

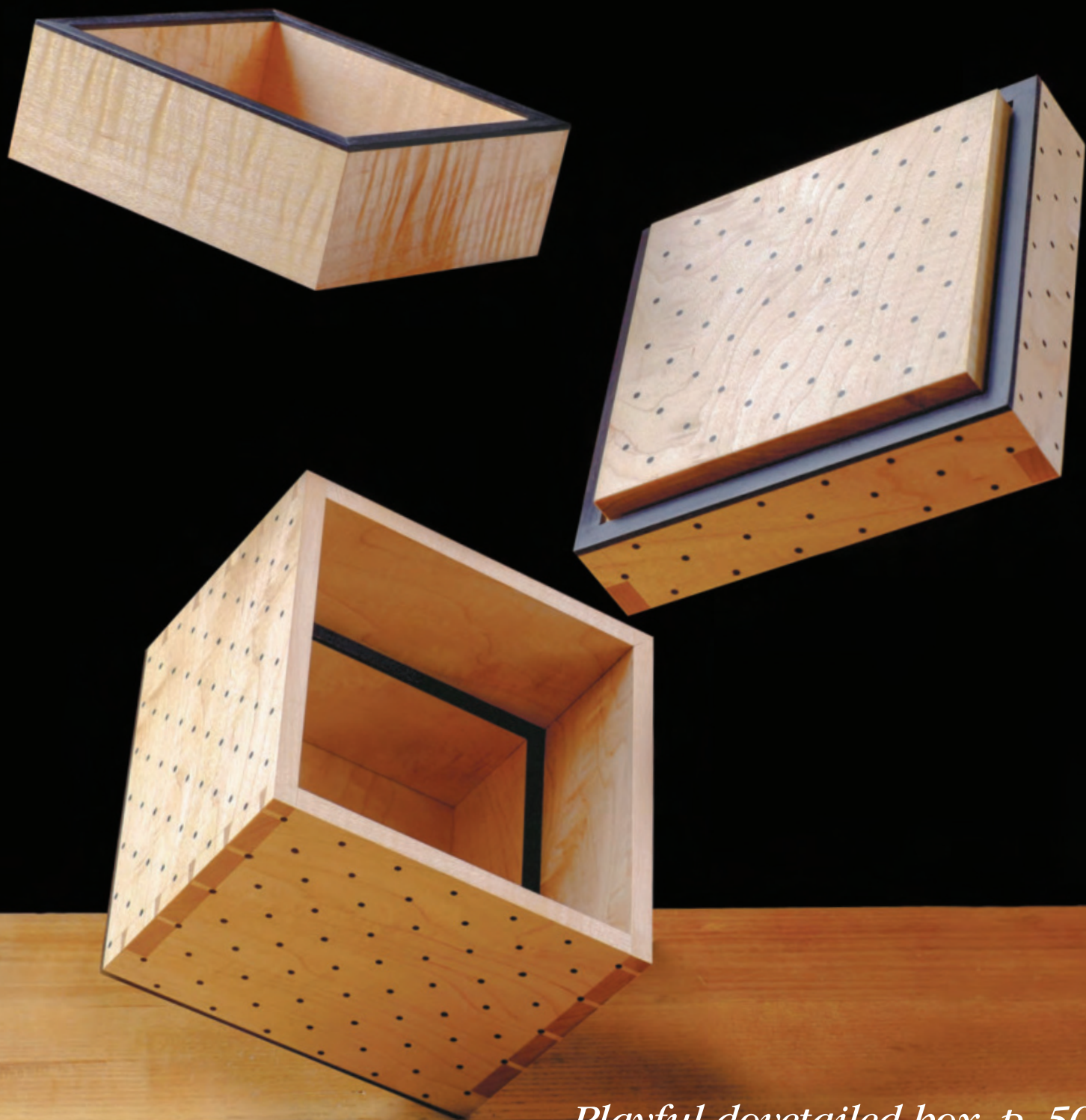
TAUNTON'S

Fine Woodworking

Teach • Inspire • Connect

June 2022 No. 296

- Shaker bed project
- Make a bench brush
- Disc sander tips
- Turning basics
- Carve a wooden cup



Playful dovetailed box, p. 50



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8" X 76" PARALLELOGRAM JOINTER WITH HELICAL CUTTERHEAD & MOBILE BASE

- Motor: 3 HP, 230V, single-phase, 12A
- Maximum width of cut: 8"
- Maximum depth of cut: 1/8"
- Maximum rabbeting depth: 1/2"
- Cutterhead type: 4-row helical with 36 inserts
- Insert size & type: 15 x 15 x 2.5mm, indexable carbide
- Cutterhead speed: 5500 RPM
- Table size: 8" x 76"
- Fence size: 38" x 4 1/2"
- Minimum stock length: 10"
- Minimum stock thickness: 1/2"
- Dust port size: 4"
- Footprint: 16" x 40"
- Approx. shipping weight: 487 lbs.



G0858 ONLY \$2575⁰⁰



12" 7 1/2 HP 3-PHASE EXTREME SERIES® TABLE SAW

- Motor: 7 1/2 HP, 220V/440V* (prewired for 220V), 3-phase, 19.5A/10A
- Rip capacity: 36"
- Max. depth of cut @ 90°: 4"
- Max. depth of cut @ 45°: 2 1/4"
- Table size with extensions: 30 3/4" x 48 1/4"
- Fence type: camlock t-shape w/ aluminum face
- Floor-to-table height: 35 3/4"
- Arbor diameter: 1"
- Arbor speed: 3600 RPM
- Max. width of dado: 3/4"
- Dust port size: 4"
- Footprint: 22 1/2" L x 24" W
- Overall dimensions: 75" W x 44" D x 42 1/2" H
- Approx. shipping weight: 756 lbs.



G0697X ONLY \$3810⁰⁰



9" X 138 1/2" INDUSTRIAL OSCILLATING EDGE SANDER

- Motor: 3 HP, 220V, single-phase, 15A
- Sanding belt size: 9" x 138 1/2"
- Sanding belt speed: 4120 FPM
- Oscillations: 1/4"
- Platen: graphite coated, 47 1/2" x 9 1/2"
- Main table size: 11 3/4" x 47 3/4"
- Main table vertical travel: 8"
- Main table tilt: 0-45°
- End table size: 18" x 13"
- End table travel: 8"
- Number of dust ports: 2
- Dust port size: 4"
- Footprint: 42" x 24 1/2"
- Overall dimensions: 82" W x 24" D x 45 1/2" H
- Approx. shipping weight: 873 lbs.



G9984 ONLY \$4895⁰⁰



8" PARALLELOGRAM JOINTER WITH HELICAL CUTTERHEAD

- Motor: 3 HP, 230V, single-phase, 12A
- Maximum width of cut: 8"
- Maximum depth of cut: 1/8"
- Maximum rabbeting depth: 1/2"
- Cutterhead type: 4-row helical with 36 inserts
- Insert size & type: 15 x 15 x 2.5mm, indexable carbide
- Cutterhead speed: 7000 RPM
- Table size: 8" x 83"
- Fence size: 38" L x 4 5/8" H
- Minimum stock length: 10"
- Minimum stock thickness: 1/2"
- Dust port size: 4"
- Footprint: 18" x 46"
- Overall dimensions: 83" W x 26" D x 46" H
- Approx. shipping weight: 730 lbs.



SB1091 ONLY \$3810⁰⁰



10" 5 HP SLIDING TABLE SAW

- Motor: 5 HP, 230V, single-phase, 19A
- Rip capacity: 33"
- Crosscut capacity: 63"
- Blade tilt: 0-45°
- Max. depth of cut @ 90°: 3 1/8"
- Max. depth of cut @ 45°: 2 1/4"
- Main table size with extensions: 14 3/8" x 27"
- Sliding table size: 12 1/4" x 63"
- Floor-to-table height: 33 3/8"
- Main blade size: 10"
- Main blade arbor: 3/8"
- Main blade speed: 4000 RPM
- Max. width of dado: 1 1/16"
- Footprint: 25 1/2" L x 28" W
- Overall dimensions: 76" W x 125" D x 46" H
- Approx. shipping weight: 688 lbs.



G0623X ONLY \$4940⁰⁰



15" 3 HP FIXED-TABLE PLANER WITH HELICAL CUTTERHEAD

- Motor: 3 HP, 230V, single-phase, 12A
- Maximum stock width: 15"
- Maximum stock thickness: 6"
- Minimum stock thickness: 3/16"
- Minimum stock length: 6"
- Maximum cutting depth: 1/8"
- Cutterhead diameter: 2 5/8"
- Cutterhead type: 4-row helical, 48 inserts
- Insert size and type: 15mm x 15mm x 2.5mm, 30° indexable carbide
- Cutterhead speed: 5200 RPM
- Feed rates: 16 FPM, 28 FPM
- Table size with extensions: 15" x 49"
- Dust port size: 4"
- Footprint: 21" x 18 1/2"
- Overall dimensions: 25" W x 49" L x 47 1/2" H
- Approx. shipping weight: 375 lbs.



G0891 ONLY \$2675⁰⁰



24" 5 HP INDUSTRIAL BANDSAW

- Motor: 5 HP, 220V, single-phase, 23A
- Table size: 33 1/2" x 23 5/8" x 2"
- Table tilts 45° right
- Floor-to-table height: 32 1/2"
- Max. cutting width left of blade: 24 1/2"
- Max. cutting height (resaw capacity): 16 1/4"
- Blade size: 180" - 181 1/2" long (1/4" to 1 1/2" wide)
- Blade speed: 5300 FPM
- Footprint: 41 3/8" x 23 1/2"
- Overall dimensions: 48" W x 32" D x 83 1/2" H
- Approx. shipping weight: 951 lbs.



G0568 ONLY \$4175⁰⁰



26" 5 HP DRUM SANDER

- Sanding motor: 5 HP, 220V, single-phase, 25A
- Conveyor motor: 1/2 HP, 2A
- Drum surface speed: 2300 FPM
- Feed rates: Variable, 0-20 FPM
- Conveyor table size: 26 5/8" x 30 1/4"
- Max. stock dimensions: 26" W x 4 1/4" H
- Min. board length: 9"
- Min. board thickness: 1/8"
- Sanding drums: two 6" x 27 3/4", aluminum
- Sanding belt size: 3" x 173" hook & loop
- Dust ports: (2) 4"
- Overall dimensions: 50" W x 37" D x 44 1/2" H
- Approx. shipping weight: 546 lbs.



W1678 ONLY \$3799⁹⁹



24" 5 HP PLANER

- Main motor: 5 HP, 220V, single-phase, 25A
- Feed motor: 2 HP, 14A
- Maximum stock width: 24"
- Maximum stock thickness: 7"
- Minimum stock thickness: 1/4"
- Minimum stock length: 8"
- Maximum cutting depth: 1/8"
- Cutterhead diameter: 3 1/8"
- Cutterhead type: 4-knife
- Knife size and type: 24" x 1" x 1/8", HSS, single-sided
- Cutterhead speed: 5200 RPM
- Feed rate: Variable, 17-26 FPM
- Table size with extensions: 24 1/8" x 31 1/8"
- Footprint: 20 1/2" x 24 1/2"
- Overall dimensions: 42" W x 40 1/2" D x 37" H
- Approx. shipping weight: 1126 lbs.



G5851Z ONLY \$6950⁰⁰



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BLOG

Tough spot for tenons

Tenons on the ends of long pieces, such as bed rails, can be difficult to tackle using common tenoning techniques. In this post, Tom McLaughlin (p. 34) demonstrates how he cut his with a handheld router.



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VIDEO

Cube of drawers

For the last three years, Vasko Sotirov (p. 50) has been creating mesmerizing build videos of his woodworking projects. After you've seen this video, we think you'll agree he's a woodworker worth watching.



BLOG

Creative spin on brush making

For Aspen Golann (p. 62), brushes are a fun, productive, low-stakes way to test techniques and designs. Get inspired by some of her other bristled beauties.

VIDEO

Offset turning

Beth Ireland (p. 56) demonstrates how you can make turned parts like legs or boxes with an elliptical cross-section, or even a triangular one.

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VIDEO

Template sanding

Disc sanders (p. 44) are a versatile tool that would be a welcome addition to any shop. We'll show you how you can use one to trim the smallest of parts flush to a template.



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VIDEO WORKSHOP

Chimney cupboard fit for a Shaker

Build a traditional Shaker chimney cupboard with step-by-step video instruction. FWW editor and creative director Michael Pekovich highlights a variety of construction techniques, including:

- A simplified face-frame method
- Traditional dovetailed drawers
- Straightforward frame-and-panel joinery





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contributors

Aspen Golann (“Make Your Own Bench Brush”) is in overdrive. In 2021, she taught up and down the eastern United States, made a settee that inspired a future keynote at Colonial Williamsburg, and finished her residency at Penland School of Craft. Her biggest undertaking was starting **The Chairmaker’s Toolbox**, an effort to increase access and equity in chairmaking. The organization combines chairmaking classes, tools, tool makers, and scholarships in an effort to further open the field to historically excluded makers. Learn more at thechairmakerstoolbox.com.



“If you’ve been keeping an eye on **Dawson Moore** (“Carve a Wooden Cup”), @michigansloyd on Instagram, you’ve seen a shift in his work. Over the past two years, he’s gone from wading into chairs to plunging right in. From his Windsor to his ladderbacks to his stools, Moore’s clean aesthetic and exacting technique are present throughout. His results are a testament to honing green woodworking skills, and it’s still fun to see him batch out spoons and forks for upcoming farmer’s markets.



After attending art school in Boston in the late 1970s, **Beth Ireland** (“Mastering the Cylinder”) worked as a carpenter and woodworker. She soon began specializing in turning, often for architectural applications. Her artistic spirit was irrepressible, however, and while making a living for decades through functional turning, she also produced an enormous body of dynamic sculptural work. She is a devoted and much-loved teacher of turning, with students whose other activities range from kindergarten to pro woodworking to snug retirement.

While in his 20s, **Vasko Sotirov** (“Polka Dot Box”), a trained chef, was working at Lido 84, a restaurant in northern Italy often cited as one of the best in the world. “It was amazing,” he says, but the hours were crushing, and he left for another cooking job that gave him more time for friends, family, and a new hobby, woodworking. He taught himself by building furniture and “making many, many mistakes.” Now a full-time woodworker in Bergamo, Italy, he says, “I’m fully in love with the craft and the endless learning hiding in the smallest details.”



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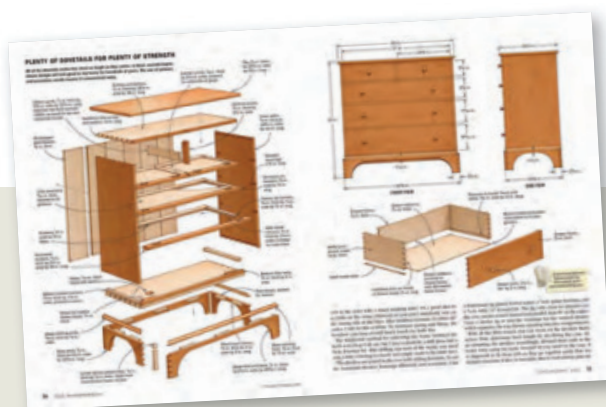


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Is it OK to copy projects from the magazine?

I've been a longtime reader of *Fine Woodworking* and I am extremely grateful to the many talented woodworkers from whom I've learned almost everything I know about woodworking. Recently, I spent some time scrolling through an active discussion on Finewoodworking.com on the "ethics of copying." At the root of the issue is the question of whether or not it is ethically or morally right to build someone else's design. When I read your magazine and see an article about a build, I see it as an invitation to build, and I've developed lots of good skills from doing so. But I'm struck by the strongly held views of some that putting your work into *Fine Woodworking* is not permission for readers to go ahead and build it. I'm not sure what to think. What are the limits of the use of the information you publish? Can I build a featured project for myself? Do I need to contact the original builder for permission? Can I build one for a charity auction? Can I build one to sell? What principles should I use to guide my decisions when I'm considering copying the work of others?

—GERRY GIESBRECHT, Calgary, Alta., Canada

Editor's reply

The short answer is that it's fine to build a piece for yourself or family and friends based on a project published in the magazine. I feel that's perfectly OK, even if you are being compensated (lumber isn't cheap!). However, if you are embarking on a professional career, you should get permission from the author before replicating a specific piece of work.

For me, a bigger question to consider is why a woodworker would want to make an exact copy of someone else's work. I think that this defeats the purpose of building handcrafted work, and more important, it misses an opportunity to invest your own creative vision into the work you make. Designing original work can be a big challenge. When you start woodworking, it's a good idea to use an existing piece as a reference. But the more you build, the more you will begin to develop a library of techniques and design details from previous projects that you can draw from in future projects. In this way, you can chart a path from basing work on existing designs to building work that more closely reflects you as a maker. Just about everything I make now still owes its form to many pieces and influences that came before it. In the end, while building from an existing plan can be an instructive exercise, you'll see greater rewards in the long run if you instead use it as a jumping-off point to an original design.

—MICHAEL PEKOVICH

Andon Lamp advice

In Craig Vandall Stevens's article on building an Andon lamp (*FWW* #295), he uses washi paper for the panels, attached with starch glue. One problem and one opportunity: Washi, used in a lamp, presents a fire hazard if the bulb used is incandescent. It will also not fare well in contact with liquid and is easily torn. A good alternative is Warlon, a hybrid washi that is stronger, water and stain resistant, and fire rated. An alternative to starch glue for attaching the washi to the panel is the 1/8-in.-wide double-sided tape designed and sold for this purpose by shoji specialty suppliers. This won't work for Stevens's 3/32-in. dimension, but the aesthetic/convenience tradeoff is one your readers should consider.

—ERIC FRIEDMAN, Berkeley, Calif.

More on epoxy

The article on glues in the January/February issue (*FWW* #294) shows West System epoxy on a scale. This is odd. In the first place, the mix ratio is specified by volume, not weight, so weighing may create a bad mixture. More important, however, is that West makes a variety of pumps which screw into the cans. One stroke on each of the two parts makes a small mix, while six or seven strokes on each makes about as much as you can apply before it goes off. My pumps must be 20 years old and are going strong. It's also not clear why one would use urea formaldehyde instead of epoxy. I don't do much veneer work but make a lot of laminations with West Epoxy with perfect results. I clean up West System with alcohol rather than acetone—it's easier on the hands.

—JAMES L. WOODWARD, West Newbury, Mass.

Editor's reply: *While minipumps are a convenient way to measure out epoxy quantities, the manufacturer also recommends measuring by weight as an acceptable alternative.*

Correction

The credit for Suzanne Walton and Owen Madden's ("A Guide to Sheet Goods") contributor photo on p. 8 of *FWW* #295 goes to Jayme Thornton.

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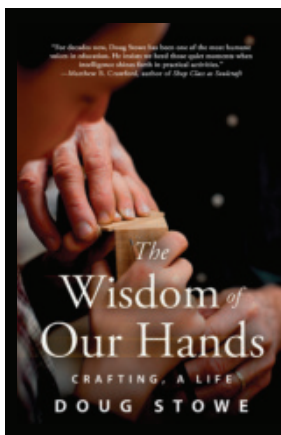


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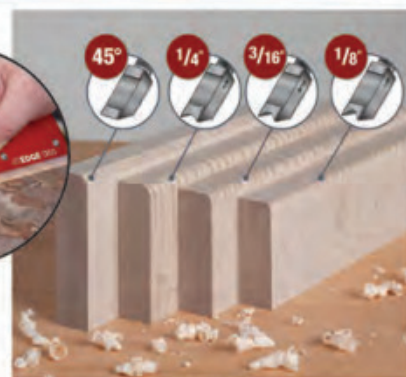
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AUTO-LINE DRILL GUIDE™

- Perpendicular holes anywhere.
- Fence fits on all 4 sides.
- Works with most drills.
- 1" inside frame.
- 2" capacity outboard.
- Deluxe Kit includes extensions.

Auto-Line Drill Guide
Drill Guide....\$259.99
Deluxe Kit....\$369.99



Drill not included.



Exact-90 Miter Gauge

- Square cuts every time.
- Miter bar self-adjusts 3/4" slots.
- Micro-adjust flip stop & 45" extension.
- 24" cross-cut capacity on most saws.
- Miter Bar available separately.

Exact-90
Miter Gauge....\$329.99
25.5" Miter Bar....\$69.99

Multi-Function Router Base

- Dial in exact cutting location.
- Cut parallel to any edge.
- Trammel point for perfect arcs.
- Extra support for edge routing.
- Works with most routers.

Multi-Function Router Base
Includes 1 Pair Extension Rods
w/ 5/16" Guide Rods....\$239.99
w/ 3/8" Guide Rods....\$239.99
w/ 10mm & 1/4" Guide
Rods....\$239.99



Router not included.

DUAX Angle Drilling Table

- For splayed legs and other angled drilling.
- Fits most drill presses 12" and larger.
- Adjusts to any angle from 0° to 90°.
- Optional Clamping Kit.

Duax Angle Drilling Table
Duax....\$299.99
Deluxe Kit....\$339.99



Table Saw not included.

RIP-FLIP Fence Stop System™

- Relocates rip fence perfectly.
- Flips out of the way when not needed.
- Couple 2 stops for perfect fitting dados.
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Fits SawStop®
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52" Capacity....\$219.99
Powermatic/Biesemeyer®
30" Capacity....\$219.99
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DelVe Square SS®

- Scribing Guides on 1/8" centers.
- Perfect for machine set-up.
- Locates center of 3/4" stock.
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DelVe Square SS
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Left -or- Right
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4' Combination....\$199.99



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- Flatten panels faster.

ClampZILLA 4-Way Panel Clamp
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50" Capacity....\$199.99



workshop tips

Open blast gates without bending and reaching

Blast-gate locations usually aren't very accessible, requiring awkward stooping and reaching to open and close them. I solved the problem with a simple mechanism that controls the gate from the front of my machines, where the power switches are. I installed the first one on my tablesaw.

First, I cut a length of flexible ½-in. PEX tubing (used for plumbing) to reach from the front of the saw to just short of the blast gate flap when it's fully open. Any stiff but slightly flexible tubing can be substituted. Before attaching the tube to the saw, I threaded a length of drapery cord (braided nylon) through it, by running my shop vacuum at one end and feeding the cord into the other. Next, I fastened the PEX tube to the saw using tubing clamps. Zip ties will also work as long as the tube doesn't move significantly in use. I then drilled a hole in the top of the gate and tied off the cord there with a double overhand knot.

