keep the bench from tipping forward, you'll probably have to modify the base. On the trestle base shown here, the

Modify the bench base by cutting off the fronts of both top rails. This allows moving the base forward to center it under the widened top. You'll also have to cut a notch for the adjustable jaw's guide bar.



Make the adjustable jaw's front block in two pieces to create its angled dog hole. Cut a shallow groove across the grain in each piece. Then saw the angled shoulders and clear the waste.

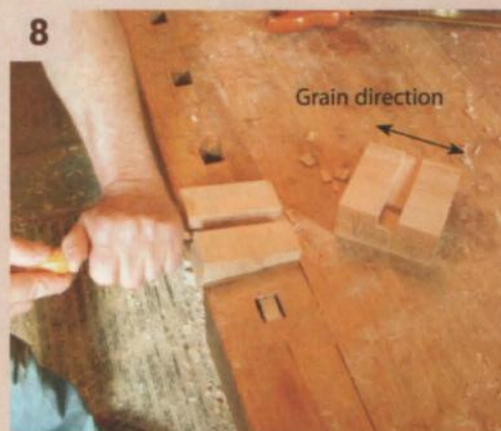
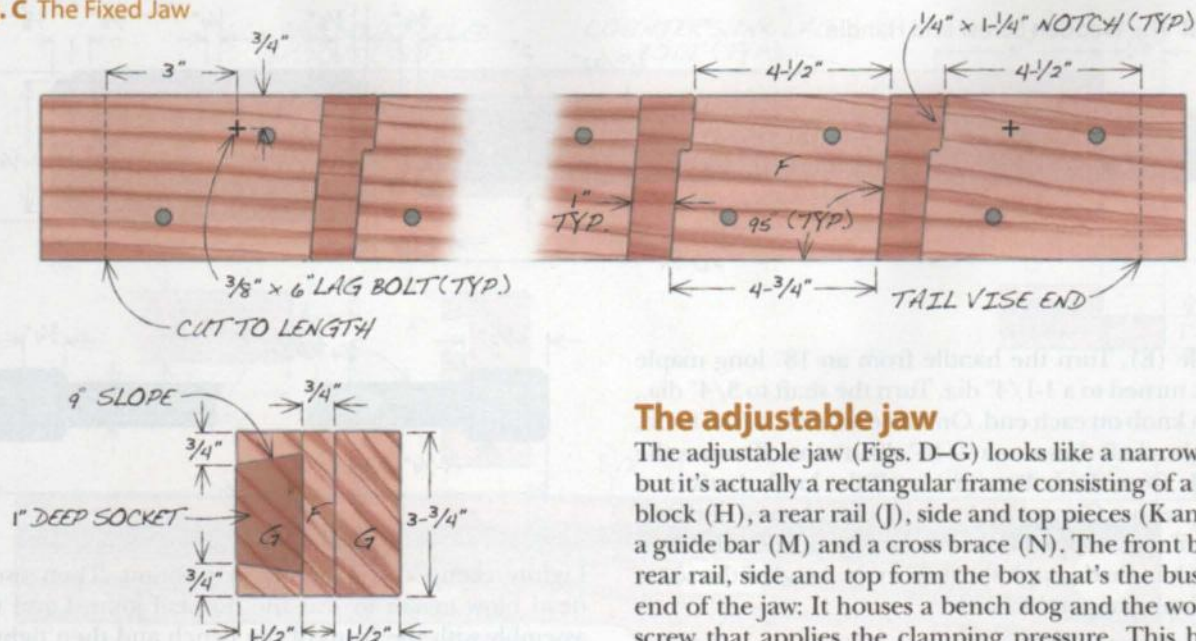


Fig. C The Fixed Jaw



solution is to shorten the top rails (**Photo 7**). This allows moving the base forward under the top until it butts against the fixed jaw. You'll also have to cut a slot for the adjustable jaw's guide bar. It's best to make this cut later, when you're installing the adjustable jaw.

The adjustable jaw

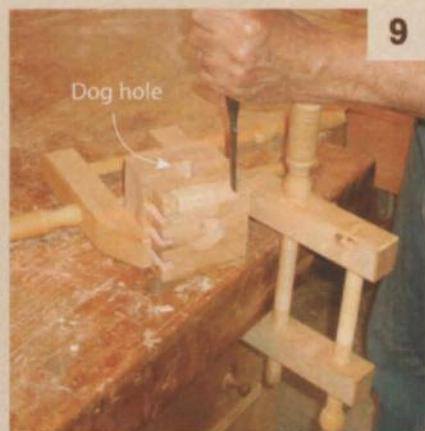
The adjustable jaw (Figs. D–G) looks like a narrow box, but it's actually a rectangular frame consisting of a front block (H), a rear rail (J), side and top pieces (K and L), a guide bar (M) and a cross brace (N). The front block, rear rail, side and top form the box that's the business end of the jaw: It houses a bench dog and the wooden screw that applies the clamping pressure. This box is supported by the right end cap and kept level with the bench top by a tongue (P) that's attached to the front block. The guide bar and cross brace slide under the bench top. The guide bar, mortised into the rear rail, housed in the end cap and supported by a rub rail (Q), holds the adjustable jaw against the front of the bench as it slides. The cross brace completes the frame by connecting the guide bar to the front block.

The biggest challenge in building the adjustable jaw is cutting the angled dog hole in the center of the front block (Fig. E). The trick is to make this block in two pieces (**Photo 8**). Cut a pair of identical 1-7/8" x 3-3/4" x 3-3/4" blocks. Then cut a precisely centered 1/4" deep x 3/4" wide dado across the grain in each block, using a dado set and a miter gauge with a fence and a stop block. Clamp the blocks together with the dados facing each other and lay out the ends of the angled dog hole on the top and bottom faces of both blocks. Use these depth marks and a hand saw to cut the angled shoulders. Clear the waste with a chisel and cut the notch on one end. Then carefully glue the two blocks together, using a spacer to precisely align the dados.

Cut dovetails on both ends of the adjustable jaw's side (K) and top (L). (Note that the side's front-block dovetails are longer than its rear-rail dovetails.) Transfer the dovetail locations to the front jaw. Then cut the sockets and fit the joints (**Photo 9**).

The front block's back face has a tongue and a mortise (Fig. F). The tongue (P) holds the block level with the bench top as the adjustable jaw opens and closes (**Photo 10**). It slides in a groove created by a rabbeted cleat (R) that's attached to the bottom of the bench top. The mortise in the front block houses a tenon on the cross brace (N). Fasten the rabbeted cleat under the bench top and then attach the tongue with glue and screws and chop the mortise.

Cut the rear rail (J, Fig. G) to length and width.



9

Glue the front block together to create the dog hole. Then drill it to house the wooden screw, dovetail it to fit the side and top pieces and mortise it for the cross brace.



10

The front block slides in a groove created by attaching a rabbeted cleat to the bench. A tongue fastened to the jaw fits the groove and keeps the jaw flush with the bench top as it slides.

Cutting List



Notes:

- a) For 24" wide bench top; extends 1-1/2" beyond front edge of bench top.
- b) For 24" wide bench top; extends 3-1/4" beyond front edge of bench top.
- c) Sides slope at 9°.
- d) Ends slope at 5°; 1/4" x 1-1/4" notch at one end. Make two of the fill blocks 8" long.
- e) For 80-1/2" long bench, including end caps. Start with 67" long blank.
- f) Create by gluing together two 1-7/8" x 3-3/4" x 3-3/4" blocks.
- g) Dovetails are 1-7/8" long on one end and 1-3/8" long on the other end.
- h) Cut 5/8" long dovetails on both ends.
- j) Cut 3/8" x 1-1/2" x 1" tenon on one end. Trim length if necessary
- k) Cut 3/8" x 1-1/2" x 1" tenon on one end with adjacent 1/4" x 2-1/2" rabbet.
- l) Cut 5/8" x 3/4" rabbet on one edge.
- m) On one end, cut a centered 1-1/2" x 1-3/4" slot with a round bottom.



