TAUNTON'S

Fine WoodWorking

10 must-have layout tools, p. 24

Study antiques to avoid mistakes

Two block planes are better than one

Best waxes for woodworking

The art of turning a bowl

TOOL TEST

Track saws for woodworkers

Build a classic gate-leg table

August 2016 No. 255

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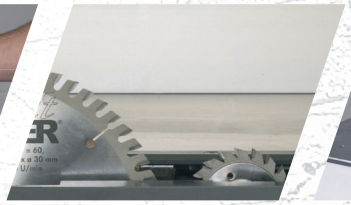
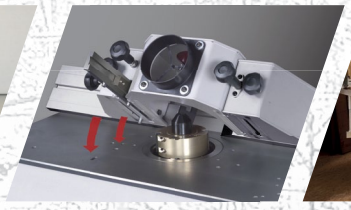


Scoring unit
Tear free cut for laminated workpieces



Multifine adjustment
Spindle fence 240 for max. Ø 9" tooling

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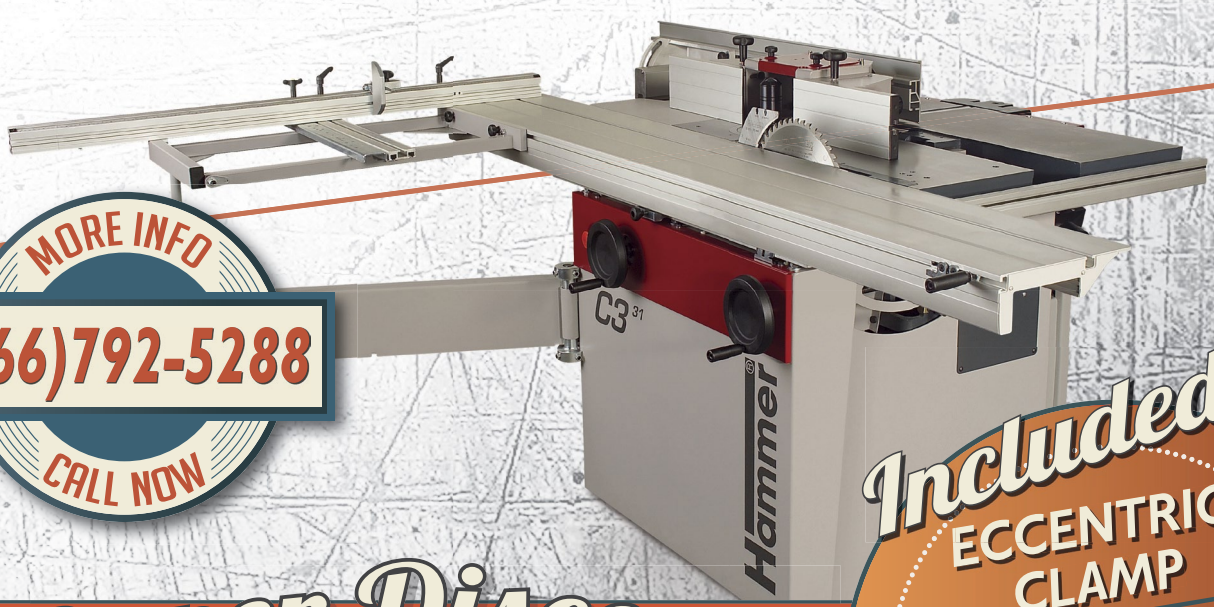

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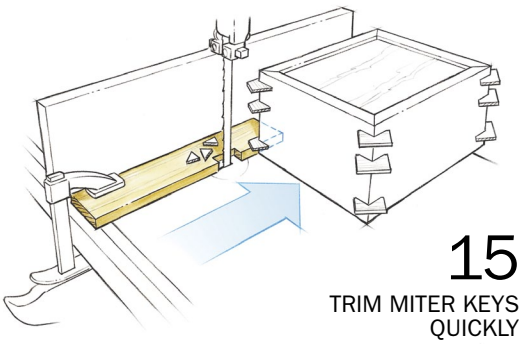