At the front of the saw, I cut a notch in the tube and put another knot in the cord, positioned so it would catch in the notch with the gate fully open, and added a weight to the end of the cord. When I release the knot from the notch and feed it into the tube, the gate closes.

You're relying on gravity to close the gate, so it needs to be positioned as vertically as possible, with smooth,

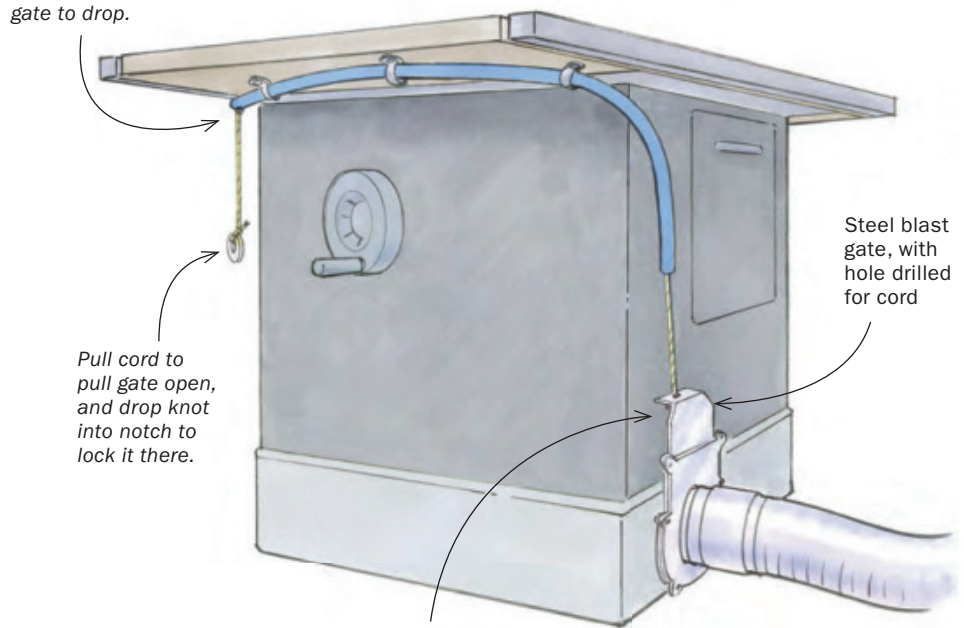
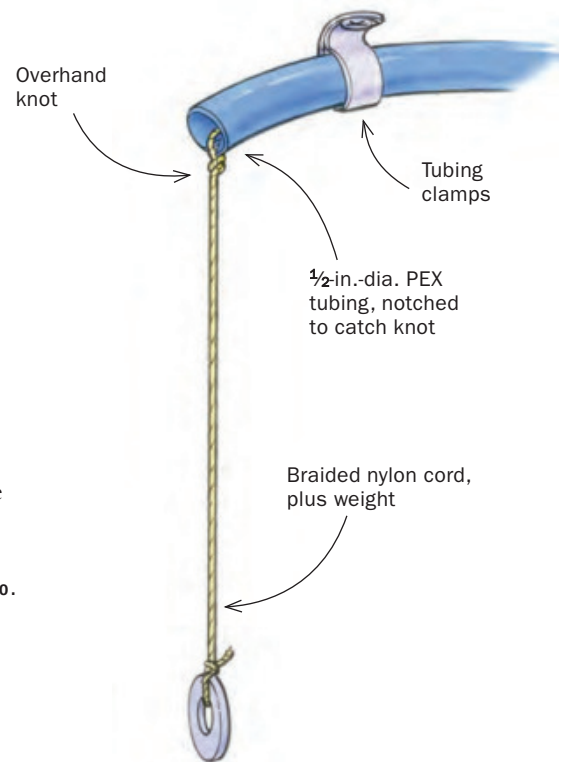
friction-free action. Metal blast gates work better than plastic for this setup, as plastic blast gates tend to be sticky. While most metal gates will work as is, you can take yours apart and smooth any rough internal edges to improve the action, or even add some weight to the top of the gate.

—DENNIS VOLZ, Parker, Colo.

Feed knot into tube to allow gate to drop.

Pull cord to pull gate open, and drop knot into notch to lock it there.

Knot end of cord.



Best Tip



Dennis Volz was bitten by the woodworking bug in junior-high woodshop and says he's "been scratching the itch ever since." After retiring as a commander in the U.S. Navy, where he kept his hobby alive by hauling his tools all over the world, Volz turned his avocation into a second career. He returned to school to earn a bachelor's degree in industrial design and opened a one-man shop, where he creates furniture, cabinetry, and household items.

A Reward for the Best Tip

Send your original tips to fwtips@taunton.com. We pay \$100 for a published tip with illustration; \$50 for one without. The prize for this issue's best tip was an Irwin Quick-Grip 4-pc. set, Irwin Speedbor 13-pc. set, and Irwin Marples 6-pc. chisel set.

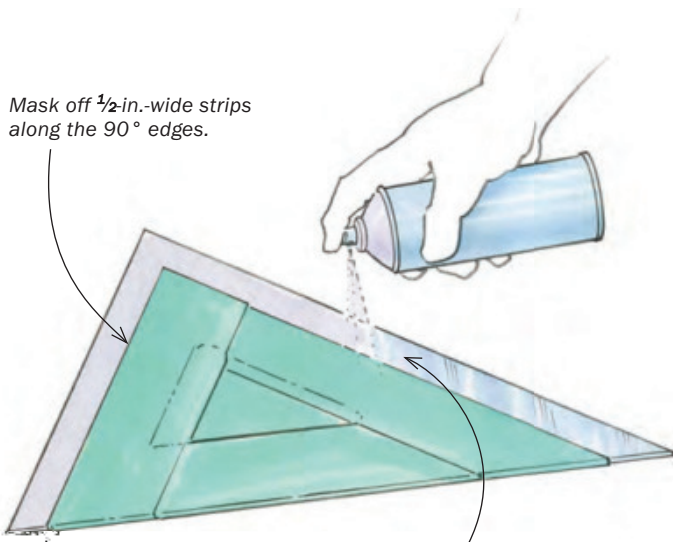


Turn a drafting square into a shop square

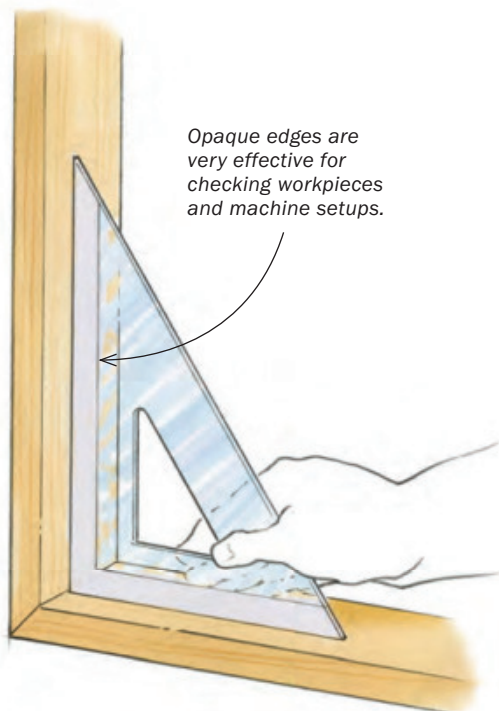
Not all shop squares are 100% accurate, but plastic drafting squares are. Being transparent, however, they make it tough to see gaps between the square and whatever you are checking. To make the two 90° sides more distinct, mask off ½-in.-wide strips at the edges, lightly sand the exposed plastic, clean off the dust with solvent, and spray with gray primer. After the paint dries, the edges will look like steel, turning an inexpensive craft-store square into a precise shop tool.

—DAVID GLEASON, Houston, Pa.

Mask off ½-in.-wide strips along the 90° edges.



Sand lightly, clean away the dust, and spray with gray primer.



Opaque edges are very effective for checking workpieces and machine setups.

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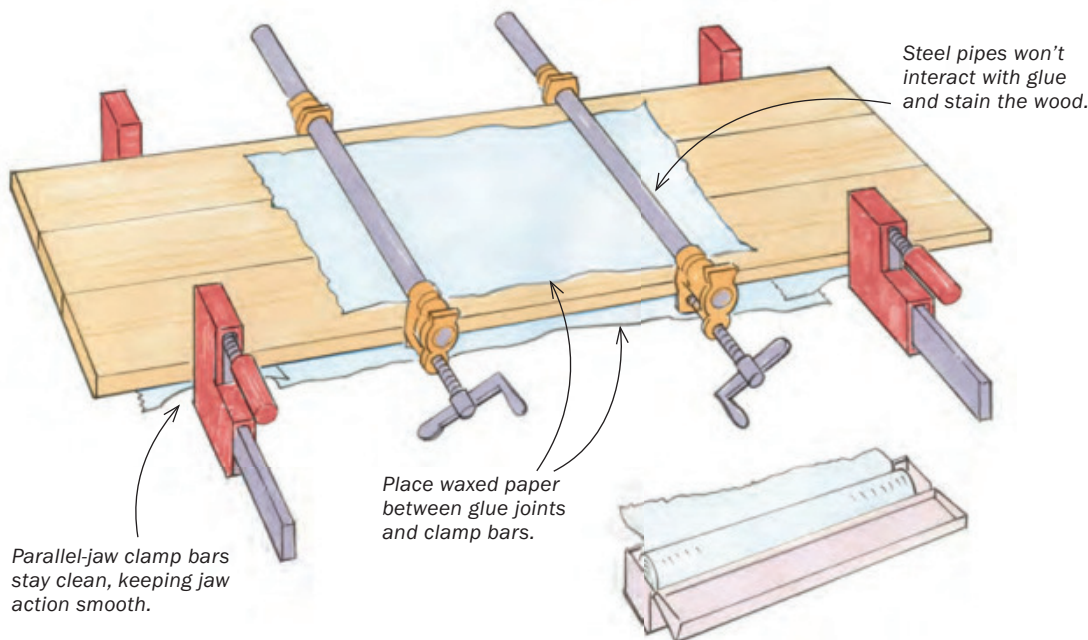
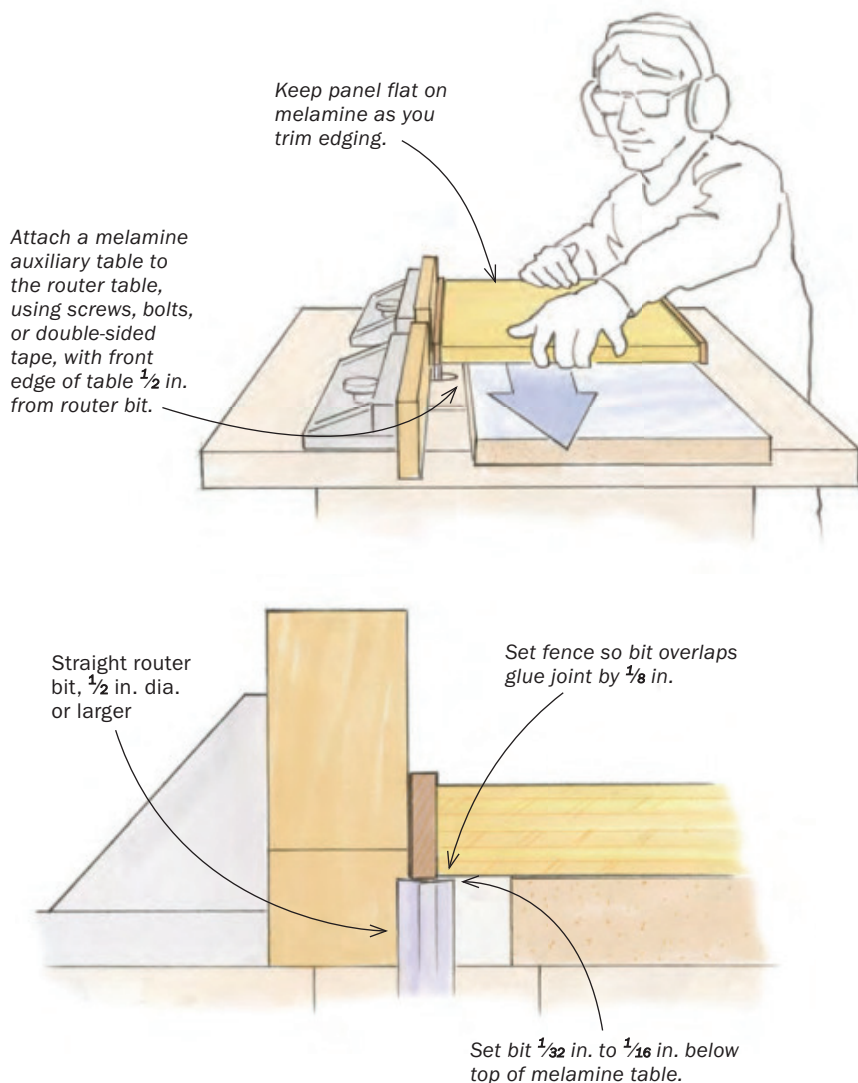
Simple, effective setup for trimming plywood edging

Trimming solid edging on plywood is a tedious task, especially if you have a lot of shelves and cabinet edges to process. I know the magazine has offered a number of good solutions, but the following is the favorite by far in my pro cabinetry shop. The setup is simple, and works on either a router table (with the user feeding parts by hand) or a shaper equipped with a power feeder.

Start by loading a straight bit in the router (or equivalent shaper cutter). A $\frac{1}{2}$ -in. bit will work for thin edging, but bigger is better. Then attach a melamine auxiliary table on top of the existing table, using double-sided tape, or better yet, using screws, or T-slots and bolts, to make it easier to attach and detach. Set the table $\frac{1}{2}$ in. or so away from the bit, to leave room for overhanging edging on the bottom side, as well as any glue squeeze-out there. Last, set the fence to position the outside of the cutter under the edging you are trimming, and raise the bit until it's $\frac{1}{32}$ in. to $\frac{1}{16}$ in. shy of the top of the melamine table. Keep your panels flat on the melamine as you trim the edging, and the job will go quickly, with great results. A climb cut, moving left to right, will give the cleanest results, but a right-to-left cut will be easier to control.

This setup will leave a sliver of edging to be block-planed and sanded away in short order.

—STEVE LANN, Hyattsville, Md.



Protect clamp bars with waxed paper

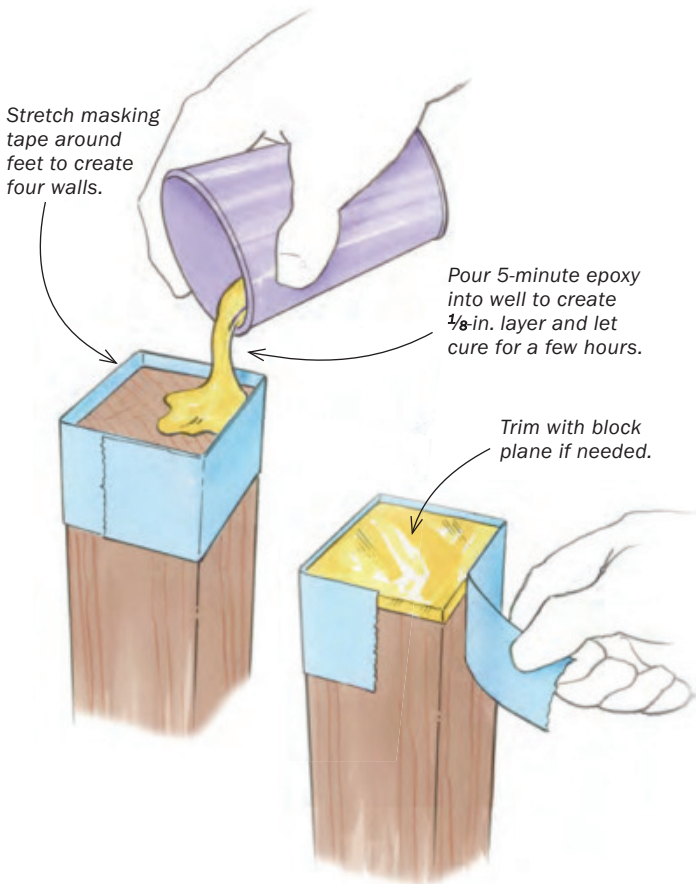
I love my parallel-jaw bench clamps, but I don't love how glue squeeze-out drips onto the serrated bars, making the clamps hard to operate. After a recent cleaning, I've started laying waxed paper over the bars to prevent the problem. Waxed paper also prevents pipe-clamp bars from discoloring wood when glue oxidizes the steel pipes.

—TOM SCHORN, Groton, Mass.

Protect outdoor furniture with epoxy foot pads

This method works on outdoor furniture to prevent the feet from wicking water up into the legs and inviting rot, and on indoor furniture to prevent the feet from damaging floors. Create a simple well at the bottom of each foot by applying masking tape as shown, and then pour in a $\frac{1}{8}$ -in.-thick layer of 5-minute epoxy. Leave the epoxy for a few hours to fully cure and you'll find it easy to trim with a block plane, making it easy to level the feet. The epoxy can be left transparent, dyed black, or dyed to match the color of the wood. I used it most recently on an outdoor side table.

—NATHAN COUTARD, Charlottesville, Va.



Quick Tip

Share the love by donating your work

I love wood turning, and I create more pieces than my family, friends, and acquaintances need. So I donate work to a local charity, which sells ceramic and wood vessels at an annual fund-raising event called "Empty Bowls." Check with your local charities for events like this one. They can use the funds, and you can keep doing what you love.

—MIKE FAY, Fernandina Beach, Fla.



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■ POWER TOOLS

Plunge without the plug

Cordless plunge router by Metabo HPT Model M3612DA \$400



ADDING TO A NUMBER OF CORDLESS TRIM ROUTERS on the market, including its own, Metabo HTP (formerly Hitachi Power Tools) has introduced a dedicated cordless plunge router.

Its power, endurance, and cut quality are excellent.

This is a powerful, full-featured plunge router that includes $\frac{1}{4}$ -in. and $\frac{1}{2}$ -in. collets, an excellent edge guide, a bushing holder, and a full set of bushing guides. The ergonomic handles, easy trigger lock, smooth plunge action, and positive plunge lock are all user-friendly. The dust-collection attachment works great, too, even with a bushing guide in place, making mortising much faster and easier. Thanks to an included alignment pin, the bushing holder is also easy to center, making bushing-guided routing more accurate. It also offers soft start and adjustable speed.

A 36-volt, 2.5 amp-hr. (Ah) battery and charger come with the router. You can also plug it in with an optional adapter that slides into place where the battery would go (\$160).

My main issue with the cordless version of this router is its $1\frac{31}{32}$ -in. plunge capacity, which meant I couldn't fully withdraw my $\frac{1}{2}$ -in.-dia. mortising bit into the base. The rest of my bits, however, from $\frac{3}{8}$ in. down, worked fine. Also, the handles are only comfortable when held from the front, and the flat section on the base is also at the front. That means you have to turn the router around to place the flat side against a fence, making the handles less comfortable. Otherwise, the M3612DA is an excellent cordless tool.

—Asa Christiana is a woodworker and freelance writer in Portland, Ore.



Smooth and powerful. The Metabo managed a deep cut in white oak without hesitation, leaving behind a perfect surface.



How low can it go? The plunge capacity is just shy of 2 in., meaning longer $\frac{1}{2}$ -in. bits may stick out. Other bits, like the $\frac{3}{8}$ -in. one used to cut this mortise, fit just fine, however.

■ ACCESSORIES

Easy hardware installation

I BUILD KITCHENS and freestanding furniture, so I install a lot of hardware. My kitchens are highly customized, with casework built to fit particular spaces, so few parts are ever the same height and width. Until now, I'd used a steel rule and tape measure to lay out hardware drilling locations.

The TP-1935 from True Position Tools has changed that. I expected to find it less useful for my work than it would be for jobs with many identical elements, but because it allows for adjustments in different planes, it proved more than up to the task. I could set the center-to-center location for drilling drawer pulls and adjust the distance from the top of a drawer face using the sliding fence; an extension arm and movable end stop allowed for positioning at the center of a drawer or at the same distance from each end. The same basic setup worked

for hinges, pulls, and latches. The jig is thoughtfully designed, made from hardened aluminum with clear markings and parts that fit well. Its instructions are well written and illustrated. Adjustable fences protrude from both faces of the bars, allowing you to flip the jig front to back

when positioning pulls the same distance from both ends of a drawer.

The jig is made for use with the 5mm bit supplied—fine if you're using standard cabinet hardware, but if you don't you can still use the jig to mark the hole locations with a 5mm brad point, remove the jig, and drill.

—Nancy R. Hiller is a FWW ambassador.



Hardware locating jig
by True Position
Model TP-1935
\$300

Mesh sandpaper
and sanding block
by Diablo
\$12



■ SANDING

Better hand sanding

FOR YEARS I USED ADHESIVE-BACKED sandpaper on a plywood or cork block. I eventually realized that the expense of the sticky-back sandpaper caused me to use each piece well past its prime. A few months ago, out of curiosity, I grabbed a set of Diablo SandNET hand sanding sheets and a sanding block. The kit included a sanding pad and a few 80-, 120-, and 220-grit sanding sheets.

The SandNET sheets, made of abrasive mesh, remain clear much longer than traditional sandpaper, and in turn last far longer. Since the mesh keeps from clogging, I was able to use

one 120-grit piece of mesh far longer than I expected—right up until the adhesive on the grit eventually broke down. I would love to see the SandNET paper made in 180-grit. The jump from 120-grit to 220 is too drastic for my tastes.

The sanding pad is made of two densities of foam with hook-and-loop on both sides. One side is more dense, with just enough give to it for 98% of my sanding tasks. It feels very similar to sanding with a cork block. If you find yourself sanding contoured pieces, such as cove molding, the other side is much softer, letting it shape to a piece.

—Ben Strano is the editor of *FineWoodworking.com*.