14

SOURCES

-

48 AmericanWoodworker.com OCTOBER/NOVEMBER 2011

■ CLAMPING

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Precision Drill Press Table

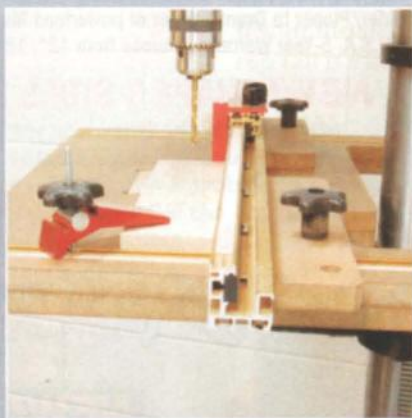
For accurate
drilling, build
an engineered
table.

by Steve Lehmann



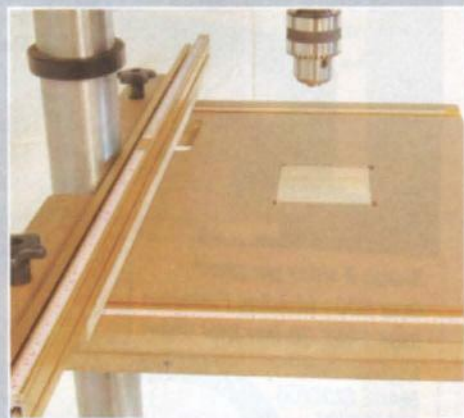
Sacrificial inserts

Make a bunch to prevent blowout when you drill through a workpiece.



Hold-down clamps

The T-track is mounted so securely that you can use very strong clamps.



Deep capacity

The table's design allows you to clamp the fence all the way back.

DID YOU KNOW that most drill press tables are made for metalworking? Woodworkers need a better table: it should have a broad surface, an easily adjustable fence with a stop, hold-downs and replaceable inserts.

I've studied many plans for a table with these features, but each one seems to have a shortcoming. I've taken all of their best qualities and come up with a table that should satisfy all your needs. It uses two types of Incra track—which I like a lot—but other kinds of T-track would work well, too.

Make the table

The table is laminated from two layers of 3/4" MDF. Cut the upper piece (A) to exact size; cut the lower piece (B) about 1/4" oversize. Make a large notch on the rear of the upper piece (Fig. B). (The deep section allows clearance for turning the table-height adjustment crank.) First, drill holes to make internal corners, then cut the notch with a jigsaw. Cut out the same notch on the lower piece, but make this notch about 1/8" smaller. Round the outside corners of the top piece using a template and flush-trim bit or a file and sandpaper.

Glue the upper and lower pieces together (**Photo 1**). After the glue dries, rout all around the table with a flush trim bit to even up the edges of the two pieces.

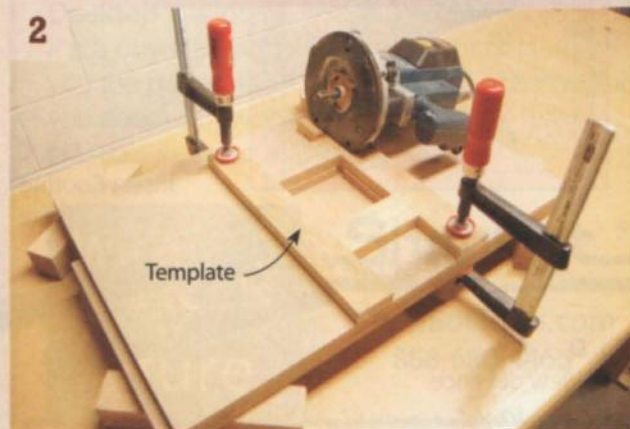
Build a template for routing the recess for the sacrificial inserts (Fig. C). Glue the template's pieces around a square piece of plywood, then fasten them together with screws. Install a template guide and straight bit in your router and make a test recess in a scrap piece of MDF. (This is a good time to plan ahead: If your inserts will be made from a supply of 1/2" or 3/4" sheetstock, adjust your router's depth of cut to match this material's thickness.) The test cut will give you the exact size of the recess. Back on the real table, draw the recess (Fig. B) and drill holes at each corner. (These holes will allow you to easily remove an insert.) Position the template over the holes and rout the recess (**Photo 2**).

Using a dado set, cut grooves in the table for the T-track (**Photo 3**).

Glue two pieces of 3/4" MDF face-to-face to make the table. Use cauls above and below to distribute clamping pressure.



Rout a recess into the top of the table for holding the inserts. Make a square template and install a template guide and straight bit in your router.



Cut grooves to hold the T-track. Drill a few holes through the grooves, then insert 1/4 inch cap screws through the holes.



Slide the T-track over nuts that are attached to the ends of the cap screws. Tighten the screws from underneath the table. This T-track is never coming loose!