15 TRIM MITER KEYS QUICKLY

up front

20 NEW BACKSAW FROM SKELTON

features

The Taunton Press
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Cover photo: Michael Pekovich

in the back

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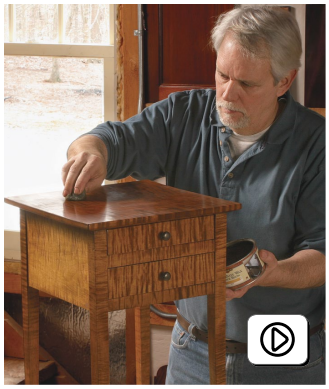
Visit our website to access free web tie-ins, available June 1. While you're there, don't miss our collection of free content, including tool reviews, an extensive project gallery, and must-read blogs.

Crosscut Table

Track saws (p. 38) are equally at home in the workshop and on the job site. Ben Strano shows how to build a table that will make the track saw your go-to tool for crosscutting panels that are too big for your tablesaw.



Wax on, Buff off

As a professional furniture finisher, Peter Gedrys is no stranger to using wax. In this video, Gedrys demonstrates how he uses wax to take his finishes to the next level, mixing clear furniture wax with dry pigments and artist's oil colors to create decorative finishes, manmade patinas, and color-matched protective finishes for furniture.

Behind the Design

Furniture maker Duncan Gowdy (p. 22) walks you through his design process—from inspiration to sketching, scale mockups, full-size mockups, and finally the finished piece.

Does Your Tape Measure Up?

Tape measures have a hook at the end that moves in and out to compensate for inside and outside measurements (p. 25). However, after years of constant use, the holes wear out and can move 1⁄16 in. or more. In this Drawing Board video, you'll learn how to make sure that your tape measure is still reliable.

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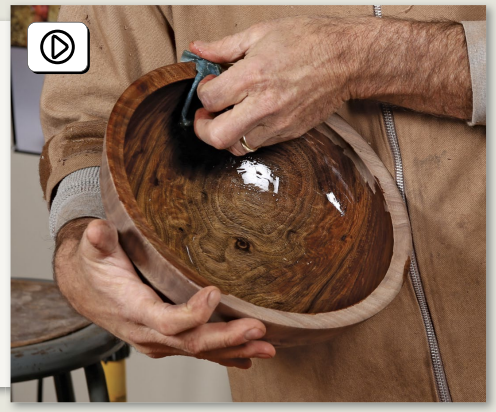
VIDEO WORKSHOP

Wood Turning Basics

Learn how to transform your firewood pile into gorgeous works of art. Mike Mahoney (p. 66) offers insights on the tools you'll need and walks you through five projects, including:

- Conventional and natural-edged bowls
- A lidded box that demonstrates end-grain turning techniques
- A memorial urn with lessons on threaded lids



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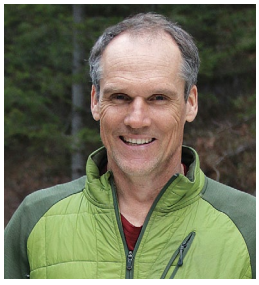
contributors

A professional wood turner since 1992, Mike Mahoney (“Turn a Bowl”) specializes in utilitarian pieces, without any embellishments, which gives them a very traditional feel while incorporating contemporary ideas. “I am passionate about my craft and the American Craft movement. For my work to be admired is one thing, but for my work to be used fulfills my purpose as a craftsman.” When he isn’t teaching or turning, he can be found tending the pistachio and walnut crops on his northern California farm or leading hikes through the Sierra Nevadas. Here he is next to a giant Valley Oak near his house.