■ NEW TO MARKET

Tools to look out for

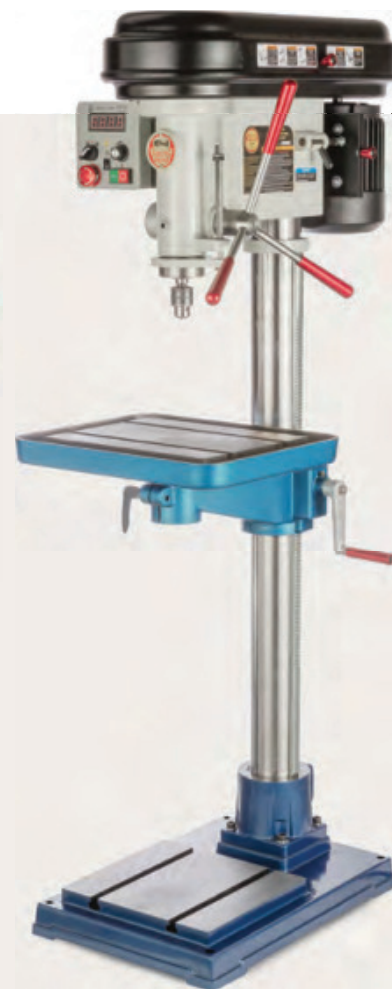
Adjustable track saw square

Woodpeckers has introduced a track saw square that will hold your track from square up to 60°, including detents every 5° and at 22½°. The angle gauge can be recalibrated if necessary. The square slides into the underside of tracks, and holds onto them via a clasp. It will fit Festool, Makita, and Triton tracks.



Easy-to-move task light

Rockler's task light comes with a magnetic base and clamping bracket that expands to 2½ in., letting you move it from power tools to the workbench. It has a low and high setting, which you can adjust between a wider floodlight and more-focused spotlight. Its flexible neck allows you adjust the light's angle quickly.



3-phase 220 drill press

Thanks to an onboard inverter, this 1-hp, 19½-in. drill press from South Bend has a 3-phase variable-speed motor that runs on standard 220-volt single-phase power. The speed control has two ranges, 50–400 rpm and 300–2,000 rpm, with a digital readout. The distance from the spindle to the column is 9¾ in. The 20-in. by 16-in. table can lower 25⅝ in. from the spindle via a hand-cranked rack and pinion. The spindle can travel 5½ in.

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D. Petrides

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R. Simon

"The cuts were so good I had to look twice to see the cut side from the machine planed face!"

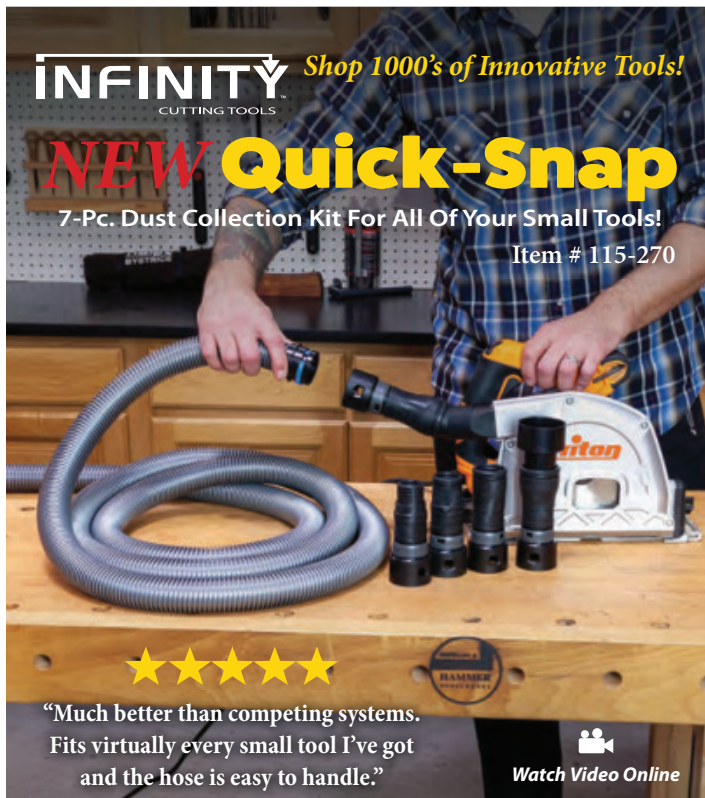
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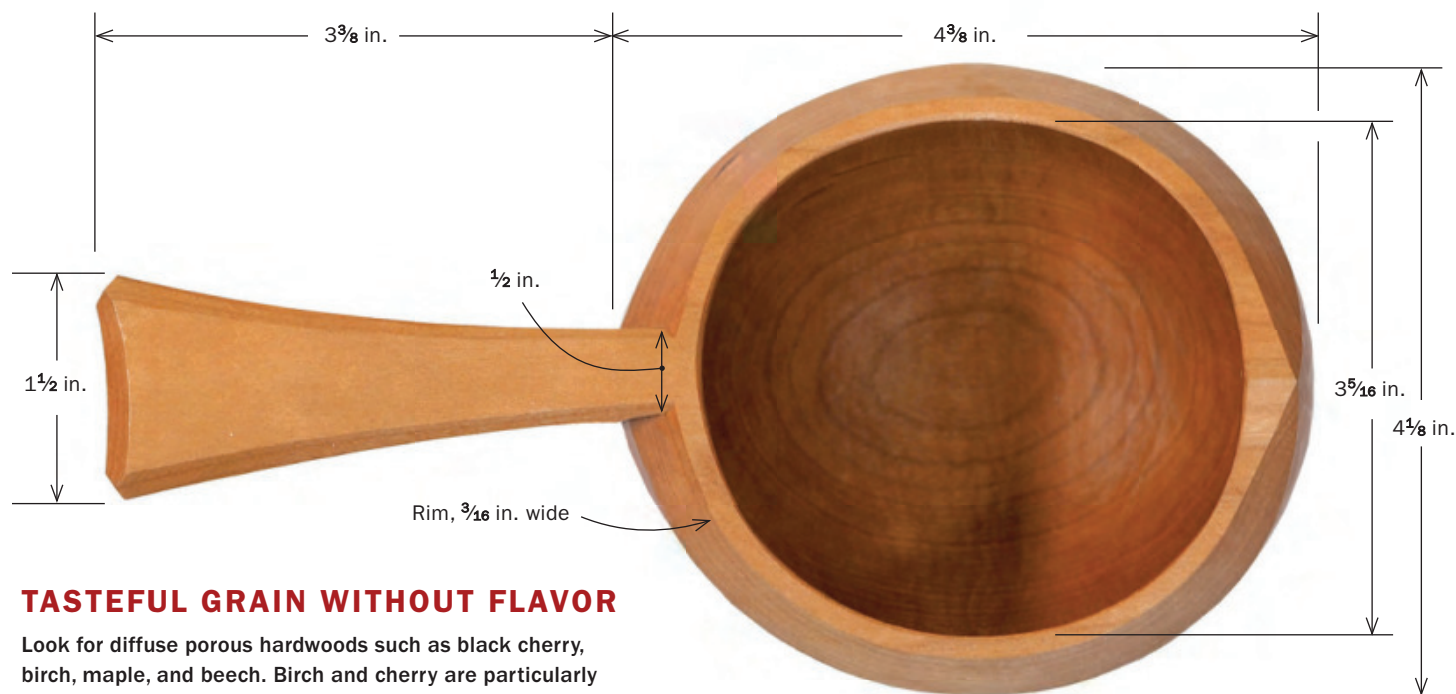


greenwood

Carve a wooden cup

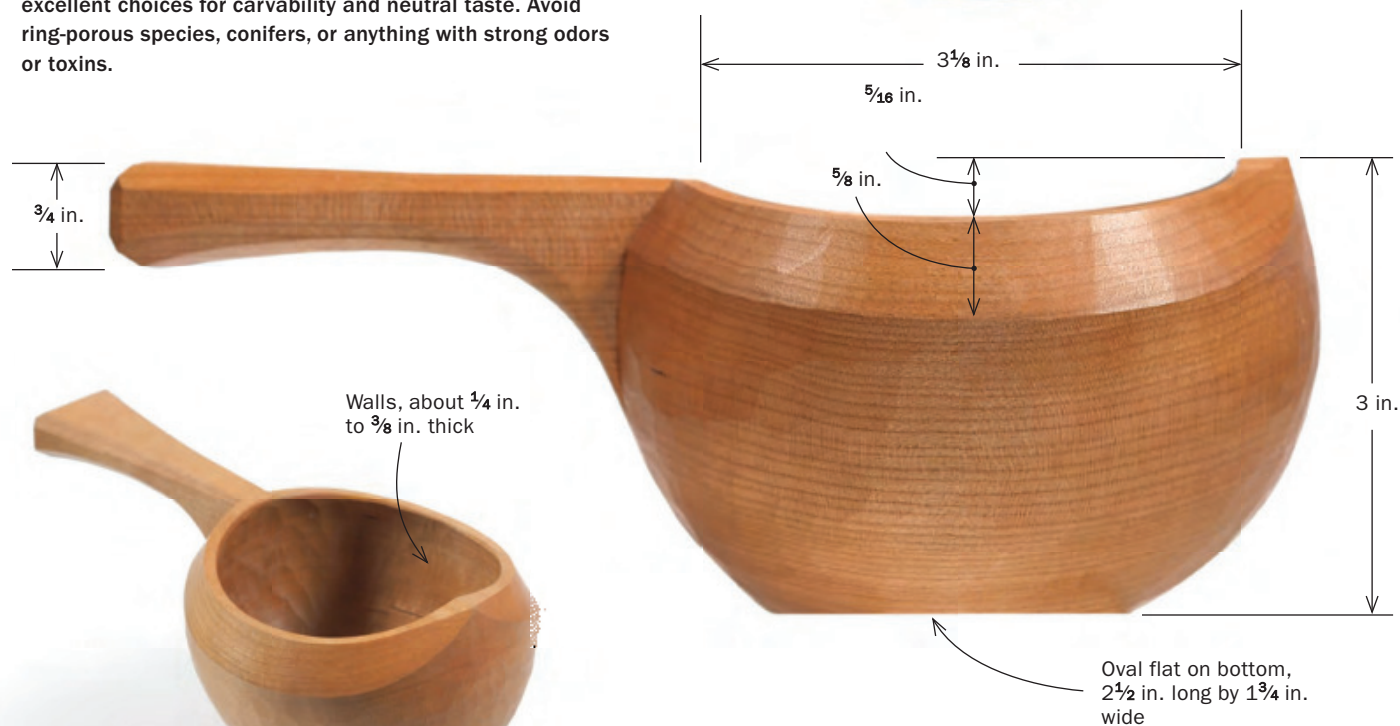
BY DAWSON MOORE

Carving your own wooden cup leaves you with a deeply personal object that can become a daily part of your life. And because it is a small object, you'll feel nearly every surface, from facets to curves, each time you pick it up. Wooden cups take many forms and have roots in many craft traditions around the world. Mine tend to be influenced most by Scandinavian *kuksa* and Japanese teaware, but there are many avenues to explore and learn from. Your tool set will also greatly influence the shape of your cup. Instead of trying to force a form that becomes burdensome for your tools, let their individual touch further personalize your cup.



TASTEFUL GRAIN WITHOUT FLAVOR

Look for diffuse porous hardwoods such as black cherry, birch, maple, and beech. Birch and cherry are particularly excellent choices for carvability and neutral taste. Avoid ring-porous species, conifers, or anything with strong odors or toxins.



Start with a log

My methods rely on the relative ease of carving green wood. A fresh log 12–18 in. diameter and 8–9 in. long is a nice place to start, though smaller or larger also work.

When splitting out the blank from the log, remove any knots or other grain irregularities—or better yet, avoid them from the start. Take off the pith, bark, and, if you don't like it, sapwood too. Last, hew the sides of the blank square to the top and bottom surfaces.

Although I do lay out a centerline, three concentric rings to

guide shaping and hollowing the bowl, and the profile of the handle, the layout is actually minimal. This is because much of the cup's final shape will be dictated by the hollow, which in turn will be determined by your specific tools. It's best to keep an open mind with the design of your cup and explore what shapes and forms are attainable with your given tool set.

Hollow the inside, then shape the outside

Carving begins with hollowing the inside of the cup. If you began by shaping the outside of the cup, there would not be

MAKE THE BLANK

Start with a log.

Moore splits the round into billets using a small hatchet and a large mallet. Split off the pith before using the hatchet to peel away the bark. The pith side of the blank will become the cup's bottom. Make sure the billet is free of knots or wavy grain.



Flatten the sides.

After using a straightedge to lay out the sides of the cup, hew to those lines so the sides are 90° to the top and bottom. In essence, this process is similar to truing roughsawn boards before laying out joinery. Unless you want to see it in the finished cup, now's the time to split off the sapwood.



enough material left to safely clamp the workpiece for the hollowing process.

I like to start the hollowing with an adze, which works quickly but leaves a rough surface. To refine the rough adze work and undercut the bowl a bit, I pick up a hook knife, preferably one with a long handle for better leverage.

Turn to the exterior shape of the cup. I do this in three stages, rough shaping with a bandsaw and ax, using a drawknife to get close to my final shape, and then turning to a sloyd knife for the final cuts. While some people let their greenwood projects dry before taking finishing cuts—because cuts on dry wood are often smoother than on green wood—I've come to prefer doing most of the cup's finishing work while it's still wet. Working green wood is less physically demanding, and you can still end up with a nice finish provided your tools are sharp. Save any decorative carving, however, until after the piece dries to keep those cuts as crisp as possible.



Shave down to expose one growth ring.

This provides an excellent surface for drawing layout lines and ensures less cleanup later. Moore does this step with a drawknife at a low bench with the blank wedged in place.



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HOLLOW THE CUP



Lay out the bowl. Referencing off a centerline, draw three concentric circles $\frac{3}{8}$ in. apart. The outermost circle represents the outside of the cup at its widest point, which won't necessarily be at the rim, but more likely the belly. The middle circle will be the reference for the outside diameter of the rim. The innermost will be the inside of the rim.

The first step in shaping the exterior, removing the bulk of the waste, can be done with a bandsaw, a hatchet, or, as I prefer, a combination of the two. I cut to the layout lines with the bandsaw before picking up the hatchet for the contoured work.

Aim for a consistent wall thickness, including on the bottom, as this will determine if the cup survives the drying process and future use. At this stage, the wall should be about $\frac{1}{2}$ in. thick.

The second step, the drawknife work, is done entirely at the spoon mule, a valuable workholding tool similar to a shaving horse. It's here that the cup



Sketch the handle. Draw a handle shape to suit your own taste, but consider how the shape will work with your workholding options later. Moore's shape works well with a spoon mule.



Adze takes care of most of the hollow. Again at the low bench with the blank wedged tight, Moore uses an adze with a narrow, tight sweep, a laid-back hang, and a relatively long handle to remove the bulk of the waste. He begins by swinging the adze using a two-handed grip. As he nears his layout lines, he uses a mallet to take more controlled cuts.



Refine the hollow with a hook knife. When he reaches the point of diminishing returns with the adze, Moore switches to a hook knife—preferably one with a long handle (left). Work right up to the inner layout line (above), and undercut the rim if possible.

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BANDSAW AND AX TO ROUGH SHAPE

Get a handle on it. After crosscutting relief cuts to the base of the handle, Moore makes the long rips to establish the handle's sweeping shape. Next, he bandsaws the cup's outer diameter. His last step is to remove the waste under the handle.



Chop large chamfers. Take short but strong swings to start shaping the cup's round bowl. Keep the cut well supported throughout to avoid breaking it.



really begins to take shape, including the large bevel around the rim.

Last are the finishing cuts with a sloyd knife. Here, I work systematically to make sure I end up with a pleasing shape. By tuning the inside of the inner rim, then the wide chamfer of the outer rim, and then the flat bottom, I create waypoints that guide the rest of the fairing.

Drying and finishing

The benefit of using green stock is that it's easier to work. However, a drawback is that you need to control the drying process. Fortunately, it's not that tricky, especially if the cup's walls are evenly thick. You just want to slow the process somewhat to prevent cracking. The simplest method I've found is sealing the cup in a paper bag and taking it out periodically for short periods.

Then switch to skewers. To continue shaping, take controlled skew cuts.

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Smooth the handle. Take controlled pulls downhill with the drawknife. But don't go too far. You'll return to the handle after carving the outside of the bowl, when you can better fair the transition between the two.

Sculpt the bowl.

The convex surface can be challenging to carve, especially where it meets the handle. Be sure to take controlled cuts, and skew the drawknife here. Keep the walls evenly thick—a necessity for proper drying—letting the inner hollow significantly dictate the outer form. Moore uses his fingers as calipers.



Rough in the large bevel.

Make angled cuts as you work to the middle layout circle, creating the outer rim of the cup (right). With the bowl close to final shape, return to its transition to the handle; now you can blend the elements much more cleanly (far right).



Online **Extra**

SADDLE UP A SPOON MULE



During all of this drawknife work, Moore is constantly reorienting the cup to work different parts of it. His spoon mule (FWW #286) is a great help here, as it adjusts quickly while clamping securely and out of the way of the drawknife. To read how to make it, go to FineWoodworking.com/296.



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DR POWER EQUIPMENT



KNIFE FOR FINAL CUTS

Wide chamfers on handle. Use short cuts by pulling the knife. Anchoring your thumb to the workpiece offers more control and acts as a stop, since your knuckles will hit it before the knife can (right). For the long cuts, don't try to take a single cut at final depth; instead, move from the end of the cut back, slicing slightly deeper as you go (far right).



A little off the top. Clean up the top of the handle and the rim, making sure to fine-tune the flowing sweeps that travel around the rim (right). Make very fine cuts to fair the inner rim (far right), ignoring the rough surface of the outer rim. Take your time, as this shape will be your reference for adjusting the outer rim and will significantly impact the overall look of the cup.



After the cup is dry, you can add finish. My finishing regimen helps it hold hot liquids and maintain a neutral taste. I use Half & Half from The Real Milk Paint Co., which is tung oil cut in half with citrus oil. I apply it in several thin coats to speed curing time. A light bulb kiln expedites the process even more. If your oil is not properly cured before use, your drinks will taste awful and you'll increase the risk of cracks.

A wooden cup can last for years if properly cared for. Don't put it in the dishwasher. Try to keep hot liquids below 190°. Avoid leaving liquids in the cup for long periods, such as overnight. But don't be shy about using it. Regular use can help to maintain a relatively stable moisture content in the wood, which can be better than cycling through extremes of dry and wet.



You can follow Dawson Moore on Instagram at @michigansloyd.



Final cuts. Flatten the bottom and refine the large bevel so it looks good against the inner rim. Then, working from the bottom up, finish shaping the cup and bringing the walls to final thickness.

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Low Pencil-Post Bed

Traditional form gets a trim in this update to a classic

BY TOM McLAUGHLIN

I love the simple formality of a tall pencil-post bed. So when thinking about a new low-post design in cherry, I looked to the timeless tapered pencil post for inspiration. Scaling down elements gave me a more casual, sturdier bed perfect for a guest room or a child.

Just because this bed is scaled down doesn't mean it skimps on the details. It

features the signature octagonal posts with sweet lamb's tongue transitions from the upper tapers to the lower square. Because the tops of the posts are accessible, I dome them to ease their touch. To maintain the historical elegance of the bed's inspiration, I use slats instead of a box spring, evoking the thinner period mattresses held up only by ropes woven through the bed rails

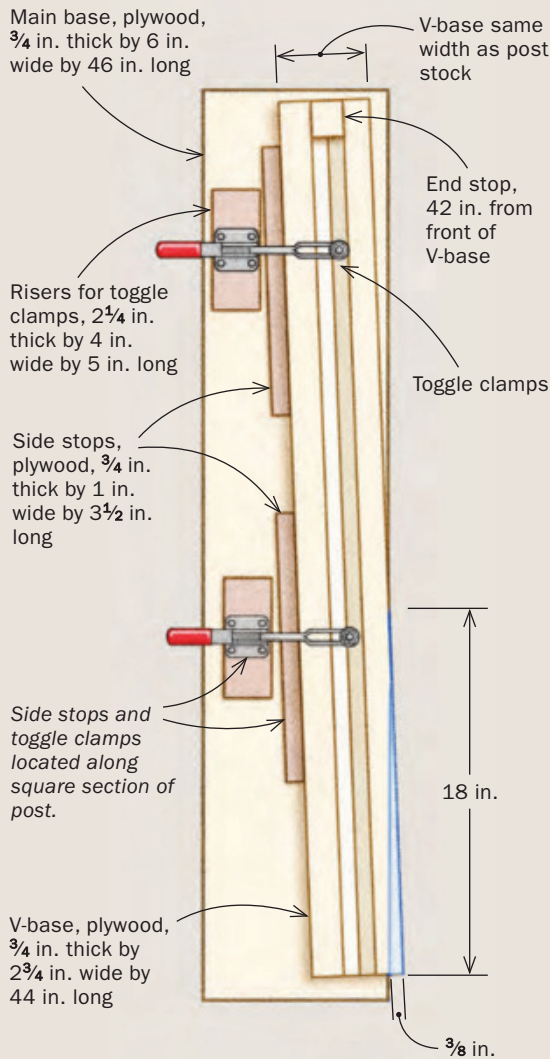
(those ropes were tightened for support, hence the saying "sleep tight"). Full-size plans for this bed are available at my website, epicwoodworking.com. They include drawings for both slats and a box spring.

Eight tapers, one jig

The posts are one of the major design players of the bed, sharing the stage only

SLED FOR OCTAGONAL TAPERS

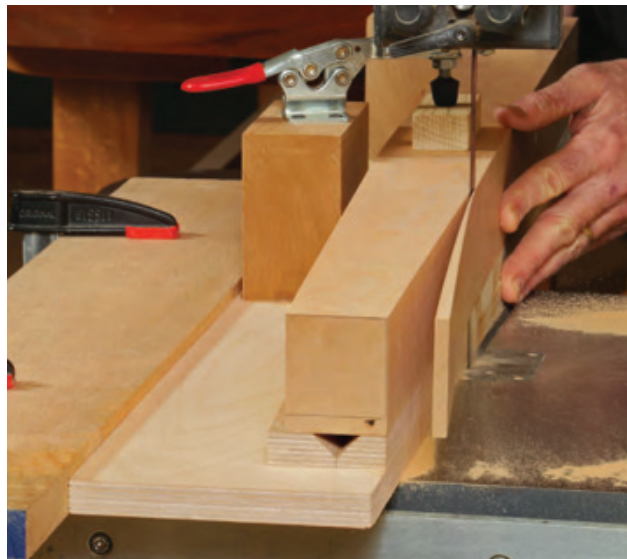
Angle an auxiliary V-base to cut all eight sides.