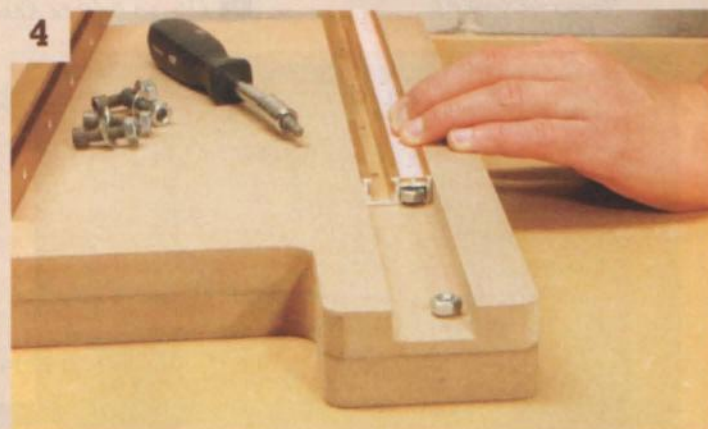


Fig. A
Exploded View

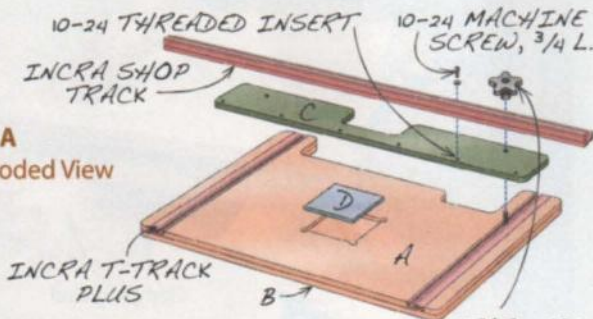


Fig. B
Plan View of Table

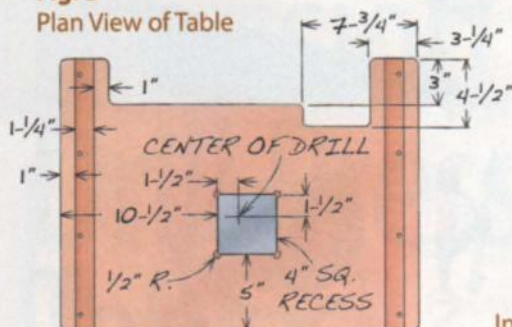


Fig. C
Insert Routing Template

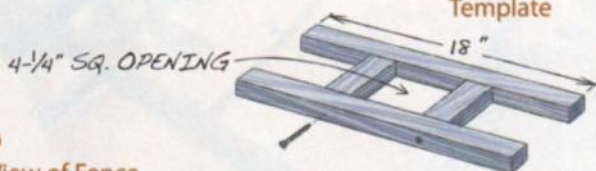


Fig. D
Plan View of Fence

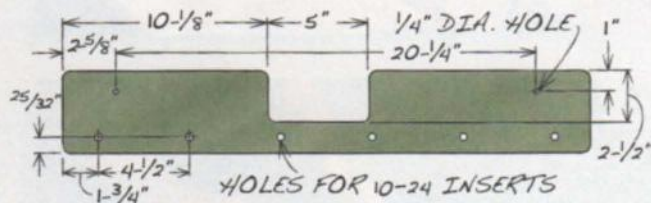


Fig. E Side View of Fence

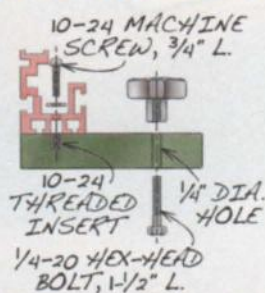
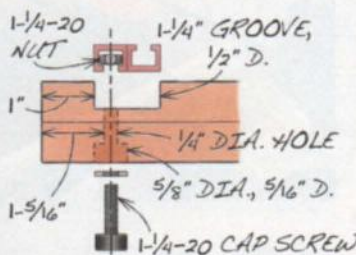


Fig. F T-track Mounting Detail



On the bottom of the table, carefully lay out the holes for the screws that will fasten the T-track in place (Fig. F). Use a Forstner bit to drill the large diameter portion of the holes first, then finish drilling the holes using a smaller bit. (The heads of these screws are recessed so the table will have a smooth bottom. This makes it easier to clamp a workpiece to the table.)

Install the screws and washers through the holes, then loosely attach the nuts. Slide the T-track over the nuts (Photo 4). Once the T-track is positioned, tighten the screws from underneath. This extra-strong fastening system prevents the upward force of the hold-down clamps from yanking the T-track out of the table.

Fence and inserts

Make the fence by cutting the base (C) to size. Cut a notch in the base so it can clear the drill press column (Fig. D). You could screw a wooden fence to the base; I chose an Incra fence because it has a scale and built-in T-tracks for holding a stop block.

Drill holes for the bolts that will clamp the base to the table's T-track. Drill holes for the threaded inserts that hold the Incra fence (Fig. E). Install the inserts and the fence.

Make a large supply of inserts to fit the recess in the table. Set aside one insert and draw crosshairs on it indicating where the center of the table will be (Fig. B).

Install the table

Install a small bit in the chuck of your drill press. Position the new table under the chuck, aligning the bit with the crosshairs you drew on the insert. Underneath the cast-iron table of the drill press, trace the outline of the mounting holes with a pencil.

The strongest way to fasten the wood table to the cast-iron table is by using 1/4-20 bolts, fender washers and threaded inserts. (MDF doesn't hold screws very well.) Turn the wooden table over and drill holes in it as far apart as possible for the threaded inserts. Avoid drilling into the sacrificial-insert recess. Install the threaded inserts and mount the table. Add the fence and you're ready to go!

SOURCES

Incra, incra.com, 972-242-9975, Incra T-track Plus, 18" long (TTRACKPLUS18), \$9.95; Incra Shop Track, 36" long (TRACK36), \$72.95; Incra Shop Stop, \$32.95.

Woodpeckers, woodpeck.com, 800-752-0725, Star Knob, 1/4-20, #13-KN115, \$0.75 ea.; Hold Down Clamp - Pivot Style, #HDCG-PIV-WP, \$7.99 ea.

Shopping List

- 8 socket-head cap screws, 1/4-20 x 1"
- 10 washers, 1/4"
- 8 nuts, 1/4-20
- 2 hex-head bolts, 1/4-20 x 1-1/2"
- 6 threaded inserts, 10-24
- 6 round-head machine screws, 10-24 x 3/4" and washers
- 2 star knobs with 1/4-20 inserts
- 4 threaded inserts, 1/4-20
- 4 hex-head bolts, 1/4-20 x 1" and fender washers

Cutting List

Overall Dimensions: 1-1/2" Th x 24" W x 18" D

Part	Name	Qty.	Th x W x L
A	Upper table	1	3/4" x 24" x 18"
B	Lower table	1	3/4" x 24-1/4" x 18-1/4"
C	Fence base	1	3/4" x 4" x 26"
D	Insert		1/2" x 4" x 4"

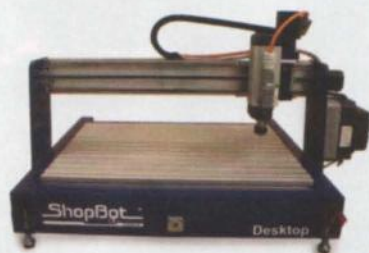


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Ultimate Lathe Stand

Build a professional-quality stand that's stable, strong and heavy.

by Alan Lacer



Serious beef

Double and triple thicknesses of 3/4" plywood, plus 120 lbs. of sand, provide ample mass to absorb vibration.



Strong fastening system

The legs and rails are bolted together using copper tubes to house the nuts. These joints will never shake loose.



Stable stance

The legs splay out in both directions.



A GOOD STAND is just as important as a good lathe. As a professional turner, I can't emphasize enough how important it is to have a stand that's stable, strong and heavy—particularly for bowl turning. This one meets all those requirements, and is better than many steel stands, yet it's just made from plywood.

Building your own stand has another major advantage: You can customize its height. Turning on a stand that's the right height allows you to control your tools much easier, and is less fatiguing, too. Time to do it!

Make the parts

First determine your stand's height and length (see "Sizing Your Stand," page 57). This stand is designed for a person about 5' 8" tall and a lathe that is 28" long with an axis 9" above its base. (I built this particular stand for a Vicmarc VL100.) Adjust the cutting list if necessary to fit your height and your lathe's dimensions.

Most of the plywood parts are made from two pieces glued together, face-to-face. Cut the pieces for these parts slightly oversize (Fig. A, Parts A, D, E, F, G, H and J). Glue them together (**Photo 1**).

Cut the top interior (A) to final size. Glue edge banding on all four sides (B and C, Fig. A). Trim the edging flush with the interior.

Double-splayed legs are the key to the base's stability (Figs. B and C). Use your tablesaw or circular saw to cut the top and bottom ends of the legs at 5° (**Photo 2**). Before you cut each leg, make sure these angles lean the same way, not in opposite directions. Lay out and cut the tapers on the long sides of the legs (**Photo 3**).

Rip the rails (E, F and G) and shelves (H and J) to final width. Trim the pieces to length, cutting their ends at 5° in opposing directions. (Leave the top shelf extra-long for now, so you can adjust its position later, if necessary.) In addition, cut the shelves' front and back edges, and the rails' top edges, at 5°. On the bottom shelf, leave the front edge square. (Note that the front bottom rail is not angled to follow the legs' taper. It is set back so you won't bump your ankles.) Make the tool dividers (N) and fasten them to the top shelf.

The fastening system

To make the joints, start by laying out the bolt-holes in the legs (Fig. C and D). Tilt your drill press table to 5°, put a 3/8" bit in the chuck and drill the holes (**Photo 4**). Use a fence to ensure that all the holes are the same distance from the tapered edges of the legs. Reset the fence for the front bottom rail holes.

Temporarily clamp together the legs and all four rails. Using a hand drill and the same 3/8" bit, extend each bolt-hole into its corresponding rail (**Photo 5**). Disassemble the base. If necessary, drill these holes deeper.