Longtime contributing editor **Steve Latta** (“Learn from Antiques”) never seems to rest. He makes contemporary and traditional furniture, teaches woodworking at Thaddeus Stevens College and Millersville University in Lancaster County, Pa., and lectures throughout the country. Working with Lie-Nielsen Toolworks, he also helped to develop an innovative set of inlay tools, and a few years ago he found time to complete a master’s degree. Instead of slowing down, Latta is now working on rehabbing a local centuries-old Quaker meeting house.



Mark Edmundson (“Tool Test: Track Saws”) enjoys a lot of variety in his life these days. When he isn’t building furniture, cabinets, and the occasional “hard-to explain” project, he is racing to keep up with his kids—on skis, skateboards, and mountain bikes. Living in a remote part of northern Idaho, Edmundson embraces self-reliance. He built his kids a huge skate park, and often builds them skis and snowboards, too. To celebrate his 50th birthday, he says he is hoping to swim in 50 different lakes, “since doing 50 pull-ups appears to be impossible.”

Michael Robbins (“Marriage of Metal and Wood”), who works in a converted garment mill in the small town of Philmont, N.Y., found his way into furniture making from landscape photography. He worked in that field until the digital wave broke and he found less and less opportunity to use his traditional film-based skills. “I had no interest in working at a computer,” he says. Soon he was learning to build houses and eventually he applied his new skills to furniture making. Woodworking, he says, offers “a physical connection to something that isn’t fleeting.”

For more information on our contributors, go to FineWoodworking.com/authors.

We are a reader-written magazine. To learn how to propose an article, go to FineWoodworking.com/submissions.

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letters

Spotlight

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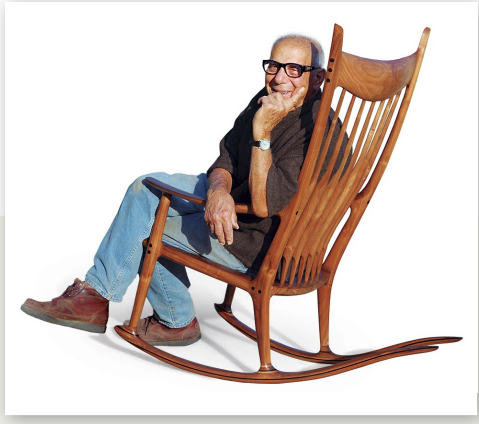

CHANCE ENCOUNTER

It was with a smile and affectionate warmth that I read the article by Sam Maloof in the Looking Back segment of the April 2016 edition of *Fine Woodworking*. It gave me a chance to reminisce about an encounter I had with Sam back in 2008.

After a decade working in the film industry in Los Angeles, I was preparing to move back to New England. With just a few days left and me not knowing when I might be back to California, I seized the opportunity to take a tour of Sam's home and gallery at the Sam and Alfreda Maloof Foundation in Alta Loma.

As I joined a tour alongside a small group of visitors, the docent informed us that Sam was on the premises for the day. He went on to ask that we please not approach or bother Sam if we did see him as he was entertaining guests and should be left undisturbed.

After an amazing tour of the interior spaces and exterior landscape, I found myself not quite ready to leave the premises. I lingered outside admiring a garden gate that featured Sam's organically carved handiwork. As I crouched down, camera poised, a voice from behind me asked, "Ah, do you like that?" I turned, stood up, and found myself face to face with the furniture rock star. His demeanor was hardly that of a celebrity, though. We engaged in conversation, and it was immediately clear what a humble, soft spoken, down-to-earth person he was.

I spent the next 30 minutes on a personal tour with the master himself. Sam led me through his home, showing me a chronological history of his work. Then, he showed me the first piece he ever made for his wife, Alfreda. I commented that he must have made a lot of things for her. He paused for just a moment, and with a wistful glance out the window, said "I made everything for her."

We made our way back outside, and Sam said to write to him when I could. A few months went by before I wrote Sam a letter, and I was a bit disheartened that I hadn't received a reply, until I read of Sam's passing. I hardly knew him at all, of course, with just that short time between us, but he exuded such charm and benevolence. He put me at ease and made me feel like I had just popped in on an old friend that I hadn't seen in a while.