Tapered octagonal posts



V-base attaches to main base at an angle to set the taper. The posts ride on the V-base. Because it's skewed to the main base, the amount and angle of the overhang determines the posts' taper. The centered V lets the sled handle both the square and octagonal tapers with the same setup.



Bandsaw the square tapers. Because there's plenty of material below the taper to keep the post flat on the sled, you can rotate the post 90° between passes to cut uniform tapers.



Use V-shaped spacers for the octagonal tapers. To ensure the sled's toggle clamps apply even pressure across the 90° corners, McLaughlin uses an offcut from the V-base.



Chamfers are stop cuts. Don't run the sled all the way through the saw. Rather, stop just shy of your layout line, back the sled out, and cut the shoulders by hand.

Classy midsize bed

Three types of mortise-and-tenons come together for a knockdown bed with traditional touches.

Headboard, $\frac{3}{4}$ in. thick by 19 in. wide by $40\frac{1}{2}$ in. long

Head post, $2\frac{3}{4}$ sq. by 42 in. long

Counterbore for bed bolt, 1 in. dia. by $\frac{5}{8}$ in. deep

Hole for bed bolt shank, $\frac{7}{16}$ in. dia.

HEAD POST TOP VIEW

$\frac{1}{2}$ -in. plywood, multiple sheets are fine

Ash slat, $\frac{13}{16}$ in. thick by $2\frac{1}{2}$ in. wide by 38 in. long

Spacer block, $\frac{13}{16}$ in. thick by $\frac{7}{8}$ in. wide by $6\frac{5}{16}$ in. long

Long rail, $1\frac{3}{4}$ in. thick by $5\frac{1}{2}$ in. wide by 75 in. long

Mortise for nut, $\frac{1}{2}$ in. wide by $\frac{7}{8}$ in. long by $1\frac{1}{16}$ in. deep

Mortise for nut starts $2\frac{1}{2}$ in. back from tenon shoulder

Ledger, $\frac{7}{8}$ in. thick by 2 in. wide by 74 in. long

Hole in long rail for bed bolt, $\frac{7}{16}$ in. dia. by 4 in. deep

Tenons on long rail, $\frac{3}{4}$ in. thick by $5\frac{3}{16}$ in. wide by $\frac{9}{16}$ in. long

LONG RAIL TOP AND SIDE VIEW

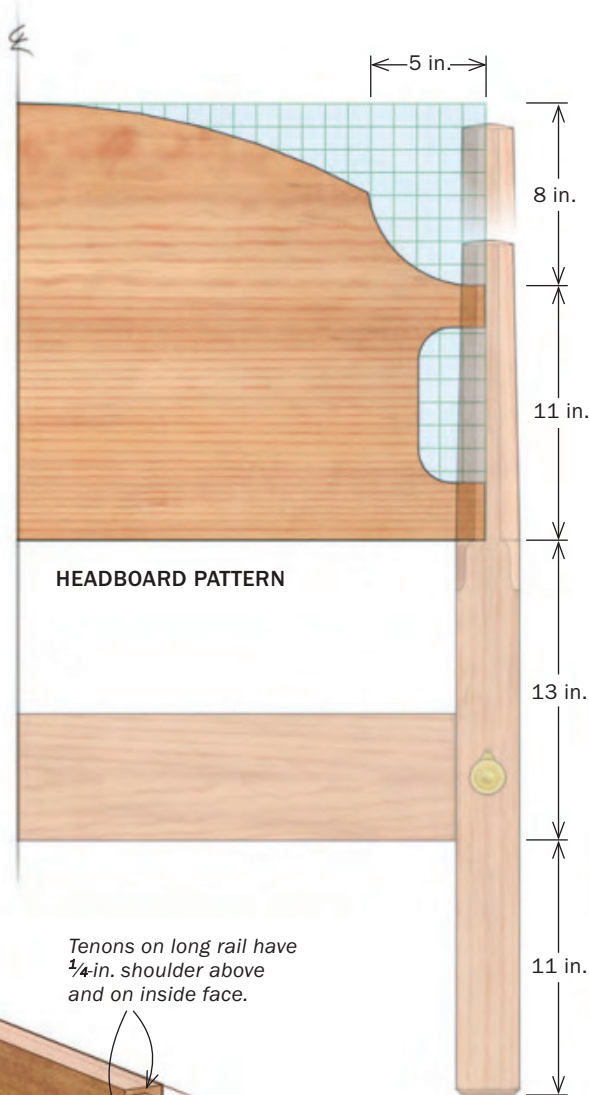
SOURCE OF SUPPLY

HORTON BRASSES

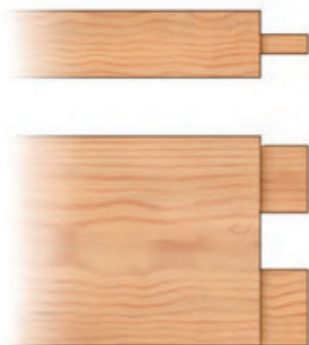
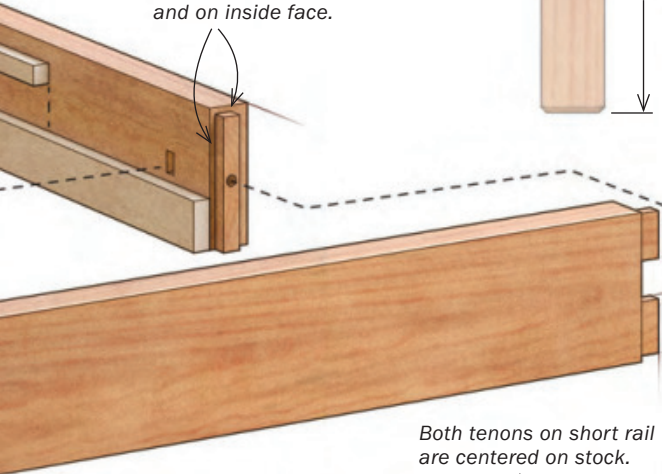
6-in. long, $\frac{3}{8}$ -in. steel bed bolts and nuts (model no. H-736)

$2\frac{1}{8}$ -in. bed bolt cover (model no. H-33-SB)

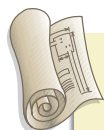
Short rail, $1\frac{3}{4}$ in. thick by $5\frac{1}{2}$ in. wide by $40\frac{1}{2}$ in. long



Tenons on long rail have $\frac{1}{4}$ in. shoulder above and on inside face.

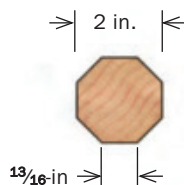


SHORT RAIL TOP AND SIDE VIEW

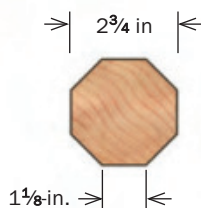


To purchase plans for this low pencil-post bed, go to epicwoodworking.com.

Foot post's cross section at top of taper, $2\frac{3}{16}$ in. across with $\frac{15}{16}$ in.-wide facets



Lower mortise for headboard, $\frac{3}{4}$ in. wide by $2\frac{1}{2}$ in. long by $1\frac{1}{4}$ in. deep



Taper starts 24 in. from bottom.

Bed bolt

Bed bolt cover

Upper mortise for headboard, $\frac{3}{4}$ in. wide by $1\frac{13}{16}$ in. long by $1\frac{1}{16}$ in. deep

Dome on posts, $\frac{3}{16}$ in. deep

Mortises for headboard are centered on taper.



Handwork refines the posts



Saw the shoulders and plane the facets. After cutting free the waste from tapering, use a block plane to clean up the bandsawn surface. Check regularly to make sure you're planing the tapers equally. Use the sled to hold the workpiece.



with the headboard. You'll add detail to the posts later, but to start you need even tapers. For these, I make a special sled.

This sled, with a base, toggle clamps, and stops, is similar to the one in my article "Leg-Tapering Jig" (*FWW* #268), but there are two key differences. First, this jig's for the bandsaw. Second, it has an auxiliary base with a V-groove in it tacked to the main base. The V-base is skewed in relation to the main base at an angle that matches the post's taper.

The V-groove must be centered in the width of the V-base. To accomplish this, I rip the V-base to the same width as the post stock, tilt my tablesaw blade to 45°, set its height to cut slightly more than halfway through the stock, and make a cut with one edge against the fence. A cut with the other edge against the fence completes the V-groove. To cut the tapers, start with the four primary ones, placing each face of the post in turn flat on the V-base. Then, to cut the octagonal tapers, set the 90° corners of the post in the V-groove. The first four tapers are through-cuts, but the octagonal ones are stopped. For these, back the jig out of the bandsaw and cut the taper waste free with a backsaw. Clean up the bandsaw cuts with a handplane.

Next, carve the lamb's tongue and dome the tops of the posts. The carving recalls the bed's traditional roots. The dome is both an aesthetic and tactile addition, considering how low (and touchable) the tops of the posts are.



Shoulder plane and scraper work into the corner. A standard block plane won't cut into the sharp 90° shoulder at the bottom of the taper, so McLaughlin refines the surface there with light cross-grain skewing cuts from a shoulder plane before picking up a scraper.

Different mortise-and-tenons

The bed rails use two types of tenons. To make the bed knockdown, the long rails get wide, short tenons that are left dry and bolted in place during assembly. The short rails, which get glued to the posts, have a pair of tenons that are spaced apart to make room for the bolts.

The bed bolts require a stepped hole in the post. I use a Forstner bit to counterbore for the bolt's head, then follow up with a brad-point bit for the bolt's shank.

That done, I cut the mortises in the post. I cut the deep mortises for the short rails on a hollow-chisel mortiser, but I use a



Lay out the lamb's tongue. This feature is a pair of opposing S-curves. McLaughlin uses a template for easy, repeatable tracing.



Carve close to your lines. McLaughlin uses a standard bench chisel to rough out this detail, flipping the chisel bevel up and down as necessary to maintain control.



Clean up with a rasp, file, card scraper, and sandpaper. Pay attention to make sure that the lamb's tongue remains symmetrical and even, not tilted along the corner of the post. Green tape where the detail meets the taper helps protect the facets during this cleanup.



Lay out a baseline before forming the dome. To cut the dome, McLaughlin takes semi-circular passes with a spokeshave, starting from the perimeter and working in. He then files, scrapes, and sands the surface.



Joinery is mortise-and-tenons



Bed bolts need a stepped hole. Start with a Forstner bit to drill the counterbore before switching to a brad-point bit, which is easy to center using the dimple left by the Forstner.

Posts get a split mortise for the short rails. To avoid the intersecting bed bolt for the long rails while still leaving enough glue surface, McLaughlin makes twin mortises for the short rails.



router to cut the shallow mortises for the long rails. This is for a few reasons. The hollow-chisel mortiser is a quick way to cut deep mortises. While it maxes out at ½-in. bits, that width is fine for these deeper mortises.

The long rails, however, need thicker tenons, and therefore wider mortises. (To read how I cut the tenons on these long workpieces, go to FineWoodworking.com/296.) The tenons need enough meat so they won't crumble around the hole for the bolt. The extra width also adds a little strength to compensate for the tenon's short length. The wide, shallow mortises for these tenons are simpler to cut with a router.

The bulk of the strength in the long rail joint comes from the bed bolt. As a result, it's crucial to locate the holes for the bolt and nut accurately. Instead of finding the locations by measuring, I use the posts and rails themselves, putting each long rail tenon into its mortise, inserting a bed bolt, and tapping it against the tenon to leave a dimple. To lay out the mortise for the nut, I carry a line from the dimple on the end grain onto the inside face of the rail, giving me the mortise's centerline.

This line also helps me locate my jig for drilling the hole in the rail for the bolt. The jig is essentially a shopmade single-hole doweling jig. It has a groove to fit over the long rail's tenon and a centered hole. It's



Route the shallow mortise for the knockdown joint before squaring it by hand. Because this is a knockdown joint, McLaughlin uses a shallow mortise for easy assembly. He makes it wider than the split mortise, allowing for a beefier tenon to accept the bed bolt.

Bed bolts for knockdown assembly

Fit the post to the long rail to mark for the bed bolt.

The bed bolts have a pointed end, so by putting the post on the rail and then tapping the bolt against the tenon, you'll create a little dimple exactly where the bolt will enter the tenon.



Transfer the bolt location to the face of the rail to lay out the mortise for the nut. This line provides the centerline for the nut mortise. Size the mortise for a snug but easy fit of the nut and make it deep enough that the center of the nut falls in line with the dimple, or the center of the bolt.



preferable to have a steel bushing in the hole to prevent the hole from distorting, but it's not essential as long as your jig is made of hardwood and you're not going to use it for multiple beds.

End with the headboard

The headboard is a two-step process. First is shaping, which is straightforward pattern-routing. Second is making the mortises for it. These require care, since the headboard tenons are entirely unshouldered, and a sloppy fit will have no place to hide. Knife lines, a sharp chisel, and offcuts from shaping help ensure success.

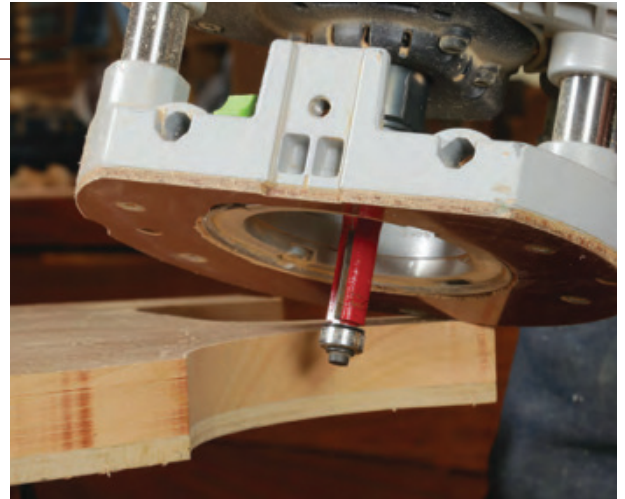
To shape the headboard, I use a half template made from 3/4-in. MDF. I trace it



Drill the rail for the bed bolt. To ensure a straight hole, McLaughlin uses a shopmade guide that slips over the tenon. The guide has a centerline, which he lines up with the line from the bolt's dimple. He temporarily screws the jig to the tenon to avoid slipping.

Headboard adds character

Use the same half template for tracing and routing. Using a half template that you flip across a centerline helps yield a symmetrical shape. Trace the template, remove most of the waste with a jigsaw, and then rout to shape with a flush-trimming bit.



Transfer the tenons to the post. Use a pencil to trace the tenons, but follow up with a knife on the front wall. The headboard's tenons don't have shoulders, and a scribed line will let you do cleaner work with a chisel.



Bore out much of the waste before chiseling. Drill with an undersize bit to leave material for careful chisel work. When paring, stop once you lightly pare down the knife wall.



Use an offcut to size and test the mortise. Set the offcut, saved from jigsawing the headboard, against the front wall to scribe the mortise's back wall. Pare back to this knife line, checking the fit regularly with the offcut.

Assemble now, break down later



Glue up the headboard. Add glue to the short rail's tenons and to the headboard's lower tenons. The upper ones float to accommodate wood movement. Clamp only across the rail to avoid toeing in the posts against the headboard's unshouldered tenons.



Attach the ledger and the slat spacers. Glue these in place. McLaughlin sets the first slat spacer just shy of the mortise for the nut. He then uses a removable spacer, pictured in cherry, a hair wider than the slats to locate the rest of the blocks, which allows for easy, repeatable location of the slats.

onto the panel, flipping it across a centerline to create a symmetrical outline. I jig-saw away most of the waste, staying about $\frac{1}{16}$ in. away from my line. Keep the offcuts; they'll come in handy for sizing the mortises. Now line up the template with the centerline again, securing it with clamps or double-sided tape for pattern-routing.

Next are the mortises. While it's standard practice to mortise a part while it's still square, I cut the mortises for the headboard after tapering the posts. This ensures that the mortises, chiseled by hand, are centered on the narrowing facets and fit snugly around the tenons.

To lay out the mortises, I balance the headboard on a post and trace around the tenons. Then—this is important—I scribe only the front wall with a marking knife. To start the mortise, I bore out much of the waste with a $\frac{5}{8}$ -in. Forstner bit at the drill press, using an offcut from tapering to support the post. Then I pare back to my knife line to create a straight front wall. Next, to get the width exact, I hold an offcut from the headboard against the front wall, knife the back wall, and pare to it. I use the offcut to test the mortise. Leave $\frac{1}{32}$ in. extra space above and below the upper tenon to allow for wood movement, and leave that joint dry at glue-up; the bottom mortise should fit tight and be glued. □

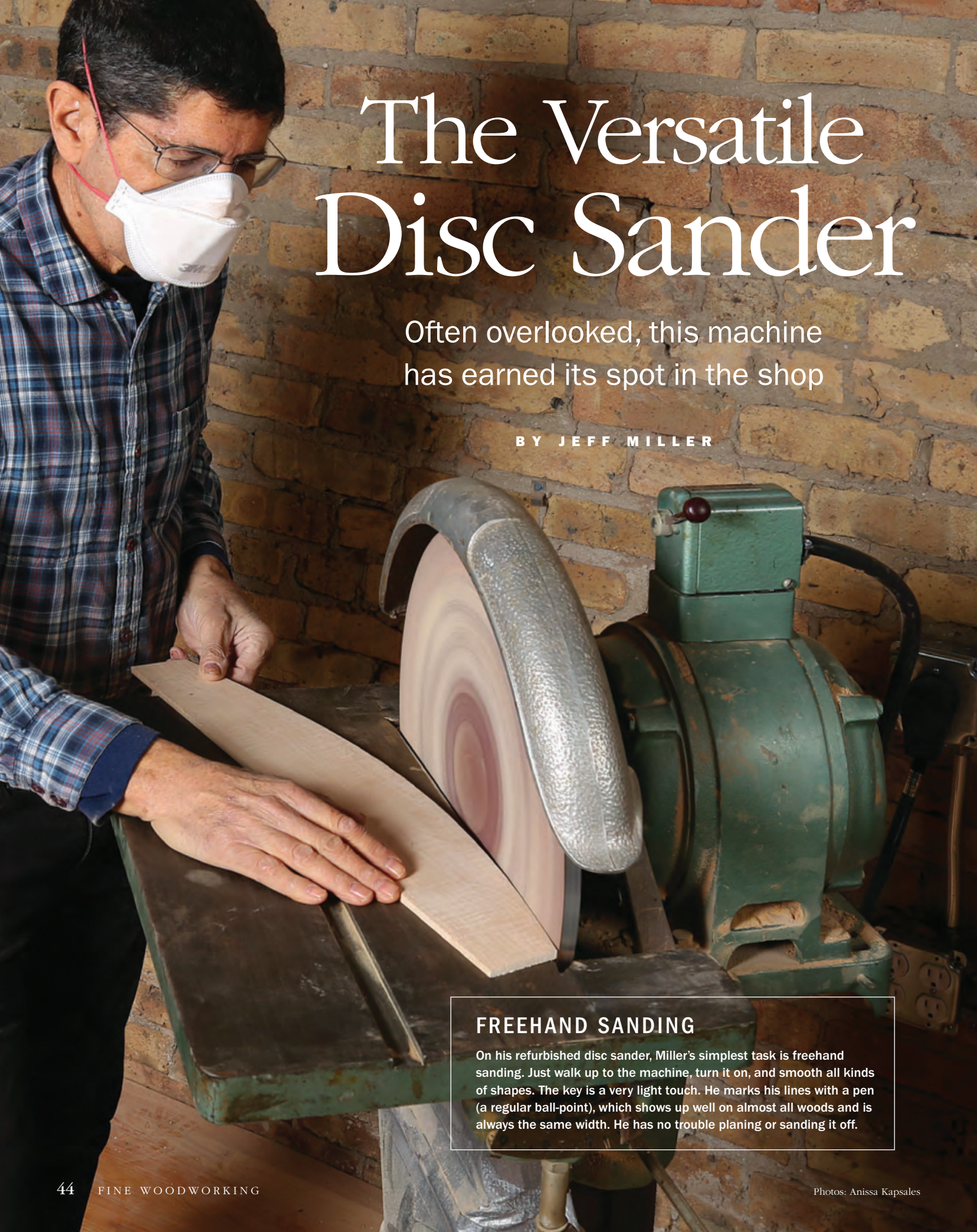
Tom McLaughlin and his wife, Kris, run *Epic Woodworking*, an educational site dedicated to furniture making.

www.finewoodworking.com



Install the long rails one at a time. Loosely bolt the long rails in place corner by corner to allow wiggle room during assembly (left). Once they're all installed, cinch the bolts tight. Then add the slats (below). To even out the pressure on the mattress, McLaughlin lays $\frac{1}{2}$ -in. plywood on top of the slats.





The Versatile Disc Sander

Often overlooked, this machine has earned its spot in the shop

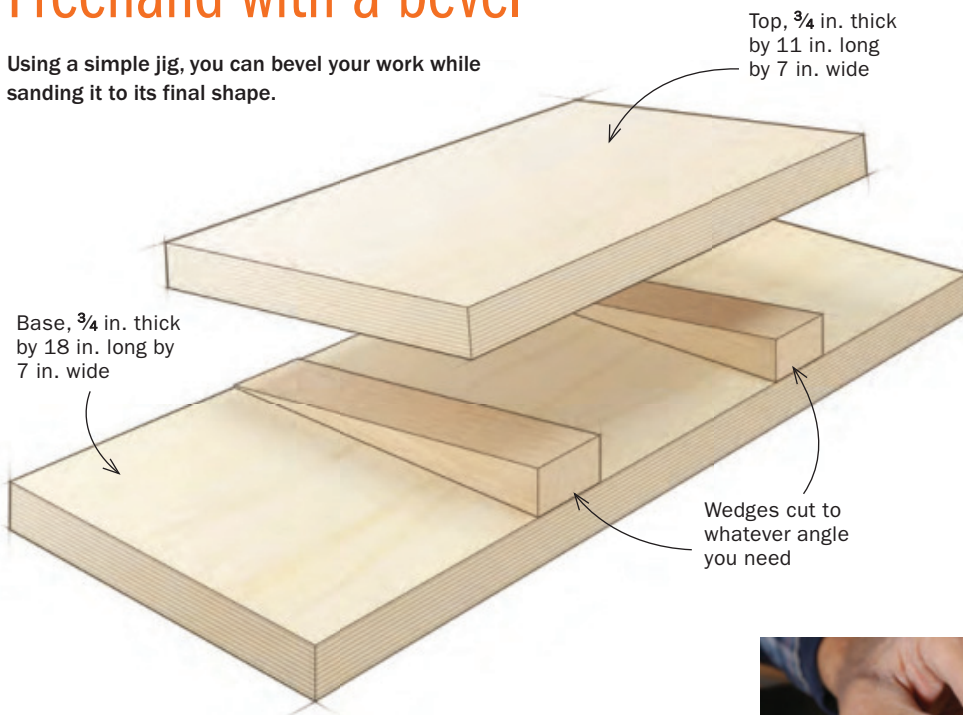
BY JEFF MILLER

FREEHAND SANDING

On his refurbished disc sander, Miller's simplest task is freehand sanding. Just walk up to the machine, turn it on, and smooth all kinds of shapes. The key is a very light touch. He marks his lines with a pen (a regular ball-point), which shows up well on almost all woods and is always the same width. He has no trouble planing or sanding it off.