Lay out the holes for the copper tubes that will hold the nuts directly from the holes you just drilled. First, draw a centerline across each hole. Insert the 3/8" bit. Adjust a sliding bevel so it's parallel to the bit (each hole may lean at a slightly different angle). Place the bevel adjacent to the hole's centerline and draw a line

Glue two sheets of 3/4" Baltic birch plywood face-to-face to make the legs. Use torsion beams or other large cauls to flatten the plywood and to provide even pressure.



Cut a 5° angle on the top and bottom of each leg. This angle creates the side-to-side splay.



Use a saw guide and a circular saw to taper the legs.



Drill holes angled at 5° for the bolts that will join the stand. Make the rails from doubled-up plywood, then cut their ends at 5°. Temporarily assemble the base with clamps.



Fig. A Exploded View

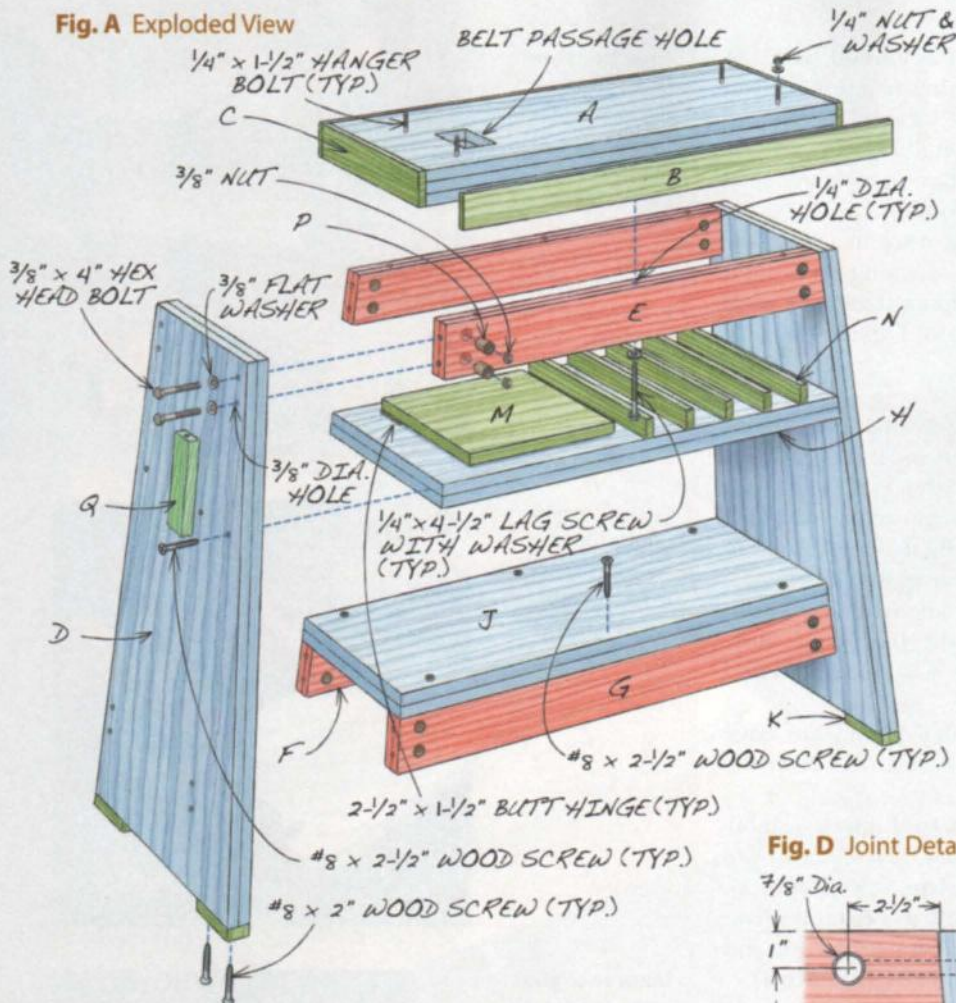


Fig. B Leg Detail, End View

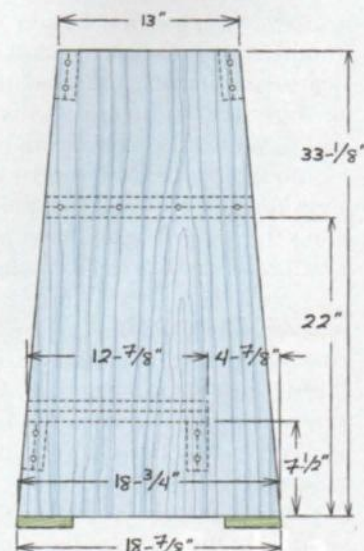


Fig. C Leg Detail, Front View

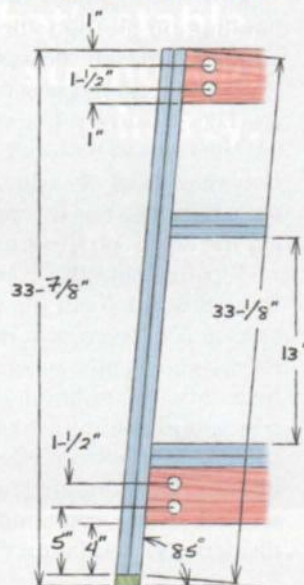
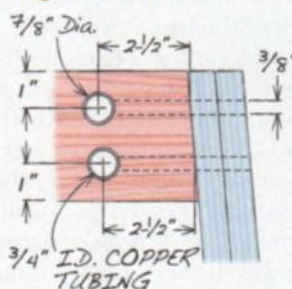


Fig. D Joint Detail



See the complete plans for making the torsion beams we used to glue this plywood together (Photo 1) at AmericanWoodworker.com/WebExtras

Cutting List

Overall dimensions: 36" H x 38-7/8" L x 18-7/8" D (a)

Part	Name	Qty.	Material	Th x W x L
Top				
A	Interior	1	3/4" Baltic birch plywood	2-1/8" x 14" x 34"
B	Edgebanding front & back	2	Oak	2-1/8" x 13" x 33" (b)
C	Edgebanding ends	2	Oak	1/2" x 2-1/4" x 34" (c)
Base				
D	Legs	2	3/4" Baltic birch plywood	1-3/8" x 33-1/8" x 18-3/4" (d)
E	Top rails	2	3/4" Baltic birch plywood	1-3/8" x 3-1/2" x 30-3/4" (d)
F	Bottom back rail	1	3/4" Baltic birch plywood	1-3/8" x 3-1/2" x 35-1/4" (d)
G	Bottom front rail	1	3/4" Baltic birch plywood	1-3/8" x 3-1/2" x 35-1/4" (d) (e)
H	Top shelf	1	3/4" Baltic birch plywood	3/4" x 15" x 32-1/8" (d)
J	Bottom shelf	1	3/4" Baltic birch plywood	1-3/8" x 13" x 34-5/8" (d)
K	Feet	4	Oak	3/4" x 1-1/2" x 4"
M	Motor mount	1	3/4" Baltic birch plywood	3/4" x 12" x 12"
N	Tool dividers	5	Oak	1/2" x 1-1/4" x 14-1/2"
P	Copper tubes	16		3/4" i.d. x 1-1/2"
Q	Knock-out bar holder	1	Oak	1" x 2" x 6"

Notes:

- Dimensions will vary depending on the lathe's size and your height
- Three layers of 3/4" Baltic birch plywood
- Cut oversize, then trim
- Two thicknesses of 3/4" Baltic birch plywood
- Do not angle top and bottom of front rail

Shopping List

- Sixteen 3/8" x 4" hex head bolts
- Six 1/4" x 4-1/2" lag screws
- Sixteen 3/8" flat washers
- Sixteen 3/8" hex nuts
- Four 1/4" x 1-1/2" hanger bolts
- Ten 1/4" flat washers
- Four 1/4" hex nuts
- One pair 2-1/2" butt hinges
- One piece of 3/4" i.d. x 24" copper pipe
- Three 3/4" x 5' x 5' sheets Baltic birch plywood
- Two bd. ft. hardwood

down the face of the rail (**Photo 6**). Mark the center of the copper-tube hole on this line (Fig.D).