—DOUG SCOTT, Hopkinton, Mass.

Chain hoist for a shop

My shop was published in a past issue of *Tools and Shops* ("A Shop Inspired by School Memories," *FWW* #167). It was built in 2004, and was designed with an I-beam down the center with the intention of installing a chain hoist that runs the length of the main room.

About a year ago I finally installed the chain hoist, which was rather inexpensive. It has turned out to be indispensable for some tasks, largely because I build fairly large furniture projects and never have a helper.

It is outstanding for furniture photography (below), as manipulating a backdrop underneath a heavy piece of furniture is difficult at the least for a single person. But it also has miscellaneous uses, particularly for elevating items onto the centrally located tablesaw top.

—MARK BELLONBY, Mason Neck, Va.

Dowelmax responds to letter writer

With respect to the letter to the editor headed "Router Lift?" (*FWW* #253, April 2016), the comments of the writer are both dismissive and disparaging to Dowelmax. Therefore I feel compelled to respond.

We are a very small company and our competitors are large corporations. In our opinion, these corporations do not have a monopoly or license over the word "lift" and if dealing in semantics, the convoluted crank system in actual fact "raises" the router, whereas our system actually "lifts" the router.

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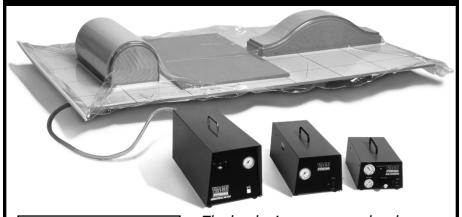

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I am an engineer and have been designing and building furniture for more than 40 years. After testing both systems I was disappointed with the crank system, so now it gathers dust. My preference is the ease and convenience of our own router-lift system.

—JIM LINDSAY, President, Dowelmax

In praise of bench puppies

Your bench puppies article ("These Puppies Have Bite," *FWW* #253) and project was a great idea and works well. One caveat I'd suggest for those who haven't made them yet, but plan to, is to be aware that your benchdog holes may be angled slightly (I angled mine at about 2°). I also made them at opposing angles from the tail vise to the bench itself. I failed to remember that and had to do a little fancy work with the bandsaw, chisel, and float. Once I did that, the puppies worked extremely well.

—JON WHITNEY, Thomson, Ill.

The bench puppies have been a wonderful addition to my amateur shop. They are tremendously useful.

I offer two additional bits of information on making them. It wasn't intuitively obvious to me that the angle at the dogleg is perpendicular to the line drawn in step 2. To save others some math pain, the length of the body to the angle is 3¼ in. on top and 5 in. on the bottom. Secondly, in use, the glue joint between the body and the heel is subjected to substantial shear stress, so I added two #8 screws to that joint. Thanks to you and to Mr. Coleman for a useful article.

—GLEN MOYER, The Villages, Fla.

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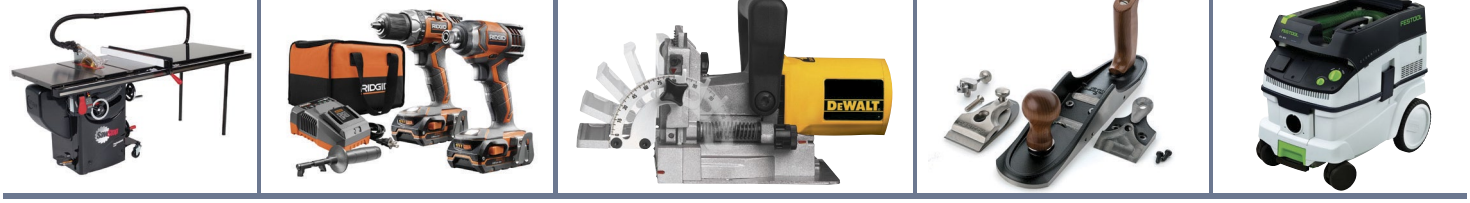