Freehand with a bevel

Using a simple jig, you can bevel your work while sanding it to its final shape.



Bevel your curves. This jig allows you to present straight or curved edges to the sanding disc at an angle. Clamp the jig to the sander table, and work to your line.

I'm not sure why I bit when offered a free disc sander. It was an old cast-iron model in poor shape (I wasn't even sure if it worked), and I had never used a disc sander before. But the allure of old iron for free proved strong, and the tool has found a home in my shop, with some great uses.

Without any added accoutrements, the disc sander is my go-to tool for freehand-shaping many small, curved parts. After bandsawing close to a layout line, I'll work my way to it by first hitting the high spots, then sanding evenly and very lightly, in one smooth motion.

Add some shopmade jigs, and the disc sander becomes a surprisingly accurate and versatile tool for repeatably creating shapes that other machines can have trouble with.

The bevel jig (shown above) is a simple ramp that lets you do a complex thing: angle the edges of a convex curve. The circle-sanding jig will take a bandsawn blank from rough to perfectly round in a few minutes. My oval-shaping jig (see

Master Class, p. 76) works the same way, but generates all sorts of ovals. And the "shooting board" can square up the ends of workpieces and is especially useful for fine-tuning miters—on wooden components but also brass and aluminum ones.

Get the hang of the disc

With or without jigs, all disc-sanding operations should take place on the side of the disc rotating downward (my machine rotates clockwise), and the workpiece must be fully supported. When you sand near the center of the disc, there are fewer crossgrain scratches, but more push on the work.

Base camp

All the jigs I'll describe, except for the bevel jig, work off the same baseplate, which does two things. It provides a way to advance the work into the rotating disc, which is important for the function of the circle-shaping and oval-shaping jigs. And it provides a square reference to register the 90° and 45° fences for the shooting board.



Bottoms up. Miller uses the bevel jig for the tops and bottoms of Shaker boxes. After scribing the inside shape of the box onto the bottom blank and sanding to the line, he fits the bottom into the oval box. The narrow side goes in first and allows the bottom to wedge into place, sealing it perfectly without putting too much pressure on the delicate box.

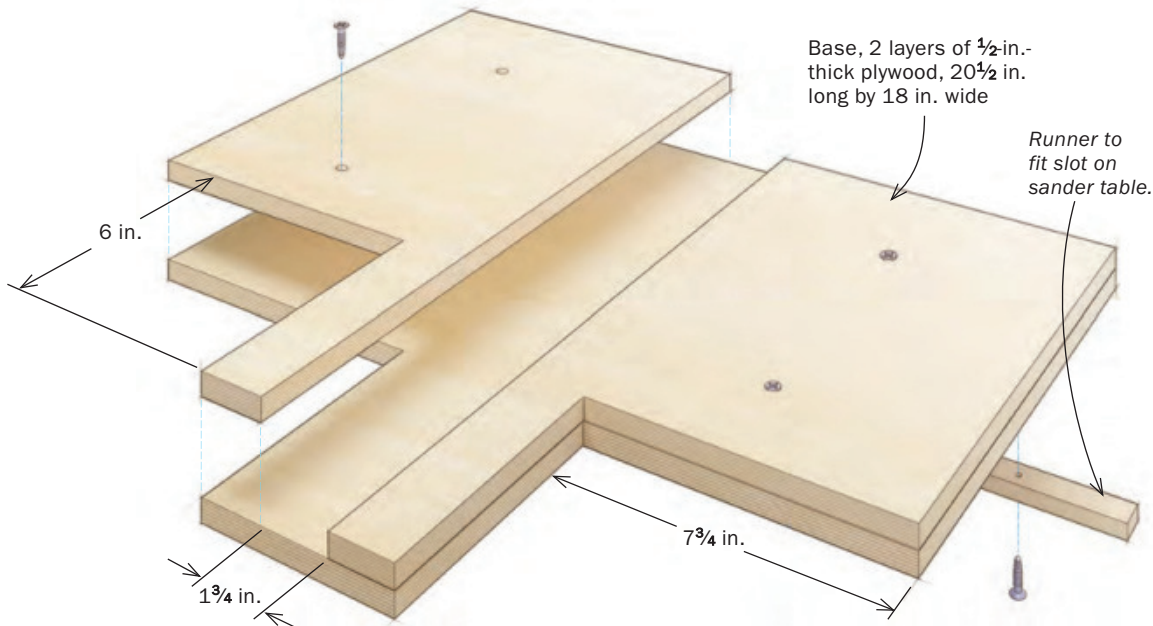
TIP HEAT THINGS UP



It's easy to remove the sandpaper from the disc. If it doesn't peel right off, heat it with a heat gun or hair dryer until the adhesive melts and the paper peels easily.

Universal base

Three of Miller's jigs work with this base (see p. 76 for the third). Three pieces of plywood come together in two layers with a slot built into the top.



The base, made of two layers of $\frac{1}{2}$ -in. plywood, is T-shaped and has a slot that fits a sliding bar. The T shape is important as it allows you to hold and control the workpiece when using the shaping jigs.

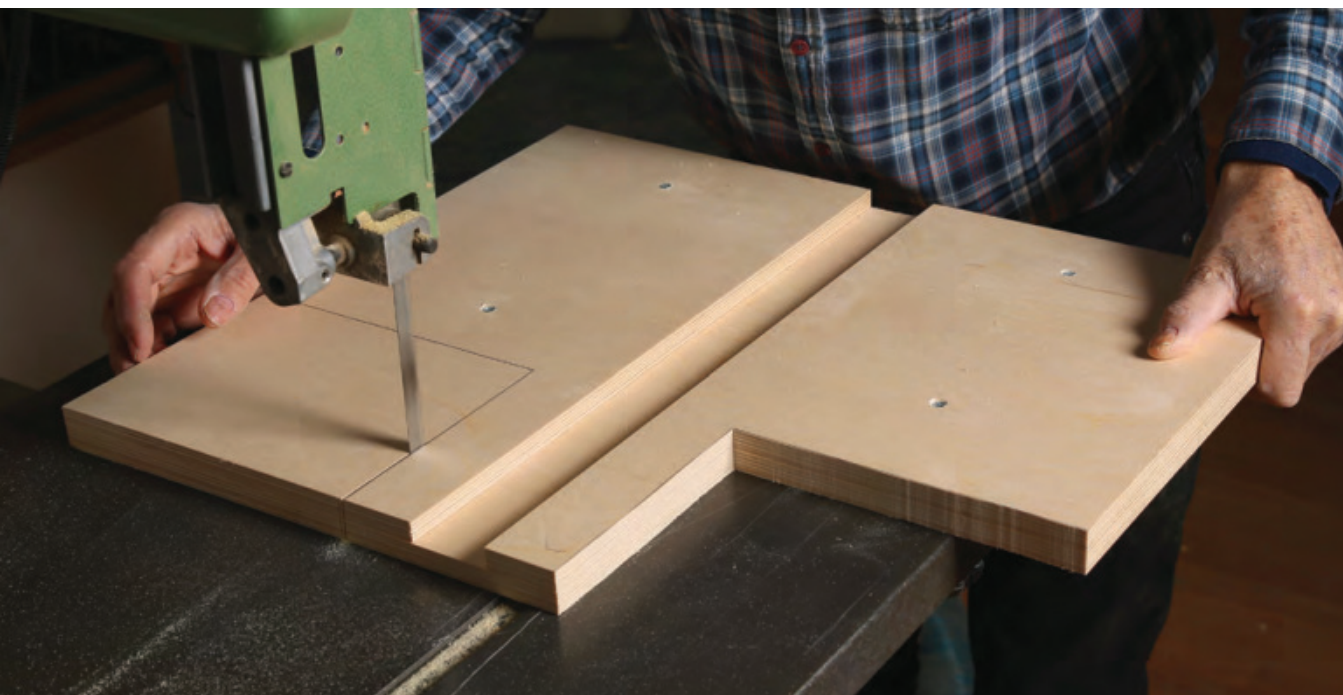
The slot must be squared up accurately to the sanding disc; the process is like squaring up a crosscut sled. Start by making a runner to fit the slot in the table of your sander. Make the runner a few inches longer than the base for now. Screw one side of the runner to the base, insert the runner into the sander table, and adjust the opposite side of the runner until you're satisfied that the slot in the jig base is perfectly square to the face of the sanding disc.



A plywood stack. The bottom layer of plywood is one sheet. Line up the first partial sheet on top of that. Glue and screw it to the bottom. Keep the glue away from the center slot so you don't glue your spacer in place.



Create a slot. Position a spacer up against the first sheet of plywood on the top layer, and glue and screw the other piece of plywood directly against the spacer.



T-bone. Use the bandsaw to cut out rectangles on two sides to form the T shape. The shape gives you more control holding and maneuvering the workpiece with the shaping jigs.

SQUARED AWAY

Much like squaring up a crosscut sled, you must square up the slot in the base to the disc for your work to be accurate.



Add a runner. To square up the base to the disc, you'll need to make a runner to fit the slot on the table of your sander. Make it a few inches longer than the base for now. Screw one side of the runner to the base.



Square the base to the disc. Insert the base into the slot, with only one side of the runner secured. Then adjust the opposite side until the slot is perfectly square to the disc face.

Clamp the loose side of the runner to the plywood base. Lift the whole assembly out and screw the runner in place.

Sanded circles

The circle-sanding jig is based on one I made years ago to sand the edge of a large, round kitchen table. It attached to my edge sander, and proved so useful I returned to the technique over and over. My edge sander was the victim of down-sizing my shop, but a run of small round tables led me to consider using my disc sander in the same way.

The bar that fits in the slot in the base needs to have a sliding fit. If it's tight, a thin shaving or two with a finely set handplane should do the trick.

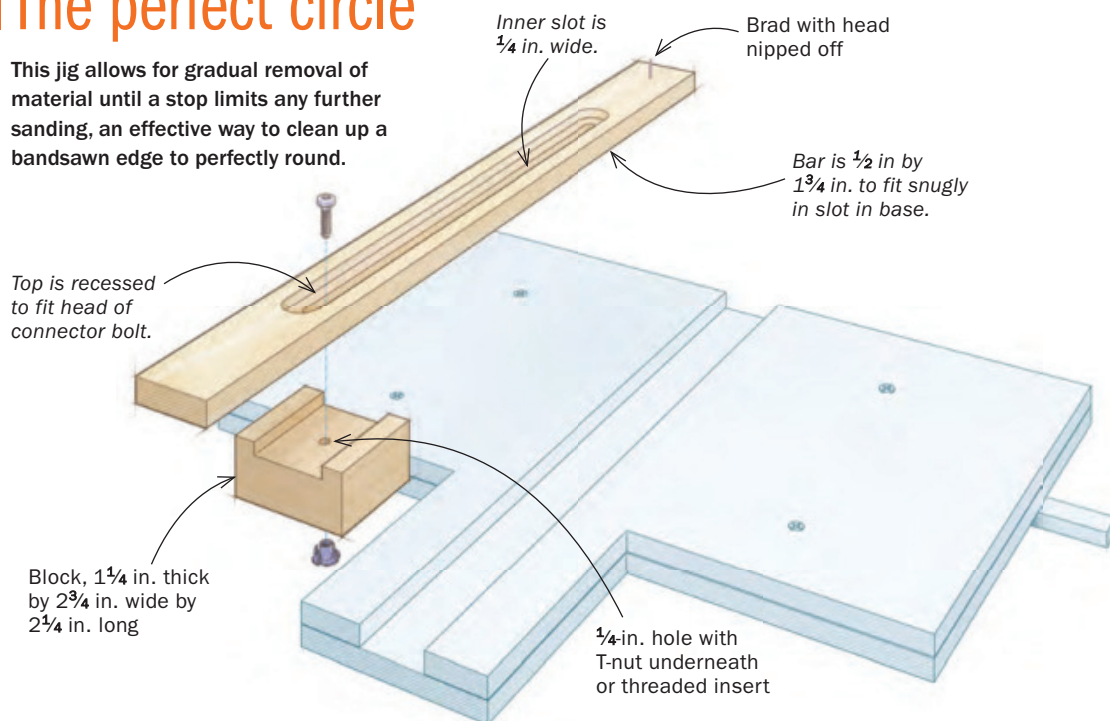
The bar gets a stepped slot for the bolt on the adjustable stop. Rout a slot down the center of the bar for the bolt's shank and a shallow slot counterbore for its head. Near one end of the bar, drill a slightly undersize hole for the brad that will be your pivot point. Pound the brad into the hole, nip off the head of the brad about $\frac{3}{8}$ in. above the bar, then file the end to a point.



Secure the runner. Once square and still in place at the disc sander, carefully clamp the unsecured end of the runner to the base. Now you can take the base off the sander and screw the clamped end to the base.

The perfect circle

This jig allows for gradual removal of material until a stop limits any further sanding, an effective way to clean up a bandsawn edge to perfectly round.



The stop is a block of wood with a $\frac{1}{4}$ -in.-deep dado, $1\frac{3}{4}$ in. wide (to fit the bar), and a $\frac{1}{4}$ -in. hole centered on the dado. For your safety, mill up a much longer piece of wood, and crosscut off the block once the dado has been cut and fitted to the bar. This will also give you more than one shot at getting the hole drilled on center. I counterbored the non-dadoed side of the block for a T-nut, then pounded that into place. A connector bolt, with its flat, wide head, works well for securing the stop block and won't be in the way of the workpiece when you're sanding.

To use the jig, insert the pivot point into the center of your bandsawn circle. Because the bar lifts right out of the slot,



Get centered. After bandsawing close to the line of the final shape, place the sharpened brad into the workpiece at the circle's center point. Then flip that assembly so the workpiece is on top, and fit the bar into the baseplate.



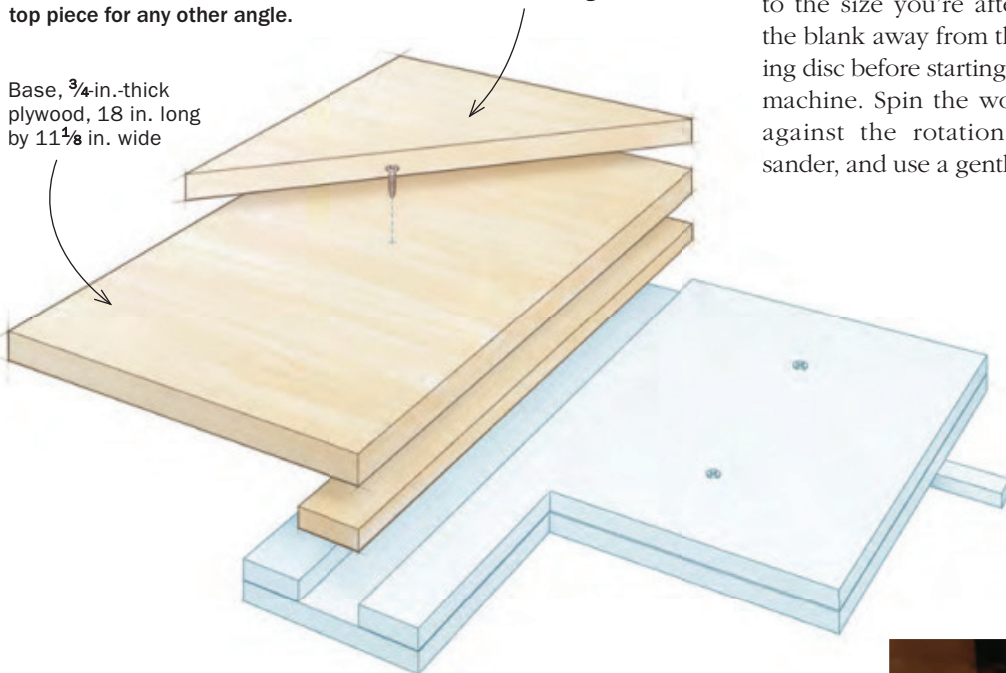
Adjust your stop and go. Set the stop so that you can skim off a little at a time, and reset it until the edge is as smooth as you desire.

Perfect ending

With this shooting jig, it's easy to zip ends to 45° or 90°. Add a different top piece for any other angle.

Base, ¾-in.-thick plywood, 18 in. long by 11½ in. wide

Top, ¾-in.-thick plywood, 11½ in. square, cut at 45° angle



this is an easy process. Then invert the blank and bar, fitting the bar back into the slot. Adjust the stop as needed to get to the size you're after. Back the blank away from the sanding disc before starting up your machine. Spin the workpiece against the rotation of the sander, and use a gentle touch.

Shooting jig

To make a shooting jig for the same base, screw a 1¾-in.-wide strip flush with the edge of a piece of ¾-in. plywood. For shooting 90° ends, the edge of this plywood will be the fence, and the strip will register it square to the sanding disc.

You can add a miter fence by screwing a second layer of plywood, cut to 45°, on top of the first layer. Once you've gotten your fences aligned, screw them down to the base. I didn't glue the plywood, so I could adjust it later if needed. □

Jeff Miller is a furniture maker and teacher in Chicago.



2:1 shooting jig. This jig is simply a piece of plywood with another 45° triangular piece of plywood screwed to it. Set the base in place, lay the jig on top, square it to the disc, and then screw it in place to keep it from shifting while you sand the ends of your work.

Polka Dot Box

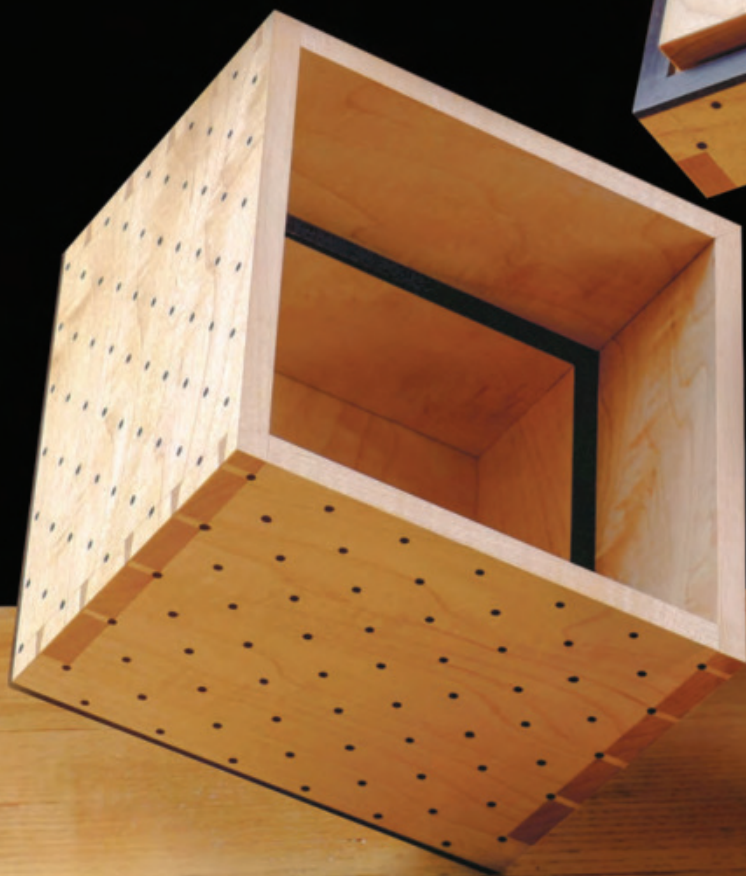
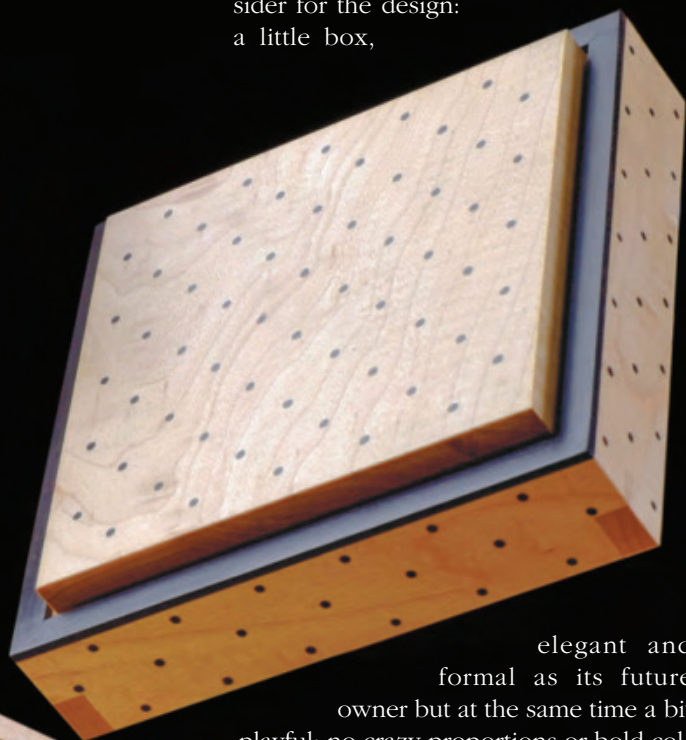
Elegant, small, and playful, this dovetailed box makes a perfect present

BY VASKO SOTIROV

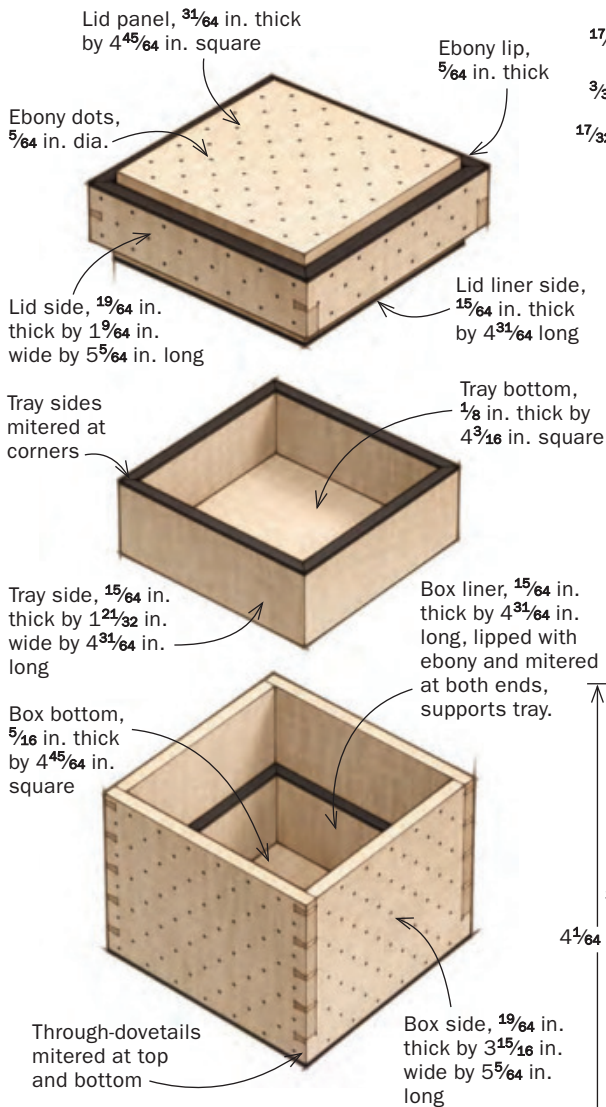
Recently I received a commission from a German gentleman for a little box he wanted to give as a surprise to his wife-to-be. No other details were added to his request. He liked my work and decided to give me carte blanche for everything. Exciting, but also very hard. It's always a challenge to design and build something that will be really meaningful to someone else; especially in this case, when I couldn't actually talk to the man's fiancée. But after a few video calls with her future husband, I grasped some important fulcrum points to consider for the design: a little box,

elegant and formal as its future owner but at the same time a bit playful; no crazy proportions or bold colors, just linear and rational, yet completely adorned with little circular dots; a polka dot pattern.