Reset the drill press table to 90° and drill the copper-tube holes all the way through the rails using a 7/8" Forstner bit (**Photo 7**).

Cut 1-1/2" lengths of 3/4" i.d. copper pipe (P) and tap them into each hole (**Photo 8**). Put the 3/8" bit back in the drill. Push the bit into each bolt hole and drill through the near side of each copper tube.

Assemble the stand

Drill holes through the top rails for the lag screws that fasten the top. Clamp the legs and all of the rails together again. Insert a bolt through each hole. Slide a nut into the copper tube, hold it against the bolt with a flat-bladed screwdriver, and tighten the bolt.

Attach the shelves and feet (K) using countersunk wood screws. The exact position of the top shelf will depend on the length of the motor's drive belt. After determining the top shelf's proper height, cut it to length. To fasten the top shelf, mark its location, then tip the base upside down. The shelf will stay put because its ends are tapered. Run screws through the legs and into the shelf.

Attach the top. Position your lathe on the stand. (If your lathe has a separate motor, place it on the upper shelf about where it will go. Line up the lathe's pulley with the motor's pulley.) Mark the lathe's mounting holes. Mark the passage hole for the belt (Fig. A). Bolt the motor to the motor mount (M) and attach the motor mount to the top shelf using hinges.

Remove the lathe and cut out the belt-passage hole. Pre-drill holes for the hanger bolts that will fasten the lathe to the stand. Install the hanger bolts and mount the lathe. Finally, screw on the knock-out bar holder (Q) and a hanger for your wrench. Apply finish if you wish. 🛠️

Special thanks to Bill Hull of Norman, OK, who helped design my original stand more than 20 years ago—it's still going strong!

Sizing Your Stand

"One size fits all" doesn't work for a lathe stand—its height should suit your height.

You'll need two measurements to calculate your stand's height. First, if you'll use a floor mat, stand on top of it. Bend your arm at the elbow to form a 90° angle. Measure the distance from the floor to the top of your fingers. Second, measure the distance from the center of the lathe's spindle to the bottom of the lathe's base. Subtract this distance from your hand-height—this is the ideal height for your stand.

The length of the stand depends on more than just the length of the lathe. You'll need enough room at the stand's left end so that your feet won't bump into its leg. When you're working out your stand's dimensions, drop an imaginary plumb line from the chuck's face to the floor. Allow about 10" between the plumb line and the inside face of the leg.

Drill into the rails through the holes in the legs. Disassemble the base.



Insert the same drill bit into the rails. Using a sliding bevel, transfer the bit's angle to the rail's face. This enables you to find the exact center of the holes for the copper tubes that will hold the nuts.



Drill holes for the copper tubes using a 7/8" Forstner bit. Precision is important for a strong joint and easy assembly.



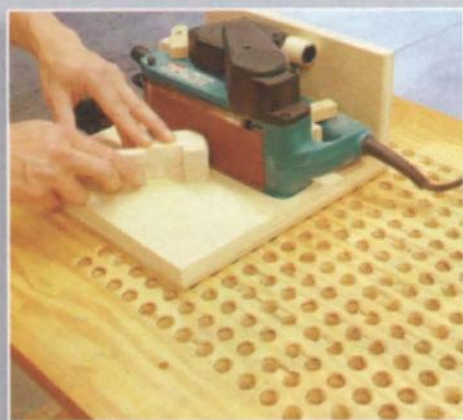
Tap copper tubes, made from copper pipe, into the holes. Drill through the ends of the rails and through the tubes to finish the joint.



Dust-Collection Cabinet

Build a versatile and economical solution for controlling workshop dust.

by Suwat Phruksawan



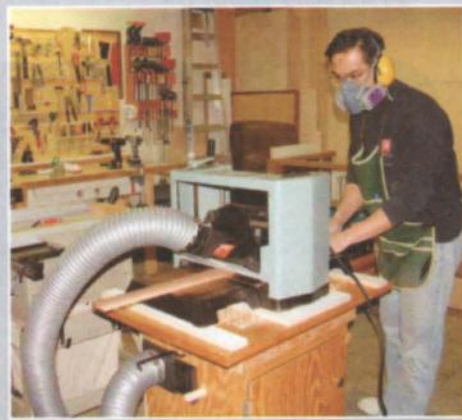
Clear the air

Capture dust through the downdraft top.



Go anywhere

Move easily on the mobile base.



A solid platform

Support benchtop power tools.

Fig. A The Cabinet

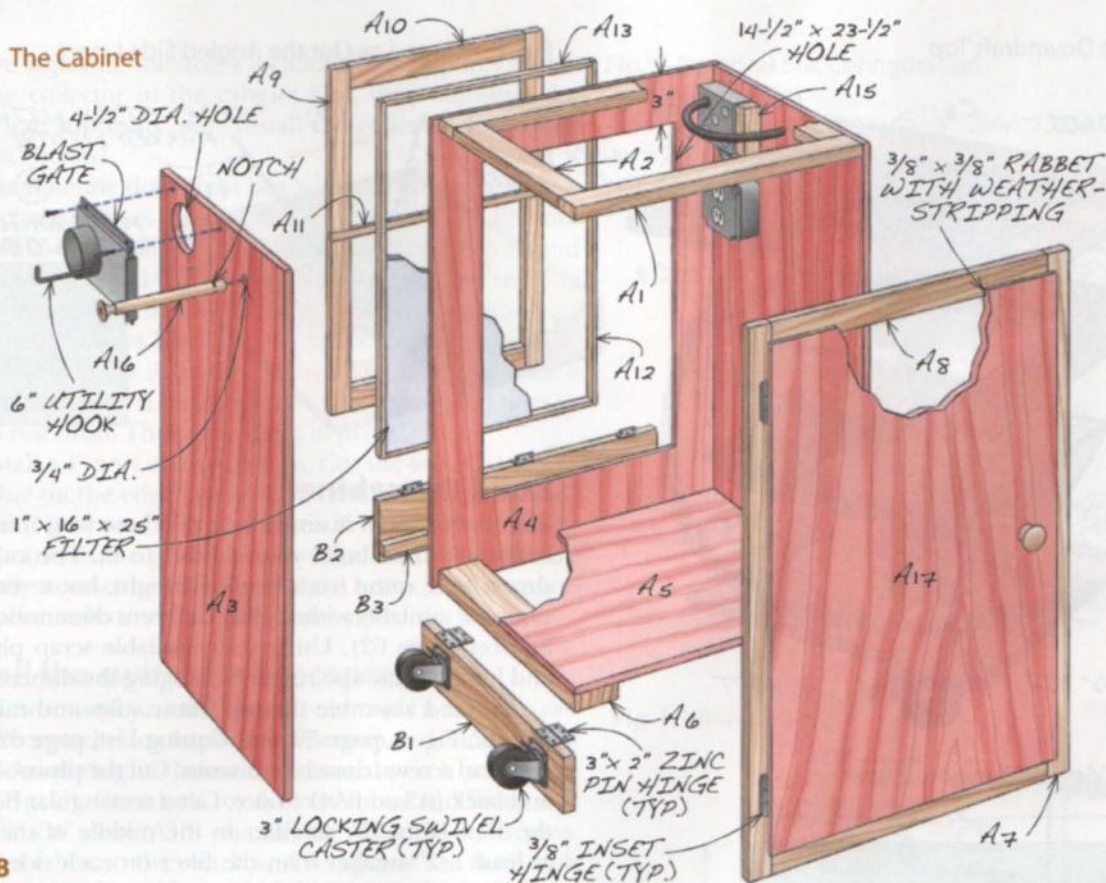


Fig. B
The Cord Rack

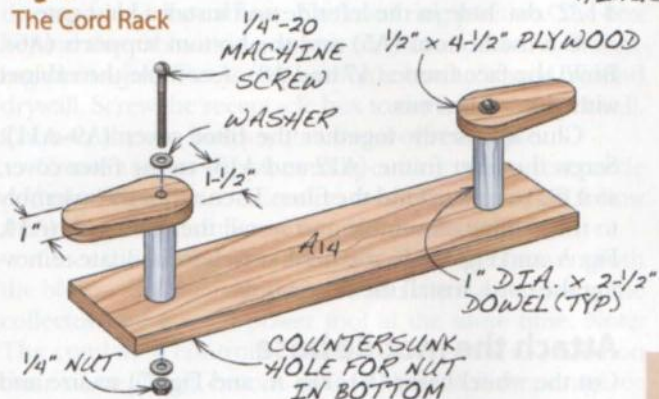
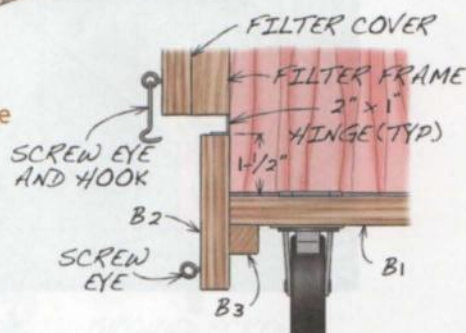
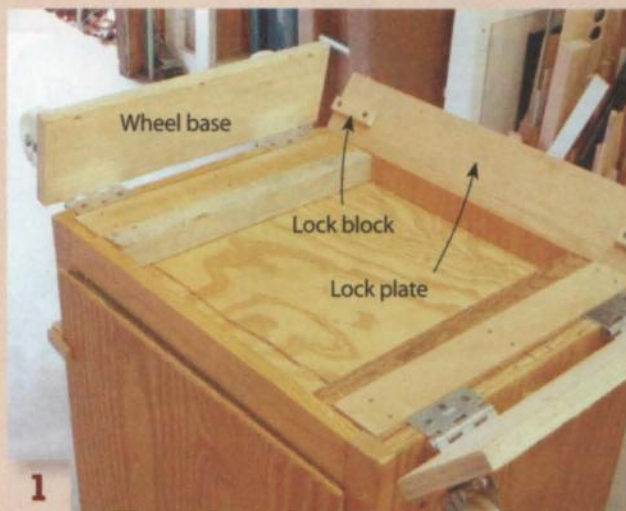


Fig. C
Mobile Base
Details



HERE'S A SOLUTION TO A NAGGING PROBLEM—how to contain workshop dust without busting your budget. This cabinet is both a portable dust collector and a downdraft sanding table. It stands tablesaw-height, so it also serves as an outfeed surface. Hidden inside the cabinet is a mini dust collector that costs about \$100. Such a small collector has limitations, of course, but it will easily pay for itself by reducing housecleaning chores. Using leftover plywood and scrap lumber further limits expense.

A mobile base makes this cabinet easy to move from machine to machine—much easier than horsing around the collector and its filtration bag. This cabinet also works well as a mobile base for benchtop tools. Onboard blast gates direct the airflow to the downdraft top or to the external port, and a switched receptacle allows simultaneously powering the collector and a small electric tool such as a sander.



1
The wheel bases fold flat against the bottom, and lock blocks on the hinged lock plate securely hold them.

Fig. D The Downdraft Top

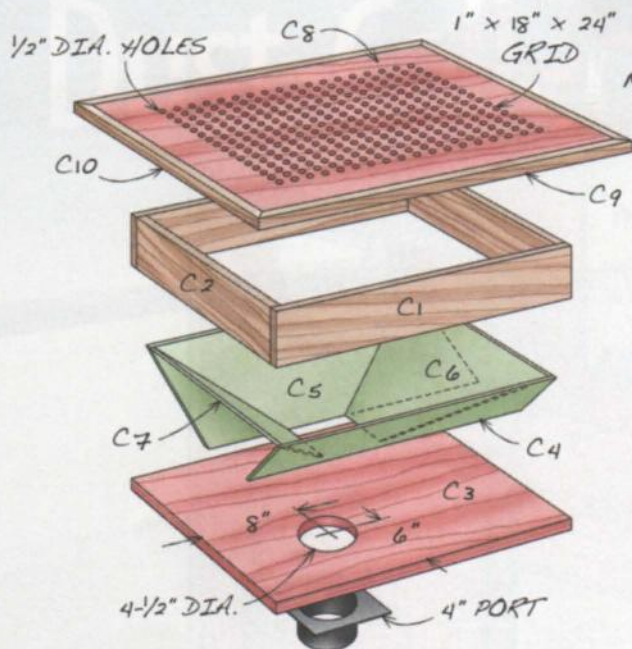
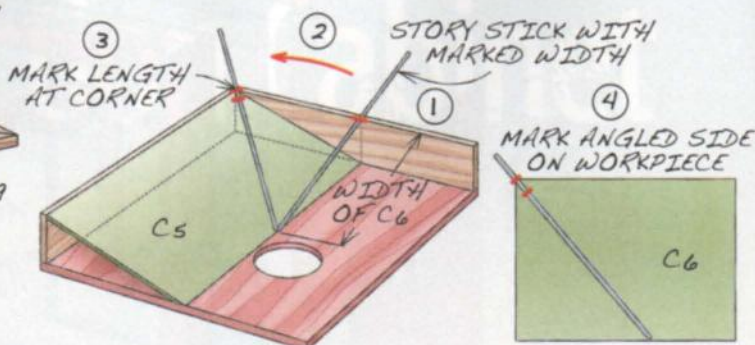


Fig. F How to Lay Out the Angled Side Liners



Build the cabinet

The first order of business is to purchase your mini dust collector—then build your cabinet to fit. The collector shown here came from Harbor Freight, but several versions are available with slightly different dimensions (see Sources, page 62). Using your available scrap plywood and lumber may also require changing the dimensions.

Cut and assemble the top frame stiles and rails (A1 and A2, Fig. A, page 59, and Cutting List, page 62) with glue and screws, dowels or biscuits. Cut the plywood sides and back (A3 and A4) to size. Cut a rectangular hole for the 1" x 16" x 25" air filter in the middle of the back, at least 1/2" smaller than the filter on each side. Cut a 4-1/2" dia. hole in the left side and install a blast gate.

Cut the bottom (A5) and the bottom supports (A6). Build the face frame (A7 and A8). Assemble the cabinet with glue and screws.

Glue and screw together the filter cover (A9–A11). Screw the filter frame (A12 and A13) to the filter cover, so it fits snugly around the filter. Then screw the assembly to the cabinet. Assemble and install the cord rack (A14, Fig. A, and Fig. B). Its top hook swivels to facilitate removing the cord. Install the hose hook.