The box has mitered dovetails on the four corners and flat, proud panels on the top and bottom. It gets glued up as a closed cube and then sawn open near the top to separate the lid. There's a small removable tray inside that rests on a mitered lining. Another mitered lining, glued inside the lid, protrudes just enough to register the lid on the box. All the outside surfaces except for the bottom are inlaid with ebony dots arranged in a perfectly symmetrical pattern. I love repeating patterns. There's just something extremely pleasing about them. Maybe it's the sense of familiarity they give me, or just an obsession with the endless search for perfection.



LIDDED BOX IN MAPLE AND EBONY



Cubic containers. Sotirov's dovetailed maple box with ebony dots and detailing has a tray that slips inside.

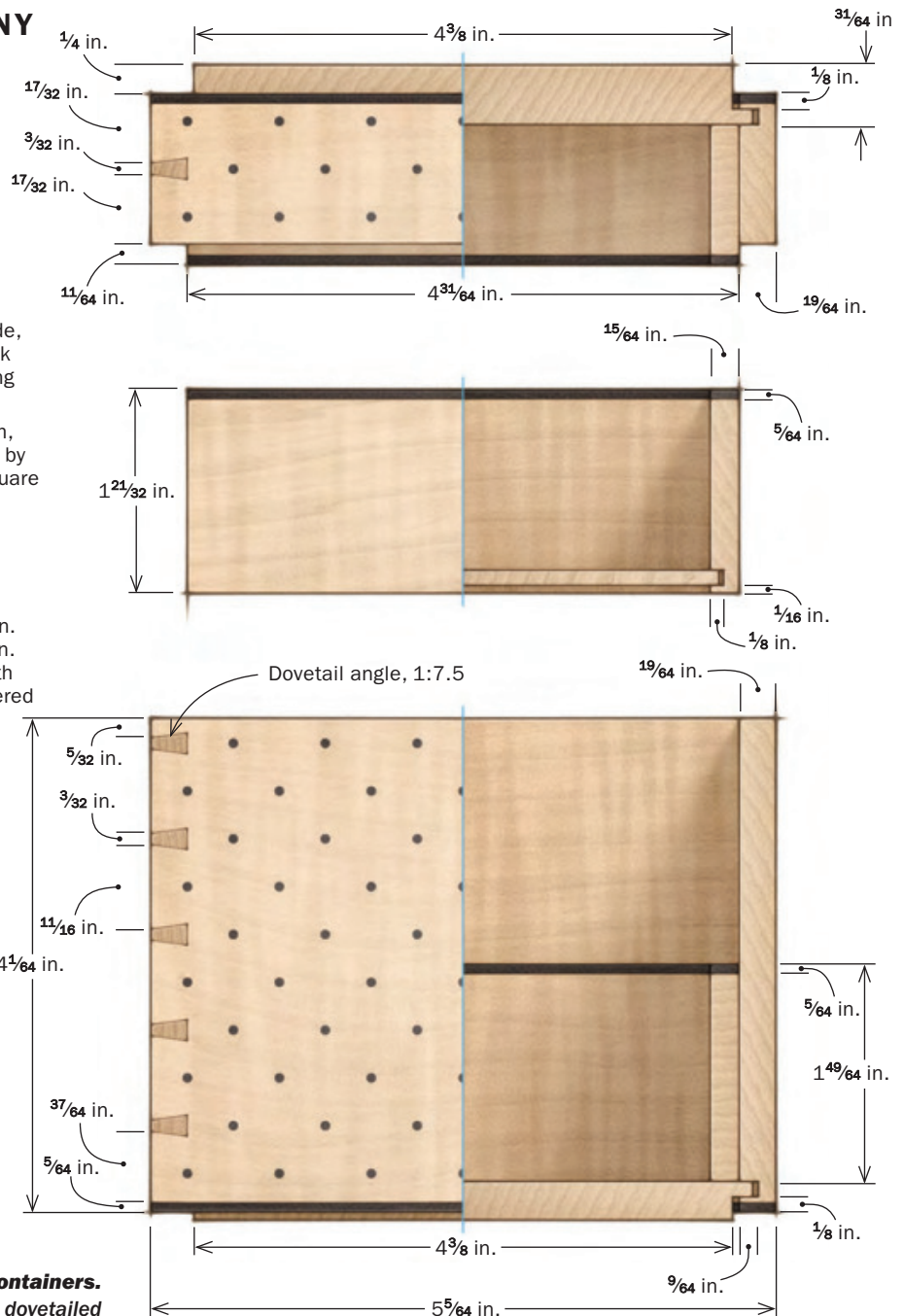
Just the right wood, just the right way

Let me tell you more about how the box was made. First step, as always, was the lumber selection. I wanted something classy that would produce a delightful contrast when dotted. In my wood storage I immediately spotted a piece of hard maple with a particular subtle figure that some people call angel step, the perfect match for my client and very well suited as a

canvas for the black dots of Gabon ebony. By resawing a single maple plank, cross-cutting the resulting boards in half, then turning their inner faces out, I got four sides with a seamless grain flow around the perimeter of the cube.

Never enough dovetails

I might be obsessed with dovetails. I love cutting them, I love looking at them, and

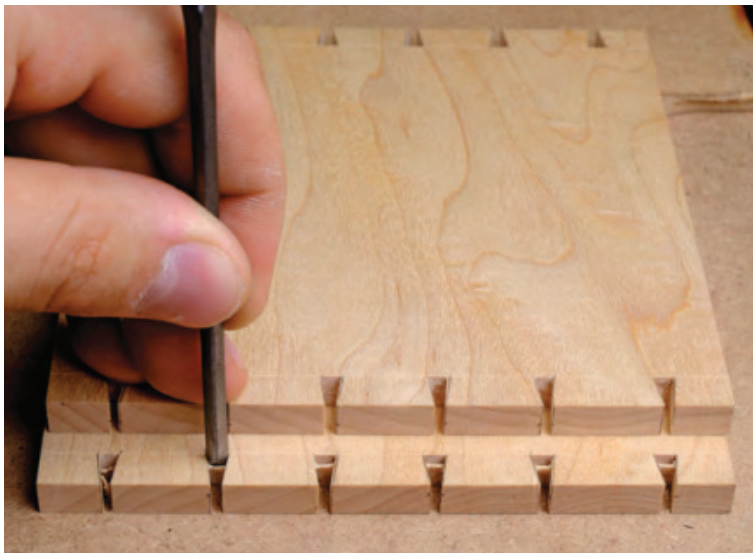


FRONT VIEW

The dimensions here were converted from the author's metric ones; you can find his original CAD drawings and metric dimensions at Finewoodworking.com/296.

● DOING MITERED DOVETAILS

Tails first. After laying out the tails with a pencil, Sotirov sawed to the lines, then cleaned up to the baseline with a chisel.



I love how versatile they are. In laying out these dovetails, I decided on five whole tails and mitered half tails at the ends. I added about $\frac{1}{8}$ in. to the width of the tails that were destined to be cut through during the lid separation to compensate for the wood lost to sawing and smoothing.

Mitering the ends of a dovetail joint adds a couple of steps but gives a more refined look to the whole piece. The steps for making this joint are the same as for cutting normal through-dovetails until just after the tails are cut and the pins are traced. When making the first and last pins, you have to make a cut with the sawblade tilted up at an angle of 45° —similar to the cuts you make with half-blind dovetails. After cutting this angled kerf, I remove the bulk of the waste with a cross-grain saw—



Miter the half tails. With all the tails cut, Sotirov makes a miter cut on the half tails. He slides a thin scrap into the socket to keep from cutting into the neighboring tail.



Miter cleanup. Sotirov smooths the sawn face of the miter with a chisel. A piece of MDF with one edge beveled at 45° supports his chisel and serves as a paring jig.



Paring the pins. Rather than sawing right to the knife lines that define his pins, Sotirov leaves some waste and pares to the lines in multiple slices. If the grain allows it, he pares vertically. If it doesn't, he pares horizontally. When he has pared to the scribe line, he slices along the base of the pin to sever the waste.

● ASSEMBLE THE BOX AND SAW IT APART



Ebony edging. After cutting and fitting the dovetails, Sotirov adds ebony lipping to the top and bottom edges of the box sides. He glues the ebony on slightly oversize, then trims it flush.



Glue up a closed container. The top and bottom panels, tongued around their edges, are slipped into grooves at glue-up, creating a closed cube.



Off with its lid. Holding a fine-toothed dozuki saw against a scrapwood fence, Sotirov begins the cut that will separate the lid from the body. He turns the box and resets the fence to cut each side in turn.



Install the liners. Once the box is sawn apart, Sotirov makes two mitered liners, one for the body of the box, to support the tray, another inside the lid, to register the lid to the body.

cut. Then I refine the miter with a chisel. When it comes to the tail board, there's no need to make the inclined kerf before mitering the first and last tails.

Assemble and separate

Well-fitted dovetail joints don't need to be clamped while drying, which means you can split the glue-up into less stressful subassemblies. I glued two of the box

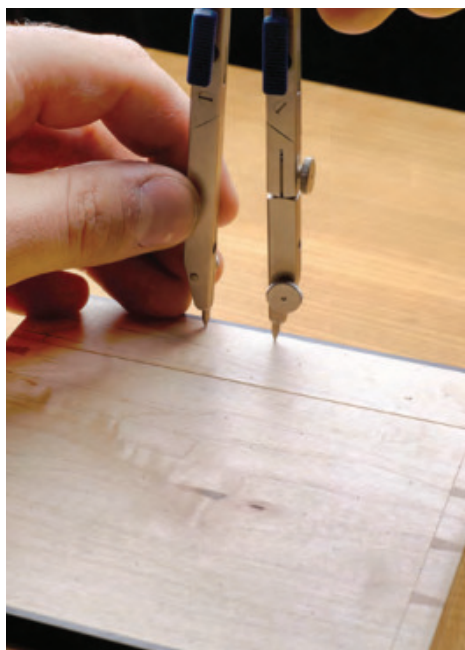
sides together, checked for square, and set them aside. Then I did the same with the other two. I did these glue-ups by clamping a pin board upright in a bench vise and tapping the tails with a hammer until they were seated. I used a pine caul to prevent marring the surface and getting glue on the hammer. Finally, I glued the two L-shaped assemblies together, capturing the top and bottom panels between them.

When it came to separating the lid from the body of the box, I could have used a bandsaw, tablesaw, or even a router, but I chose a handsaw. It doesn't take much longer on a small piece like this, and it gives me much more control. I used a very fine dozuki saw; not every handsaw is well-suited for this operation—if the tooth set is pronounced, the cut will not be straight.

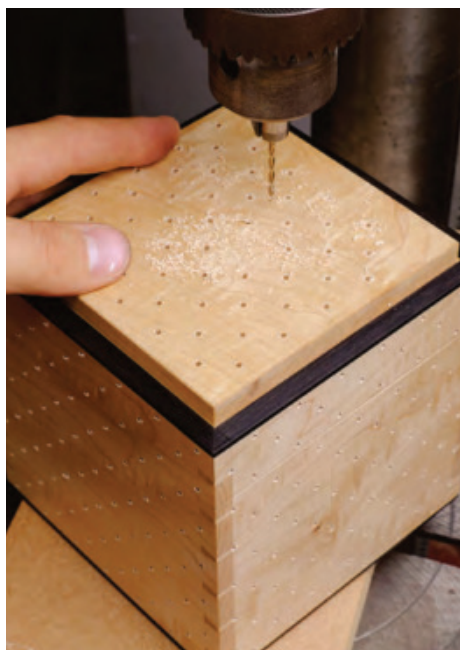
● INLAY THE DOTS



Parallel pencil lines. To start laying out the inlaid dots, Sotirov uses a marking gauge to draw a series of parallel lines on all four sides as well as the top of the box.

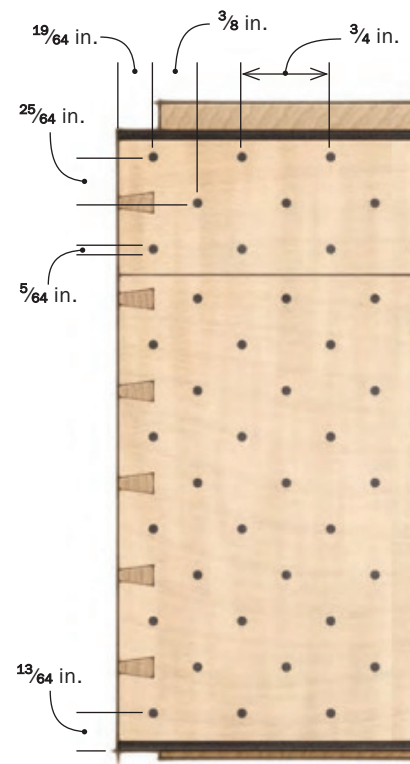


Step by step. With a pair of dividers, Sotirov makes a pinpoint along the pencil line for every dot.



Drilling all those dot mortises. With 400 holes to drill, Sotirov avoids mistakes by ignoring the number he has to do, focusing instead on drilling each hole perfectly.

DOT LAYOUT



Outfit the interior

After cleaning up the sawn edges with a block plane, it was time to add the inner linings, one in the body of the box and one in the lid. I milled the maple liner parts to size, lipped them with ebony, and finished them with shellac, masking off areas where glue would go. Then I fitted them, snugly adjusting their length on a miter shooting board. The ones in the lid are held in place with a small bead of glue, while the ones in the body are just dry-fitted. After the glue cures, the protruding part of the lid's liner can be planed or sanded slightly to adjust the fit of the lid.

Next, I made the small mitered tray that fits inside the box. Wanting to achieve a piston fit, I sized the tray sides so that they barely fit into the opening. To assemble the tray, I applied tape across the joints to act as hinges, added glue to the miters, and closed the sides around the bottom. I tightened a band clamp around the tray while the glue dried. Then I used a handplane to take a few shavings from each side, until the tray would glide slowly into place.

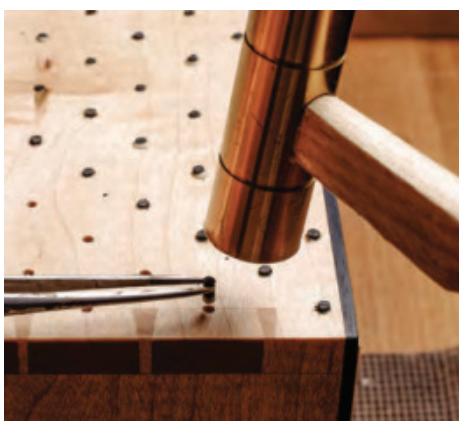
Dot matrix

With the box glued up and the lid separated and adjusted, I laid out the polka dot

Turn a dowel with a block plane. After milling up a square strip of ebony, Sotirov puts it in a planing jig—a piece of MDF with a V-groove and an end stop—and chamfers the four corners with a handplane. Then he chamfers the resulting eight corners.



Finishing the diminutive dowels. Repeated chamfering will get the ebony stick nearly round. Then Sotirov will finish the job by chucking it in his hand drill and spinning it against a sheet of sandpaper.



Microdots go in with tweezers. Sotirov crosscuts the dowel into short lengths with a fine-toothed handsaw, then inlays the dots with a drop of glue, a pinch of the tweezers, and a tap of the hammer.

pattern. A pencil marking gauge took care of horizontal lines and a pair of dividers marked centerpoints for the equally distanced dots. I used a brad-point bit in the drill press to bore the 400 holes for the little ebony dots.

I made the ebony dowels in a pretty odd way, but it worked out beautifully and was surprisingly quick. I first milled up some square ebony sticks. Then, in a scrap of MDF, I cut a shallow V-groove and put a little stop at the end. With an ebony stick in the V-groove, I used a block plane to chamfer one corner, then the other three. Then I chamfered the resulting eight corners, and the stick was nearly round. I used a caliper to check the diameter. When it was near to final size, I chucked the rod in my drill and spun it against a piece of 240-grit sandpaper. Now it really was round, and I cut the stick into small pins with a very fine crosscut saw.

I inlaid the ebony pins using a pair of tweezers and a little brass hammer. A dot of wood glue secured them. Finally, with a very sharp handplane, I planed the slightly proud ebony dots flush, producing some extremely interesting shavings. □

Vasko Sotirov works wood in Bergamo, Italy. See more of his work on Instagram @vaskosotirov.



Speckled shavings. Not wanting to risk rubbing ebony dust into the pores of the maple, Sotirov used a razor-sharp handplane to flush off the dots.





Mastering the Cylinder

Lock in the foundational skills of spindle turning

BY BETH IRELAND

I've always made a living as a woodworker. Before I started turning, in 1985, I made cabinets and furniture, and I taught myself to turn so I could put more curves into my work. When I discovered that this new work was also putting good money into my bank account, I began to specialize in turning—soon scores of balusters and newel posts were stacked in my shop. As I turned similar shapes again and again, I figured out how to turn with an economy of movement and an un-

derstanding of my tools that led to a clean finished product that was easily repeatable and needed little sanding. The foundation of it all was making a perfect cylinder.

Mounting the workpiece

There are many gadgets for finding the center of a turning blank. I use a cheap plastic type sold at most woodworking stores. Whatever you use, be sure to mark from all four corners; this will give you the exact center even if your blank is out

of square. You can also find the center by placing a straightedge corner to corner and marking an X. Once you've found the center points with a pencil, punch them with an awl, and put the blank between centers.

In the tailstock, which spins freely, I usually use a cone center. It meets the workpiece with a point, allowing me to turn a piece down to a small dimension. In the headstock, the drive center, I typically use a spring-loaded spur called a steb, which makes it easy to get pieces on and off the

Set up

MOUNT THE WORKPIECE

Nail the center point. After marking the center point, Ireland punches it with an awl (her awl's shopmade handle reveals her sculptural flair).



Drive center. In the lathe's headstock, Ireland uses a spring-loaded spur called a steb, which makes it easy to get the workpiece on and off the lathe.



Live center. Ireland uses a free-spinning cone center in the lathe's tailstock, tightening the workpiece by adjusting and locking the tailstock's quill.

ADJUST THE TOOL REST



Elevate to the midpoint. To set the height of the tool rest, lay the back of the gouge on the rest and hold the handle horizontal. Raise the rest until the cutting tip of the tool is dead center on the workpiece.



Parallel placement. Adjust the tool rest so its long edge is parallel with the workpiece and the gap between the two is $\frac{1}{8}$ in.

How to hold the tool

For clean, efficient turning, keep your arms, your torso, and the tool locked in a triangle, and advance the tool along the workpiece by moving your whole body laterally.

Connect the tool to your body.

Hold the gouge perpendicular to the workpiece with its handle against your side. As you look down, the tool, your arms, and your torso will form a triangle.



Guide the tool along the rest.

Ireland's left hand grips the shaft of the gouge. She keeps her index finger fully extended, and as it glides along, cradled in the cove of the tool rest, it keeps the tool's cutting edge moving parallel to the workpiece.



The tool travels as you shift your weight. Instead of standing still and moving your arms to advance the cut, keep your arms and the tool in their triangle and move your whole body. Ireland, who is right-handed, moves from left to right. Start with a wide, stable stance with your torso parallel to the lathe. Push off with your left foot and gradually shift your weight to your right.



lathe without having to jam the spurs into the wood. The steb holds the work without excessive pressure; too much pressure can cause a piece to flex, producing diagonal chatter marks on the wood.

The checklist

When I teach turning, I make sure my students run through a checklist before the machine goes on. After a while, these moves become automatic.

Set the lathe speed—In spindle turning, you want your workpiece to spin fast, but not so fast that it vibrates too much. Set the speed based on the size of the workpiece. For a blank 2 in. square by 12 in. long, you might set the machine for 1,800 rpm. For a blank 3 in. square by 27 in. long, you might spin it at 800 rpm. If your lathe has variable speed control, start with the dial at off and turn it up until you hit the point of vibration. If you change speeds by moving a belt, start at the slowest setting, check how smoothly that spins, and move to progressively faster settings until the blank is spinning fast, but still not vibrating too much. Many students turn with the lathe spinning way too slow. Experiment with speed and cutting until you find the sweet spot.