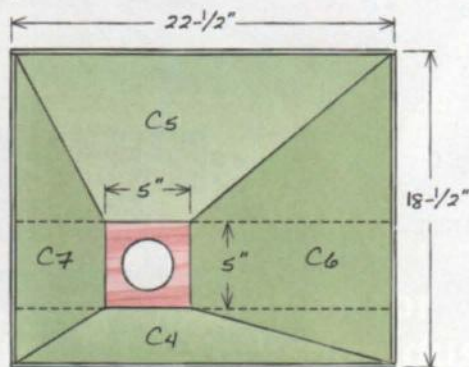
Attach the mobile base

Cut the wheel bases (B1, Fig. A, and Fig. C) to size and install swivel casters with locks (see Sources). Attach the bases to the bottom of the cabinet with 3" x 2" hinges so that they'll lay flat against the bottom supports in the "mobile" position (**Photo 1**). Fasten the lock plate (B2) to the cabinet back with the cabinet upside down and the wheel bases in the mobile position, using three 2" x 1" hinges. Then install the base locks (B3) to hold the wheel bases against the support blocks. Install screw eyes and a hook to hold the lock plate out of the way when it's not in use. To engage the mobile base, lock the casters, tip up the cabinet and rotate the wheel bases underneath. Then engage the lock plate.

Build the downdraft top

Cut the box front and back, sides and bottom (C1–C3, Fig. D). Cut the 4-1/2" dia. hole for the dust port in the bottom. Note: This hole is positioned to align with the collector's intake. Figure D shows the hole's location for the Harbor Freight collector. A different collector may

Fig. E Top View of Downdraft Box



A mini dust collector resides inside the cabinet with ducting to the downdraft top and to an external port. Blast gates control the airflow.

require adjusting the hole's location. This requires installing the collector in the cabinet first, then adjusting the downdraft top to fit (see "Install the collector, hoses and fittings," below).

Assemble the downdraft box with glue and screws. Cut the rectangular box liners (C4–C7, Fig. D and Fig. E) from 1/4" MDF. Bevel the top and bottom edges of the front and back liners (C4 and C5) so they'll rest flush against the side and bottom of the box. Glue these two liners in place.

Figure F shows how to cut the rectangular right-side and left-side liners (C6 and C7) to fit inside the box. Use a block plane to bevel their tops, bottoms and angled sides so they'll rest flush. Then glue them in place.

Install a 4" port on the bottom. Cut the top (C8) to size and glue on the edge bands (C9 and C10). Center an 18" x 24" x 1" grid on the top and then drill 1/2" dia. holes at each point on the grid. Use a countersink bit slowly and carefully to ease the top edges of the holes. Drill countersunk pilot holes and then screw the top to the box.

Install the switch and receptacles

Install two metal junction boxes, one with a raised cover and a receptacle (to plug in the collector) and another with a 5/8" "mud ring" to house the external switch and receptacle (Fig. G). Cut a hole for the switch box and fasten a 1" x 1-1/2" x 4" cleat (A15) on one side with glue and screws. Install the box so the switch and receptacle are flush with the outside of the cabinet. The mud ring positions the box behind the cabinet side, so you can fasten it to the mounting cleat—just like you'd anchor a box to a stud behind drywall. Screw the receptacle box to the inside cabinet wall. Connect the two boxes with a metal offset nipple.

Create a power-supply cord by cutting off the receptacle end of a 12-ga. 3-wire extension cord. Then carefully follow the wiring diagram to connect the circuits (Fig. H).

Once the connections are made, the switch powers both the blower and the receptacle, so you can start and stop the collector and a small power tool at the same time. Note: The combined controlled load of both tools, as stated on their nameplates, cannot exceed the rated amperage or horsepower of the switch.

Install the collector, hoses and fittings

Remove the collector from its metal frame and fasten it to the left side of the cabinet with the intake port facing up (Photo 2 and Fig. J). Attach a piece of plywood, if necessary, to make the side of the base thick enough for the mounting bolts. Make sure that the intake port aligns (relatively well) with the port in the downdraft top.

Assemble the hoses and connectors. Fashion a hook to hold the dust bag hose at the top of the cabinet. Install an external pull (A16) for the blast gate that controls airflow to the downdraft table (Photo 3). It's a 10" length of 3/4" dowel with a knob attached on one end and a slot sawn halfway through about 1" from the other end. Drill a 3/4" dia. hole through the cabinet, centered on the bottom edge of the blast gate's pull handle. Insert the pull through the hole and gently lock the blast gate handle in the slot.

Fig. G Electrical Box Configuration

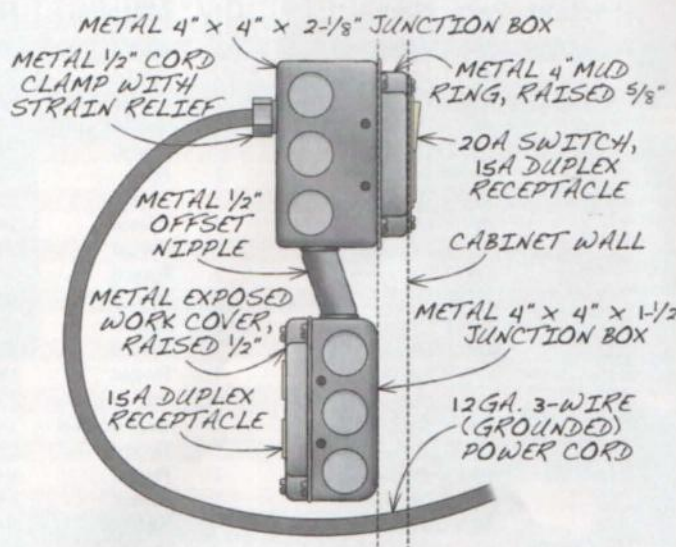
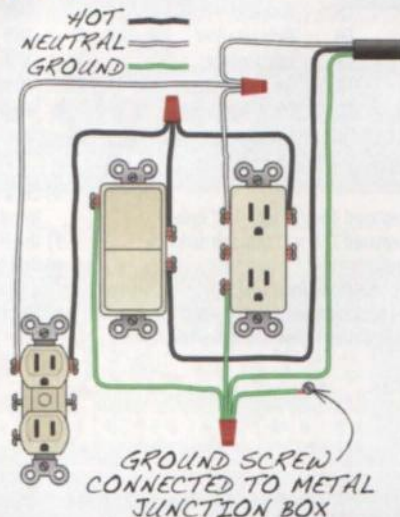


Fig. H Wiring Diagram



Electrical Hardware

- 1 metal junction box, 4" x 4" x 1-1/2"
- 1 metal exposed work cover for one receptacle, 4" box, raised 1/2"
- 1 metal junction box, 4" x 4" x 2-1/8"
- 1 metal plaster (or "mud") ring, two gang, for two outlets, 4" box, raised 5/8" (for 1/2" plywood)
- 1 metal offset nipple, 1/2"
- 1 metal cord clamp with strain relief, 1/2"
- 3 conduit lock nuts, 1/2"
- 2 duplex receptacles, 15A
- 1 switch, 20A
- 1 grounded power cord with plug, 12 ga., 3-wire, 20' length
- 3 solid copper wires for hot, neutral and ground, 12 ga., 2' length, each

Cutting List

Overall Dimensions 34-1/2" H x 30" W x 26" D

Section	Part	Name	Qty.	Material	Th x W x L
Cabinet	A1	Top frame stile	2	Plywood	3/4" x 2" x 21"
	A2	Top frame rail	2	Plywood	3/4" x 2" x 14"
	A3	Cabinet side	2	Plywood	1/2" x 18" x 30"
	A4	Cabinet back	1	Plywood	1/2" x 22" x 30" (a)
	A5	Cabinet bottom	1	Plywood	1/2" x 18" x 21"
	A6	Bottom supports	2	Pine	1" x 3-1/2" x 18"
	A7	Face frame stile	2	Plywood	3/4" x 1-1/2" x 30"
	A8	Face frame rail	2	Plywood	3/4" x 1-1/2" x 19"
	A9	Filter cover stile	2	Plywood	3/4" x 1-1/2" x 26-1/2" (b)
	A10	Filter cover rail	2	Plywood	3/4" x 1-1/2" x 14-1/2"
	A11	Filter cover middle rail	1	Plywood	1/2" x 1" x 17-1/2"
	A12	Filter frame stile	2	Plywood	3/4" x 1" x 26-1/2"
	A13	Filter frame rail	2	Plywood	3/4" x 1" x 16"
	A14	Cord rack	1	Plywood	3/4" x 4" x 16" (c)
	A15	Cleat	2	Pine	1" x 1-1/2" x 4"
	A16	Blast gate pull	1	Hardwood dowel	3/4" x 10" (d)
	A17	Door	1	Plywood	1/2" x 19-1/2" x 27-1/2" (e)
Mobile Base	B1	Wheel base	2	Plywood	3/4" x 4" x 18-1/2"
	B2	Lock plate	1	Plywood	3/4" x 4" x 22"
	B3	Base lock	4	Hardwood	3/4" x 3/4" x 3"
Downdraft Top	C1	Front / back	2	Plywood	3/4" x 3" x 24"
	C2	Side	2	Plywood	3/4" x 3" x 18-1/2"
	C3	Bottom	1	Plywood	3/4" x 20" x 24"
	C4	Front liner	1	MDF	1/4" x 4-1/4" x 22-1/2"
	C5	Back liner	1	MDF	1/4" x 11-1/4" x 22-1/2"
	C6	Right side liner	1	MDF	1/4" x 13-1/8" x 18-1/2" (f)
	C7	Left side liner	1	MDF	1/4" x 5-5/8" x 18-1/2" (f)
	C8	Top	1	Plywood	3/4" x 24" x 28" (g)
	C9	Front / back edging	2	Hardwood	1" x 1" x 30" (h)
	C10	Side edging	2	Hardwood	1" x 1" x 26" (h)

Notes:

- a) Cut centered 14-1/2" x 23-1/2" hole.
- b) Cut centered 1/2" x 1" through dado for middle rail.
- c) Drill 1" dia. holes for dowels.
- d) Screw a knob on one end; cut a slot halfway through about 1" from the other end.

- e) Cut a 3/8" rabbet around the inside edge and install weatherstripping.
- f) Use Fig. E to cut the angled sides.
- g) Drill 1/2" dia. holes through the top, following a 1" x 18" x 24" grid.
- h) Miter both ends.

Fasten the top to the base

Drill pilot holes through the cabinet's top frame. Then screw the downdraft top to the cabinet. Cut the door (A17) to final size with 3/8" rabbets all around the inner edges and mount it with 3/8" inset hinges. Attach foam weatherstripping inside the rabbeted edges to create a seal when the door is closed. Attach a knob and shop-made latches to keep the door tightly closed.

SOURCES

- Harbor Freight, harborfreight.com, 800-423-2567, Mini Dust Collector, #94029, \$94.99; Dust Collector Accessory Kit, #93601, \$44.99; 3" Polyurethane Swivel Caster with Lock, #96408, \$6.99 ea.
- Grizzly Industrial, grizzly.com, 800-523-4777, 1 HP Light Duty Dust Collector, # G1163, \$149.45.
- Penn State Industries, pennstateind.com 800-377-7297, 1HP Economy Portable Dust Collector, #DC660P, \$199.95.
- The air filter, hinges, foam weatherstripping and electrical hardware are available at home centers and hardware stores.



Buy the book

"Workshop Dust Control"
at awbookstore.com

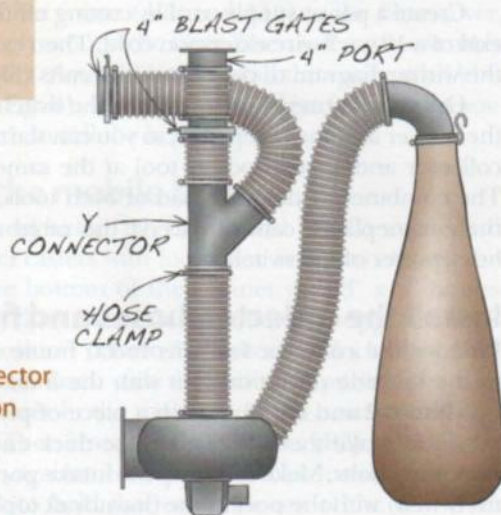


Fig. J
Dust Collector
Installation



An external pull—a dowel with a slot near one end—controls the downdraft table's blast gate.



Suwat Phruksawan

works for a financial firm, managing a software development team that builds Smart-Phone apps. Whenever his workload allows, Suwat finds sanctuary in woodworking.

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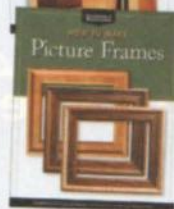
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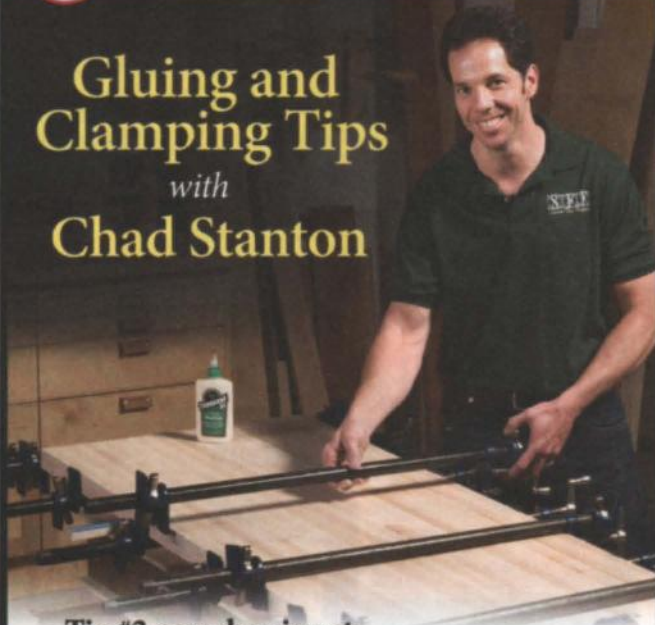
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Oops!

Crazy Mistakes Woodworkers Make



Kick the Can

WHEN I WAS A BOY, my dad taught me a great way to re-seal a can of stain. He would place the open can on the floor with the loose lid in position on the can, and place a paper towel on top of the lid. Then he would place his foot flat on the towel-covered lid, shift his weight onto the can and spin himself around 360 degrees. No spatter, no

damage to the lid—it worked great.

Years later, I wasn't paying attention and didn't lift my foot high enough to clear the can of stain. Trust me when I say, "You'll only make this mistake once in your life." I think of that mess every time I close a can of paint or stain—using a mallet.

Mike Saunders

Knifed

I DECIDED TO SURPRISE MY MOTHER with a knife block for the deluxe set of knives that she had just bought, so she could store them on her kitchen counter. I secretly measured a couple of the knives and headed for my workshop.

She was thrilled when I gave her the

custom-made block and immediately began to fill it. Everything went well until she slid in the large meat knife. Doink! It plowed right into the countertop. I guess I should have measured all of the knives.

Paul Kohler

Make your woodworking mistakes pay! Send us your most memorable "What was I thinking?" blunders. You'll receive \$100 for each one we print. E-mail to: oops@AmericanWoodworker.com or send to AW Oops!, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.



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