Adjust the tool rest—Set the height of the rest by placing your roughing gouge on it. Hold the tool parallel to the floor and adjust the tool rest height until the cutting edge of the gouge is at the center point of the workpiece. Lock the rest there. You might have to readjust for other tools.

Turn the cylinder



Set the speed. Whether with a variable speed dial or by changing a belt, gradually raise the speed until the blank is spinning fast but still not vibrating too much.



Find the bevel. After removing the corners, it will be easier to ride the bevel. Start with the handle low and raise it gradually to find the point where the bevel and the cutting edge are both contacting the work and the tool is slicing, not scraping.



Always readjust. As you remove material, periodically stop the lathe and reset the tool rest closer to the workpiece. A $\frac{1}{8}$ -in. gap is ideal.

Now stand over the tool rest and sight downward, adjusting the rest until its long edge is parallel with the machined edge of the bed. Then set the rest so it is about $\frac{1}{8}$ in. from the workpiece. Spin the blank a full rotation by hand to be sure it won't hit the rest when you switch on the lathe. It's important to maintain this $\frac{1}{8}$ -in. distance as you turn; as the size of the workpiece diminishes, you'll need to stop the lathe periodically to move the tool rest forward. The farther the tool rest is from the workpiece, the higher you have to lift the handle of the tool; this disengages the bevel and causes the cutting edge to scrape,



Come back for a final pass. With the cylinder nearly finished, Ireland rolls the gouge counterclockwise for a shearing cut and takes a light pass from right to left to achieve the final surface.

Now turn a taper

To taper a workpiece, apply all the elements of turning a cylinder, but with the tool rest set parallel to the intended taper.

Taper layout.

Wanting to taper one half of a cylindrical workpiece, Ireland marked the midpoint of the cylinder's length, then marked the small diameter of the taper on the end of the piece.



Story stick sets the tool rest. Set the end of the tool rest $\frac{1}{8}$ in. from the workpiece and mark the end of a stick with the distance between the tool rest and the layout line (above left). Then, at the center point, use the marking on the stick to set the angle of the tool rest.

instead of slice. Scraping is still a cut, but it doesn't leave a clean finish. I constantly readjust the rest as I work.

Cover your eyes—Always use eye protection! I wear a face shield when roughing, because chunks from the corners of the blank fly up toward your face and eyes. Glasses are not good enough.

After double-checking everything on the checklist, you're ready to turn.

Posture makes perfect

In turning, achieving consistent shapes and surface quality begins with connecting the tool to your body. You don't want your body stationary while the tool moves; you'll have way more control if you move your body, not your hands, to make the tool travel down the workpiece.

First place your feet in a wide, stable stance parallel to the bed of the lathe. Then place the gouge on the tool rest and anchor the handle of the gouge against your body. If you are right-handed this will be against your right side. Put your left hand beneath the shaft of the gouge with your index finger extended and lying in the cove of the tool rest. Wrap your left thumb around the top of the tool.



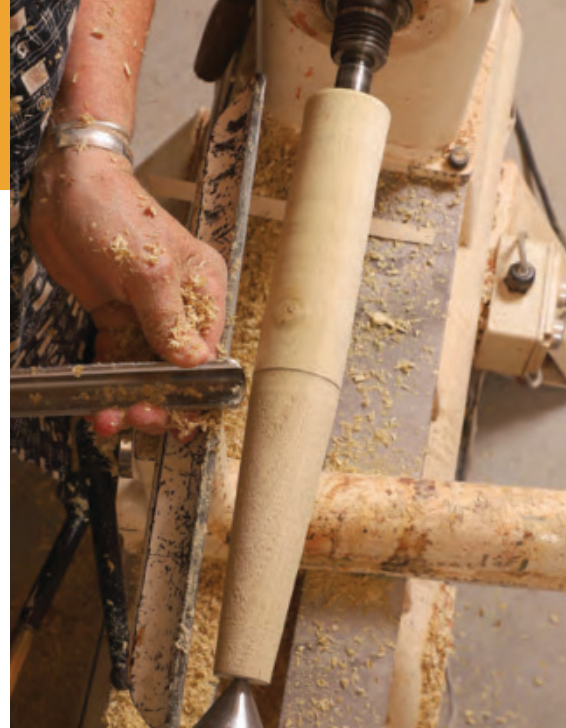
The tale of the taper. The angle of the tool rest will determine the angle of the taper. Set your stance with your torso parallel to the tool rest this time, rather than parallel to the lathe.



Start at the end. Using the same tool holding, posture, and body movement, begin cutting with shorter passes at the narrow end of the taper, and take progressively longer passes.



Long passes finish the taper. With the taper almost fully formed, Ireland begins a pass just shy of the workpiece's midpoint.



Don't mind the gap. When tapering, Ireland doesn't move the tool rest in as she goes. Turning with the tool extended produces a rougher surface but ensures the correct taper.

When you look down, your arms, the tool, and your torso will form a triangle. To move the tool, you don't move your hands; instead, keeping your index finger in full contact with the tool rest, push off with your left foot and shift your weight smoothly to your right. This moves the whole triangle. Your finger sliding along the tool rest keeps the cutting edge moving parallel to the spinning wood. Sway back and forth, feeding the gouge in a little with each pass. Keep the tool perpendicular to the workpiece as much as possible.

Bevel rider

"Ride the bevel" is the turner's chant, and it distills the most important advice for turning. Look at your tool and identify the cutting edge (sharpest part), the bevel (where the grind marks are) and the heel (where the bevel transitions into the body of the tool). As you turn, you want the tool to be at the position where the bevel and cutting edge are both touching the surface of the wood. This will be hard to judge until the piece is round. Remember that spindle turning is about delicacy, not muscle.

When you begin to rough out a blank, angle the handle of the gouge downward and use the heel of the tool like a metal finger to feel where the four corners are, so you don't go in too quickly and lose a chunk. Feel with the heel and lift the



Sandpaper cleanup. A sanding block and some 120-grit paper quickly smooths out any tears in the tapered surface.

handle up gently until you see the cut actually happen.

Find a good grind

The bevels you'll see on roughing gouges can vary quite a bit. The longer the bevel, the sharper your tool, but this is not always a good thing when roughing. A thin blade is a delicate blade and will break down quickly. Also, the longer the bevel, the farther downward you must move the gouge's handle to keep the bevel in contact with the wood. With the handle held

down low, you lose the space to fit your index finger beneath the tool on the rest. I grind a bevel that allows me to stand in a relaxed position with the gouge's handle neither too high nor too low. If you get the bevel, the stance, and the tool rest setting right, and keep your index finger running along the rest, you should end up with an almost perfect cylinder. □

Beth Ireland works wood in St. Petersburg, Fla., and teaches turning at the Center for Furniture Craftmanship in Maine.



Make Your Own Bench Brush

This one-day project has endless possibilities

BY ASPEN GOLANN

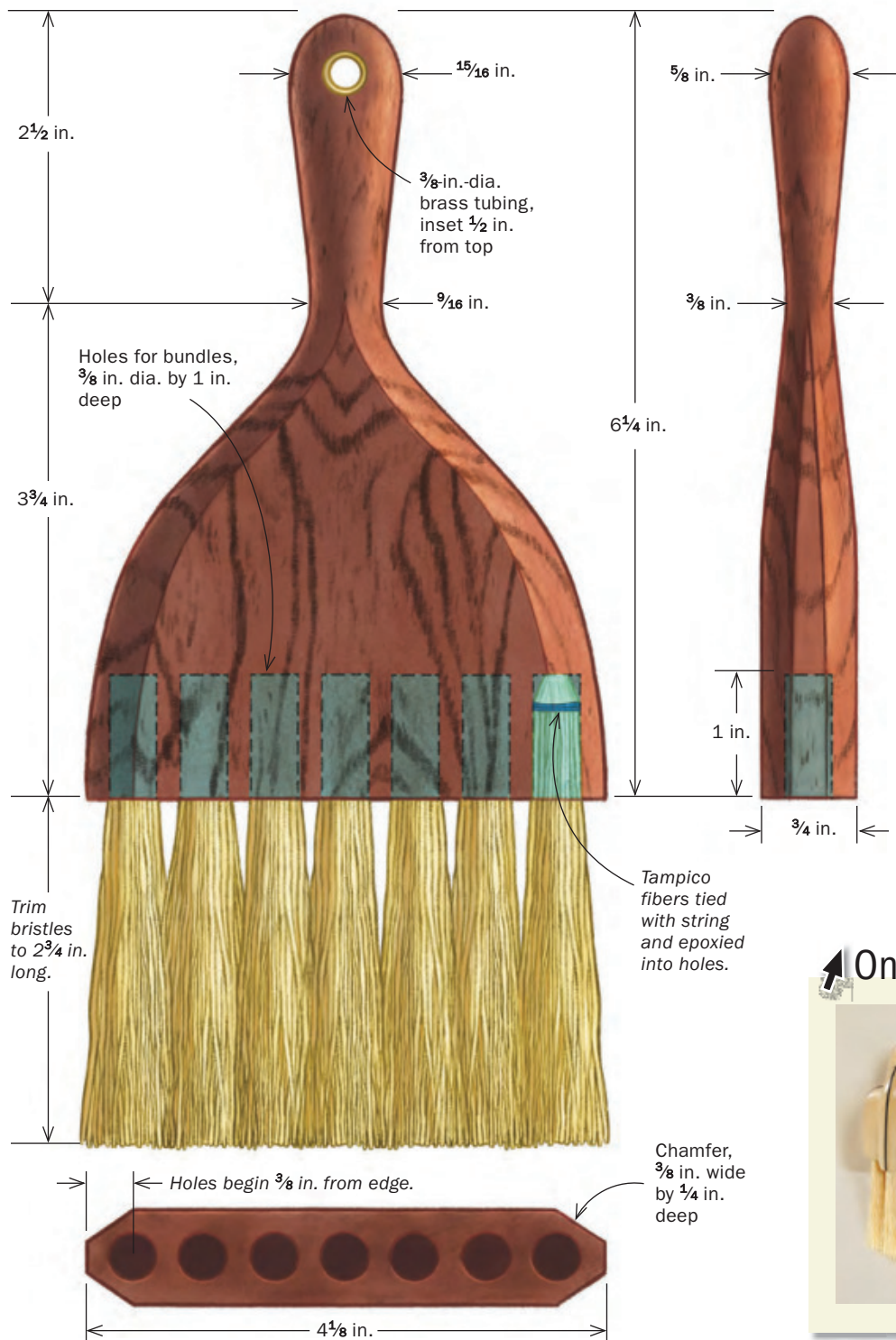
Like a good chair or table, a well-made brush is a blend of function and sculpture. Meant to just sweep away some dust or chips, brushes can be very simple. But, they are also a great way to explore new designs while practicing the decorative skills of a furniture maker—complex shaping, inlay, surface carving—but without the time investment of a chair or table. This particular bench brush was inspired by classic cabriole leg proportions, but the same process can be applied to making any brush your heart desires, from a one-off you keep by your bench to a run of experimental

brushes you make as the years go on. Regardless of which path you take, simple or experimental, they'll all keep your bench clean.

Shape the brush's outline

To get the shape just right, I make half-patterns for laying out the brush's face, edge, and bristle holes. When making a symmetrical workpiece I almost always opt for a half-pattern oriented across a centerline so opposing sides will match.

I bandsaw the handle profile, working outside the line to preserve it for the handwork that follows. Spokeshaves and half-round rasps



A SIMPLE DESIGN THAT FITS THE HAND

This brush uses the proportions and subtle shaping of traditional furniture, but its principles can serve contemporary takes, too.

SOURCE OF SUPPLY

Tampico fibers
Caddy Supply Co.
(caddysupply.com)



Online Extra



For Golann, brushes are a fun, productive, low-stakes way to test techniques and designs. Get inspired by some of her more bombastic and bizarre beauties at FineWoodworking.com/296.

are my favorite tools for fairing curves like these. I usually reach for a spokeshave to fair the brush profile, but a rasp also works if used carefully and at an angle. I often finish with a card scraper, especially around grain changes.

Drilling as considered as joinery

Once I've faired the outside profile, I lay out the holes with an awl to give the brad-point bit an assist when it bites into end grain. Brush bristles are installed as bundles, and the holes for them can range from 1/4 in. to 1/2 in. diameter. For Tampico bundles, like those

in this brush, 3/8 in. is the Goldilocks diameter. Drilling these holes at least 1 in. deep helps prevent messy squeeze-out, improves the glue joint, and hides the bundles' rough ends. Drill each bristle hole straight and square to the handle. Otherwise, you'll get a windswept brush, or worse, the bit could break through the side of the handle. At this point I also drill for the brass tube.

Add contours and chamfers

Once the holes are drilled, you can refine the handle. Start by tracing your edge template on both edges of the brush. In this stage,

Handle

CREATE THE PROFILE

Pencil the shape using a half-pattern. By using a half-pattern, you guarantee the handle is symmetrical across a centerline. Make sure the centerline is parallel to the blank's grain.



Cut out the handle. A bandsaw with a $\frac{1}{4}$ -in. blade makes quick work of the shape, but a coping saw will get the job done too. Either way, stay $\frac{1}{16}$ in. away from the line. You'll work back to it with hand tools.



you'll remove significant material from the neck of the brush and minimal (or none) from the base and the top. Work across the faces of the handle with a rasp and files until you reach the lines. I consistently use my forefinger and palm to check for even curves.

Next, I chamfer the handle. I start by drawing a layout line on each face of the brush. Using a pencil with my fingers as a gauge, I draw a line parallel to the curving edge and inset $\frac{3}{8}$ in. It goes from the bristle end up one side of the brush, around the top of the handle, and back down the other side. That defines one edge of the chamfer. To establish the other one, I divide the edge of the brush into thirds. I make two tick marks at the base, neck, and top of the handle. Then I connect those marks in an even, flowing line. I shape to those lines using the same tools as before.

I epoxy in the brass tube before fully rounding the top of the handle. I don't leave much extra brass; it's a pain to file or saw away.



Carefully refine the handle while working to the line. Golann uses a spokeshave, rasps, and files before ending with a card scraper. Between cuts, she runs the length of her forefinger along the surface to test for bumps or concavities.

BORE FOR THE BRISTLES

Drill the holes for the bundles. Triple-check the setup, since even a slight inaccuracy repeated across seven holes will be very noticeable—and unattractive. Also, these are deep holes, and you don't want to risk drilling through the side of the brush.



NO DRILL PRESS? USE MIRRORS AND SQUARES



To adapt this chairmaker's technique, secure the handle so its fiber end is parallel to the benchtop. Then set up two mirrors, one parallel to the handle and the other perpendicular to it, before placing a square in front of each. Position the drill bit so you can see both it and the squares in both mirrors without moving your body. As you drill, watch the mirrors to make sure the bit stays parallel to the squares.

ROUND AND CHAMFER

Shape the handle for a friendly fit. The edge pattern, like the face pattern, gets flipped and used for both sides to guarantee symmetry. With a rasp, shape across the face of the brush to the layout lines on the edge. You'll remove a lot of wood from the neck and little to no wood elsewhere. Use a finger to regularly check your progress. The handle should start to feel comfortable.



Before I insert the fibers, I apply finish, often shellac or Rubio Monocoat. If it seems strange to apply finish before you're actually finished, just think about how hard it would be to apply finish around fibers—no thanks! I even wax the handle now to make it easier to remove any potential epoxy squeeze-out.

Fiber bundles should be just right

I use Tampico fibers, which come from plants, for this brush because they have good stiffness and memory, meaning they respond to and remember any angle you bend them to. I bundle the fibers before installing them. To make the bundles, I use super-thin cyanoacrylate (CA) glue, sewing thread, and a simple tying jig, which for me is a piece of $\frac{3}{4}$ -in.-thick plywood about $2\frac{3}{4}$ in. wide by 11 in. long. This length lets me clamp it in the vise and work at shoulder height or sit in a chair while holding the jig between my knees. The width leaves plenty of room for tying, and lets the jig pull double-duty later when I use it as a paring guide to trim the fibers to length. Using the same bit I used for the handle, I drill 10 holes in the plywood, spacing them at least $\frac{3}{4}$ in. apart. I



Chamfer the handle's body. Start by laying out the chamfer in pencil on the handle's face and edge. Then shape to those lines. Golann cuts most of the chamfer with a spokeshave, sometimes switching to a rasp as she nears the line. She finishes with a card scraper.

FINISHING TOUCHES

Brass tube bolsters the hanging hole. Size the tube so it doesn't protrude too much from the wood, since it's much harder to shape. Epoxy it in place, and wait until the adhesive cures to finish rounding the handle.



Prefinish now to make life easier later. After rounding the handle's neck, add finish to the entire handle. Applying finish would be much trickier with the bristles in place.

Bristles

TIE THE BUNDLES

Run a loop of thread through the tying rack. Take a 3-ft. length of sewing thread, fold it in half, and feed the looped end through one of the holes in the jig. Drill these holes with the same bit you used for the bristle holes in the brush handle.



Put some Tampico fibers in the loop, bend them in half, and press them through the hole. You'll need to use some force to bend the fibers. The bundles should not be loose in the hole or extremely difficult to push through. Do not pull them, either, since that's likely to break the thread.



then lay out 10 equally sized piles of Tampico fiber. Ideally, since the bunches will be bent, each pile should compress to half the diameter of the hole, in this case $\frac{3}{16}$ in.

Even though this brush only calls for seven bundles, a few extra lets me choose the best for the brush and saves me in case I break one during the fitting. Because the Tampico source sells it only in 10-lb. packages, you'll have plenty of extra fiber even beyond these piles. I create the bundles using the steps laid out in the photos. You'll likely need to add or remove fibers from the stacks as you tie them, but you should have the size down before the end.

For gluing the bundles, I use super-thin CA glue because it wicks through the thread and into and among the fibers so well. Just don't overdo it, as too much CA glue can adhere the fibers to the jig or travel too far up the bundle, making it rigid and crusty.

Once the finish on the handle is dry, I test-fit the fibers. Using a utility knife, I taper the end of each bundle so it slides more easily into the hole. The CA glue will keep the bundle together even if you cut through the thread. I keep tapering if the bundle is still too big, and I'm not too disappointed if the bundle pops open; I tied extras. If the bundle is too small, I add some fibers



Wrap and glue. Use the remaining thread to tightly wrap the folded end of the bundle (left). Avoid creating a little thread bump that will prevent the bundle from fitting into the drilled hole. If you've wrapped tightly enough, there is no need to tie a knot; simply put three to five drops of super-thin cyanoacrylate (CA) glue directly on the thread (above).



Taper the end of the bundle. This will help with installation. Cutting into the threads here is OK, since the CA glue, not the thread, is now holding the fibers together.



Dab and spread epoxy into the holes with a toothpick. Golann likes epoxy here because it's waterproof, rigid, and fills the gap between the fiber and the walls of the hole. She uses a toothpick because it allows her to apply minimal epoxy, minimizing or preventing squeeze-out.



Add the bundles. Push the bundles into the holes very slowly while watching and listening for squeeze-out (left). It's very hard (maybe impossible) to get epoxy out of fibers, so try to avoid squeeze-out. Let the fibers set until the epoxy cures, then trim them to length (above). Scissors work well, but a wide bench chisel and a straightedge yields better results. The Tampico will dull the edge, so don't hesitate to sharpen as necessary.

evenly all around (so that the bundle stays round), wrap it with thread, and add a bit more glue.

When I have seven bundles that work, it's time for epoxy. I mix only enough for a few holes, encouraging me to take my time and be clean. Applying the epoxy with a toothpick helps too. Cleanly trim the fibers to length after the epoxy cures. I use the tying jig as a paring guide to chisel a perfect line every time. □

Aspen Golann is a FWW ambassador and leads The Chairmaker's Toolbox, a group seeking to increase access and equity in chairmaking.

DAVID SONTAG

Marietta, S.C.

David sourced the walnut in this cabinet from a tree on a nearby property. He saw the process through from sawn log to portable mill and finally to kiln-dried stock. He has always admired the work of James Krenov, and this interpretation is an homage to his standing cabinets. David incorporated curves in the base to highlight the quilted figure of the bubinga door panels.

WALNUT, BUBINGA, EBONY, 14D X 24W X 60H



GLENN CRUGER

Niwot, Colo.

Glenn completed this piece, inspired by Wendell Castle's "Alchemist Desk," in the Red Rocks Community College (RRCC) Fine Woodworking program. Part of the focus was to use brick-laying techniques. Torn between a design that left the brick-lay on the apron exposed and one that used a veneer for the aprons, he and instructor Jeremy Cox solved this dilemma by deciding to do both.

CHERRY, 22D X 22W X 24H

Photo: Natalie Statter



WAYNE DELYEA

Granbury, Texas

This piece Won "Best Texas Style Furniture" at the 2021 Texas Furniture Makers Show in Kerrville. Wayne lives near the Brazos River, whose full name is *Brazos De Dios*, or Arms of God. That name led him to take Michelangelo's fresco God's Creation of Adam, in the Sistine Chapel, as the inspiration for his marquetry. Inside the single drawer of the desk Wayne added a marquetry mockingbird, the state bird of Texas.

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FABIEN DUBRUNFAUT

Elkins Park, Pa.

After three decades running a high-end cabinetry business, Fabian changed gears and returned to his first love: designing and building fine furniture, especially chairs. This "X-armchair" is one in a series of upholstered pieces with challenging joinery, like the angled half lap of the back legs, and the box joints connecting the armrests to the front legs. The subtle tapers and softened edges are done almost entirely with a spokeshave.

WALNUT, LEATHER, 30D X 28W X 34H

Photos: John Carlano



Show your best work

For submission instructions and an entry form, go to FineWoodworking.com/rg.



ARAM SCHIFFMAN

Junction City, Ore.

Inspired by James Krenov, Aram built this cabinet on a stand to store his pocket knives. Incorporating as much handwork as possible was important to Aram, so he shaped the legs, dovetailed the drawers, made the pulls, and mitered the frame on top by hand.

SAPELE AND MAPLE
12½D X 19½W X 30W



BOB ROTTMANN

Palos Heights, Ill.

Bob has been woodworking for over 80 years, and he can prove it. He still has a piece he made, inscribed by his mother, dated two weeks before Pearl Harbor. He saw this wall-hung shelf in a restaurant, took a photo of it with a cell phone, and referenced the beer mugs on the shelves to get approximate dimensions. His bride of 63 years photographed the piece.

BLACK WALNUT, 10D X 43W X 35H

Photo: Mary Anne Rottmann

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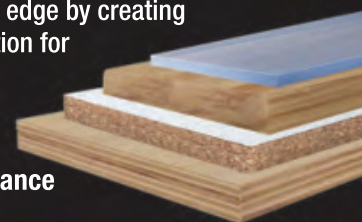


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ERIC HORTON

Winston Salem, N.C.

When Eric got his hands on wood from one of the cedar trees given by France to James Madison in 1824, he handcrafted a custom table with constitutional themes abounding. The top has solid copper inlay and 10 solid copper butterfly keys with an abbreviated amendment on each, representing the Bill of Rights. The panels below are solid copper hand acid-etched with scenes that depict the American Revolution, the Constitution, and all three branches of the federal government.

CEDAR, 42D X 88W X 30H

Photo: Jason Byers



PHILLIP KEEFE

Chicago, Ill.

The inspiration hit Phillip while walking through his sawyer's barn. He saw a badly checked, but beautiful, piece of American cherry and knew he could find the right design for it. As much as possible, he kept the original character of the board, riving it into two pieces and cleaning them with an ax. The top was then assembled using sliding dovetails for the shoulders and butterfly keys on top.

AMERICAN CHERRY, BLACK WALNUT, 12D X 25W X 25H

DAVID B. STRUNK

East Stroudsburg, Pa.

David made three cabinets for his wife and two daughters. The walnut came from Mountain Valley Farm in Hampton Township, N.J. When David acquired the wood it was already 50 years old, and he stored it for another 25 years, waiting for the right project. There are holes and discoloration on some of the drawer pulls from cut nails, but David left them as a reminder of the wood's history.

WALNUT AND CHESTNUT, 12D X 12W X 48H



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SAM PARKER

Lakewood, Calif.

Though Sam has been woodworking for a few years, this box marks the first time he made a drawer or cut half-blind dovetails. The walnut came from a tree cut down many years ago by his wife's grandfather on his northern California farm.

WALNUT AND RED OAK, 6D X 12W X 4½H



MICHAEL KEMLING

East Point, Ga.

Michael built this bedside cabinet while in the mastery program at the Northwest Woodworking Studio. His aim was to build a Mid-Century design using traditional joinery and techniques.

WHITE OAK, SHEDUA, AND WALNUT
14D X 16W X 28H



THOM MARCHIONNA

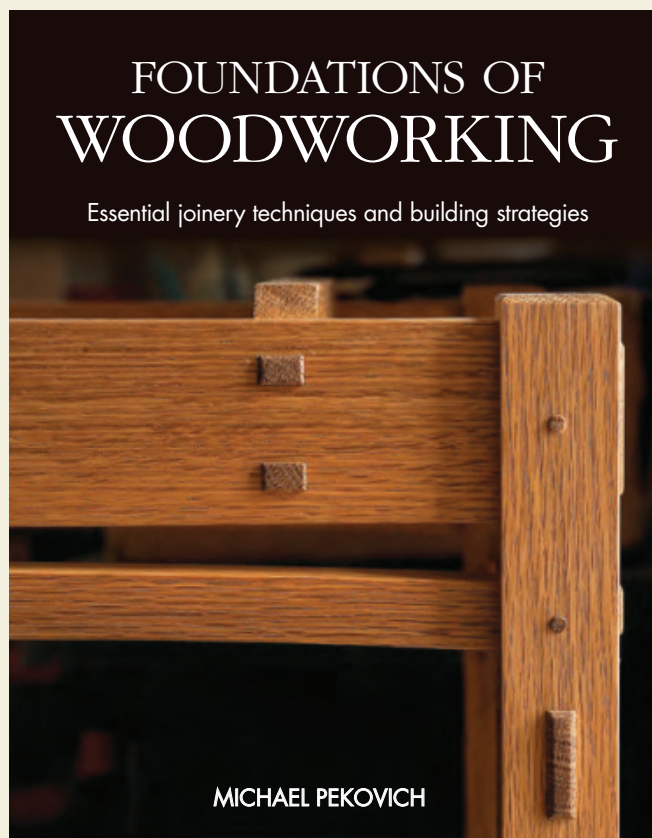
Bend, Ore.

Thom's client asked for something contemporary but timeless à la Mid-Century Danish, but with a "whimsical, musical quality." Thom says, "I called on my art history background and channeled Mondrian's "Broadway Boogie Woogie," employing the different grain patterns to create a rhythm."

WESTERN WALNUT, 18D X 46W X 15H



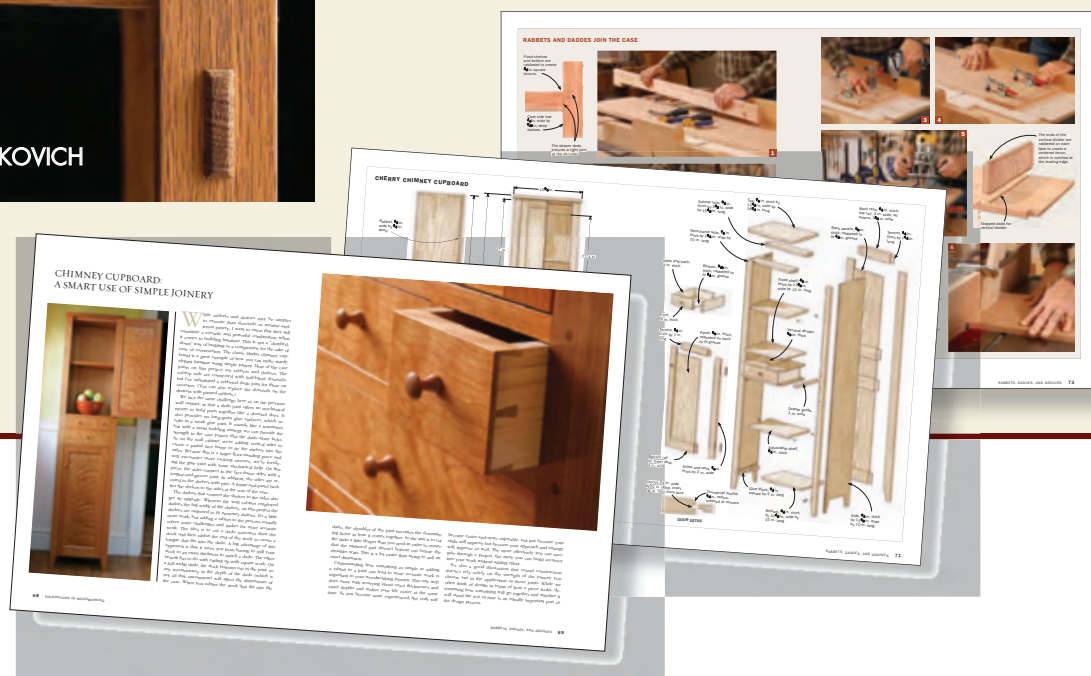
NEW FROM MICHAEL PEKOVICH



Foundations of Woodworking

gets to the very core of the craft of woodworking: laying out, cutting, and assembling joinery for furniture and other treasured wood objects. Michael Pekovich dives into a step-by-step, project-by-project description of the essential wood joints, from rabbets and dados through mortise-and-tenons to dovetails and miters. Master these joints and the door is open to create just about any design you can think of.

The book concludes with a selection of inspiring projects, including a wall cabinet, a chimney cupboard, an arched entry table, a desk divider, a dining chair, and many more.



Michael Pekovich's first book, *The Why & How of Woodworking*, was the woodworking event of the year when it was published in 2018. *Foundations of Woodworking* is sure to pick up where *Why & How* left off, inspiring and instructing thousands of woodworkers worldwide.

Available at TauntonStore.com or wherever books are sold

 **Taunton**

Clever jig for sanding ovals

BY JEFF MILLER

I first made a jig to create ovals in conjunction with my David Pye-inspired Fluting Engine (see the back cover of *FWW* #288). Pye wrote of using one, explaining that it was based on “an ancient turner’s chuck.” He then refers the reader to Charles Holtzapffel’s *Turning and Mechanical Manipulation* (1850). I followed him there.

My oval sanding jig operates much the same way as the circle jig in my article (pp. 44–49), and uses the same baseplate. The heart of the jig is a frame that the workpiece gets attached to. The frame slides along a beveled center bar and sits over a circular disc. As you turn the workpiece, the frame slides on the bar and circles the disc. The bar rotates around a centerpoint—the bolt that penetrates the whole jig. If the bolt is centered in the disc, the resulting workpiece will be round. But if you set the bolt so it is off-center in the disc, then the frame moves elliptically as it slides from side to side and travels around the disc, creating an oval workpiece. How far off center you set the central pivot determines the shape of the oval. It’s a pretty wild mechanism, but the results are miraculous. I have made a few of these jigs in various sizes. Feel free to experiment.

Building the jig

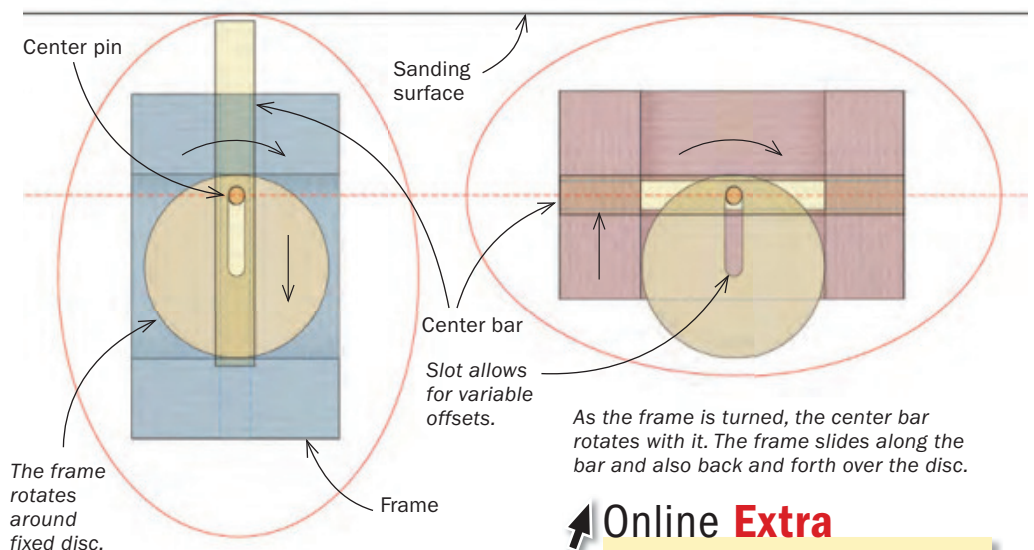
You can cut the disc out on the lathe, or with a fly cutter on the drill press. The fly cutter is more dangerous, so if you do it that way, clamp the blank to the drill-press table, and be sure to keep your hands clear of the cutter.

The frame that rides around the disc consists of two long sides, each with an



HOW IT WORKS

The workpiece is attached to a frame that slides along a center bar and rotates around an off-center disc. The amount of offset from the center pin determines the proportions of the oval.

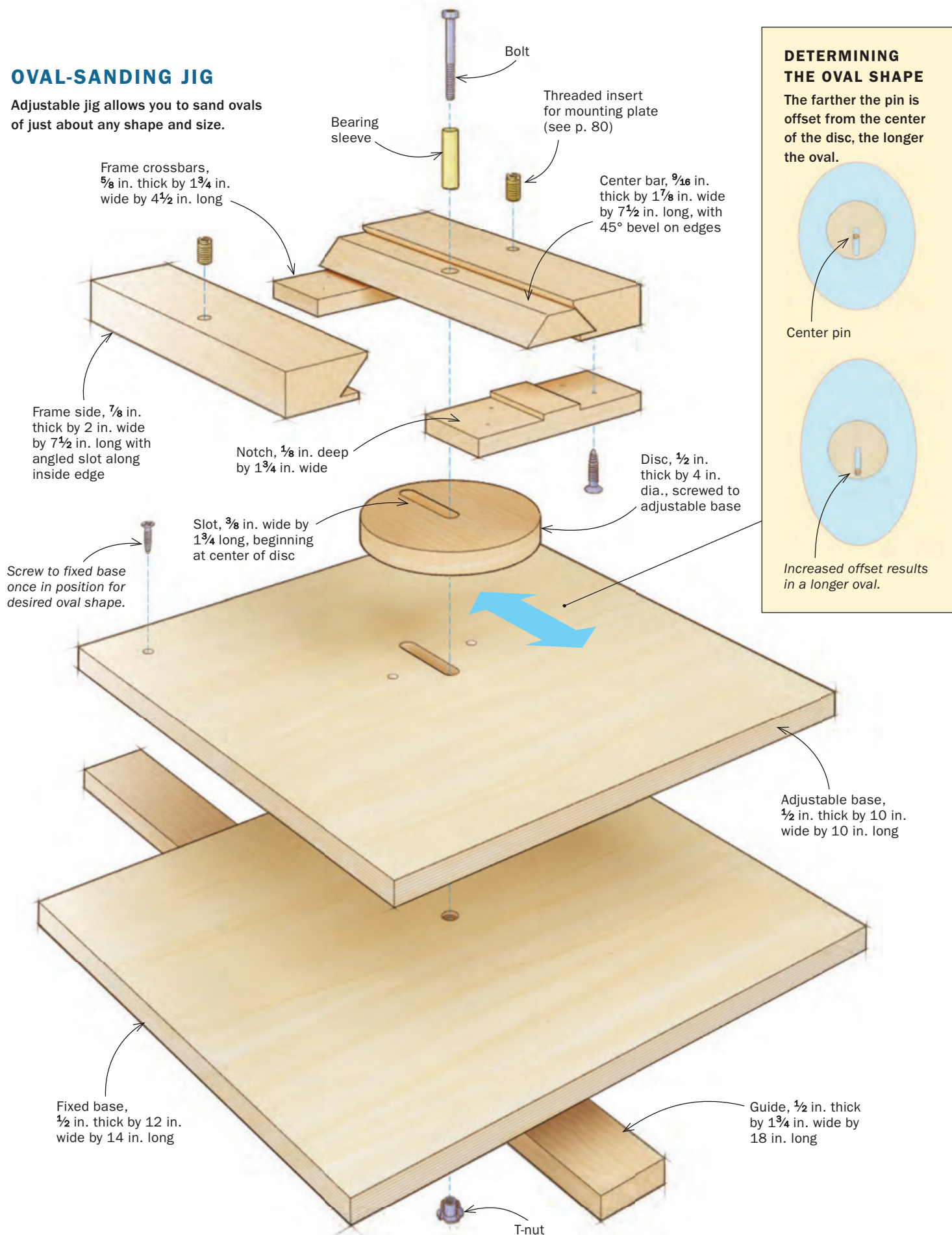


Online Extra

To see the oval sanding jig in action, go to FineWoodworking.com/296.

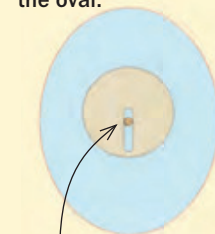
OVAL-SANDING JIG

Adjustable jig allows you to sand ovals of just about any shape and size.

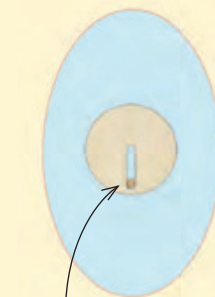


DETERMINING THE OVAL SHAPE

The farther the pin is offset from the center of the disc, the longer the oval.



Center pin



Increased offset results in a longer oval.

Assembling the jig

The frame slides along a central bar. The beveled sides of the bar are captured between angled slots in the frame sides.



Crossbars tie the frame together. Pinch the center bar between the frame sides and screw a crossbar to one end (right). Use the disc to position the second crossbar (far right). The frame should be snug to the disc but still able to rotate without too much effort.



Assemble the parts. Screw the adjustable base to the disc, then position the frame on the disc. Insert the bolt with its bearing sleeve through all the parts. It threads into a T-nut in the guide bar. The position of the adjustable base in relation to the fixed base will determine the shape of the oval.



angled slot cut into the inside edge. The beveled bar rides in those slots. Two shorter crossbars are screwed to the long sides to tie the frame together. The crossbars should be spaced so that the disc just fits between them.

To make these components work together, you'll add a few more parts. First, the adjustable base—a rectangle of plywood that you screw to the disc. Once the disc is attached, extend the center hole in the disc through the plywood. Then rout a slot through the base and the disc running parallel to the edge of the plywood. It should start at the center hole and end within $\frac{1}{4}$ in. of the edge of the disc.

Then there is the fixed base, a plywood rectangle with a hole for the bolt that holds the whole mechanism together. The bolt hole gets a shallow shoulder to accept the end of the bearing sleeve.

To change the shape of the oval you want to make, you'll slide the adjustable base and the disc one direction or the other, then screw them to

The background of the entire advertisement is a close-up, top-down view of a light-colored wooden workbench. In the upper left corner, there are several wood shavings and a piece of wood being worked on. In the upper right corner, a portion of a silver laptop is visible, showing the 'cmd' key and a trackpad. The main title 'FineWoodworking' is centered in the upper half, with 'UNLIMITED' in large orange letters below it.

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Putting the jig to use

Add a mounting plate. Screw or bolt on an oval mounting plate to the top of the frame. The shape of the oval will change based on the position of the center pin, so you'll need to make a fresh plate if you reset the offset distance. Hold a pencil over the blank while turning the jig to determine the oval shape.



Mount the workpiece. After cutting the workpiece to a rough oval, use double-sided tape to secure it to the mounting plate. Measure from each side of the plate to ensure that the workpiece is centered on the jig.



the fixed base to lock in the setting. The bolt also penetrates the bar beneath the baseplate; I recess a T-nut into the bar from below to receive the end of the bolt. Use some Loctite on the bolt to keep it from loosening as the jig is rotated.

To make it easier to determine the shape of the oval that will result from a given setting of the jig, I bolt a mounting plate to the top of the frame. If you rotate the jig while holding a pencil over an oversize plate, you get a rough drawing of the oval. The plate can be sawn out and then sanded to get the exact shape. Use the plate to lay out and trim your workpiece, which can then be attached to the plate with either screws or double-sided tape.

As always with a disc sander, use a light touch. □

Jeff Miller teaches and makes custom furniture in Chicago.



Get ready to sand. Add a clamp or a stop to the guide bar to limit the size of the finished oval. Use light pressure as you slowly feed the workpiece into the sander on the side of the disc rotating downward.



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The large green tool chest

BY DAVID E. MATUSZEK

My life as a woodworker began before I could tie my shoes. For as far back as I remember, I loved any time spent woodworking with my father. He didn't have many power tools, but as a child I was fascinated by his large, green 19th-century tool chest, filled with hand tools.

My father had just turned 60 when I was born. He was the son of Polish immigrants, orphaned at 13, and raised by his siblings. In the mid-1930s he trained to be a cabinetmaker, but the realities of the Depression and World War II interrupted this path.

That didn't stop his passion for woodworking, though. As a child, I'd dig through that large green chest in his small basement shop. "Dad, why is



I didn't know putting a twist drill in an antique bit brace would ruin the jaws or that you shouldn't use a hammer as a mallet. He was patient, probably more upset at himself than he was with me.

He would let me help with small tasks. When I grew older, I was encouraged to make my own projects out of whatever scrap we had lying around. When not in

previously, although I trained to be a machinist instead of a carpenter. The New Yankee Workshop started to take the Woodwright's place for my woodworking entertainment, and I saved up for more power tools—first a small drill press, then a better tablesaw, router, dovetail jigs, and so on. The large green tool chest saw less and less action. I worked my way through

emergency room. After weeks of recovery, I finished my project. But I was too nervous and jumpy around a tablesaw to use one safely.

I did miss making things, though. And once again it was my father who came to my aid, reminding me about the large green chest filled with hand tools.

As the years went by, I regained the confidence to use the tablesaw, but I never again neglected the hand tools in that chest. Shortly before my father passed away, at the age of 89, one of the last full conversations we had was about the joys of mixing power-tool and hand-tool woodworking.

Several years later, married and living in rural New Hampshire, I began pursuing woodworking and teaching woodworking semi-professionally. I am also a parent now and from the age of 2 my daughter has enjoyed "helping" in the shop.

I may not have any photographs of my father and me working together in his shop, but I have that green tool chest. Without that chest, which fascinated me so much as a child, and without the encouragement of my father, I would not be a woodworker.

David E. Matuszek blends power- and hand-tool woodworking in his shop in Lyndeborough, N.H.

As a child, I'd dig through the large green chest in his small basement shop. He would patiently explain what every tool was used for.

this plane so big?"

"It's a jointer plane, for straightening edges."

"What's this thing?"

"A router plane."

"What's this weird spinning screwdriver thing?"

"That's a Yankee Screwdriver ... I don't find them that useful."

I know I broke a few tools.

the workshop together, we both enjoyed watching The Woodwright's Shop on a black-and-white TV.

My father's health began to decline when I was a teenager and he spent less and less time in his workshop. I ended up going to the same trade high school as he had 60 years

college as a toolmaker and used woodworking to relax at night.

When I was 23, a near amputation on my tablesaw almost ended my interest in woodworking. My father, then in his early 80s, was the one who rendered first aid, turned off the saw after I ran upstairs bleeding, and got me to the

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Ash and Ice

If you intend to build furniture inspired by the forms and features of melting ice, one way to proceed is to obtain huge blocks of ice from a nearby fish warehouse, put them in an iron basin you build in your woodshop, and watch them turn to water.

Mette Bentzen and Lasse Kristensen, life and work partners in Elsinore, Denmark, who met building Hans Wegner chairs at the storied PP Mobler shop in Copenhagen, did just that. They watched, drew, and

photographed, learning all they could as the blocks shrank, and then began building a series of stack-laminated tables and stools in Danish ash, selecting stock that had been steamed to give it a ghostly whiteness. Depending on the size and shape, some of their pieces are monolithic, others hollow. All are shaped first with angle grinders

and power sanders, chisels, rasps, and files, before being extensively hand-sanded using an array of customized sanding blocks. The hand-sanding, Kristensen says, absorbs 70% of the time in

each piece, and is essential to attain the silky surfaces and clarified contours they seek in these

homages to Nordic winter in a

warming world

—Jonathan
Binzen