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workshop tips

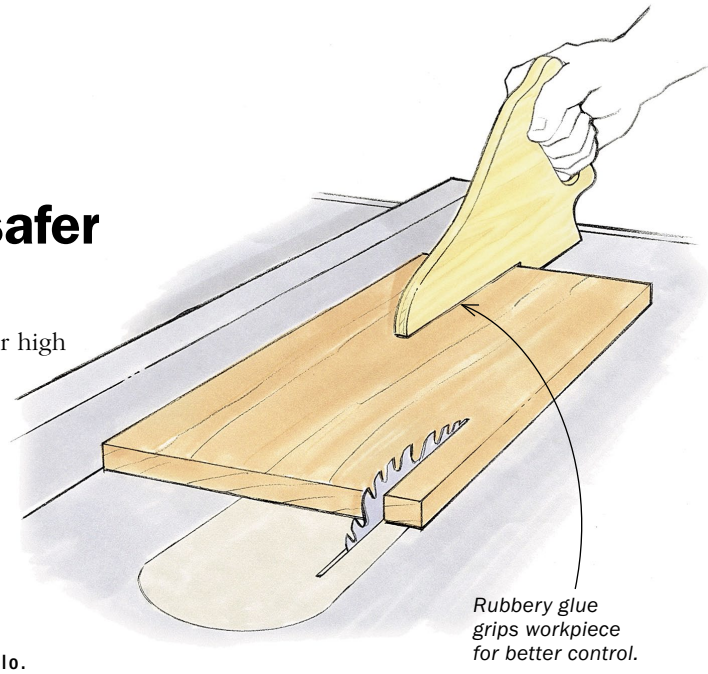
Best Tip

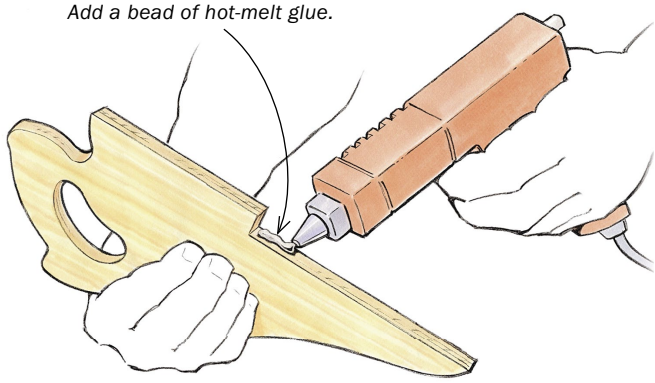
As a kid, Luke Richard spent many nights in his father's basement workshop, "making anything I could imagine." When he took some furniture-design classes in college, he knew he wanted to teach woodworking. Now a high school shop teacher, he says, "The best part is to see the pride students have when they finish a project."

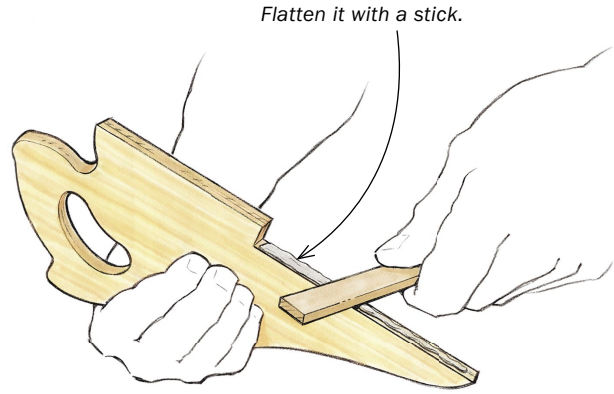
Make your push stick safer with hot-melt glue

Recently, I found a way to make the tablesaw in our high school woodshop safer with a better push stick. To give the bottom edge more grip, just add some hot glue. I run a thick bead along the lower edge and then immediately flatten it by running a stick over it. It gives you much better control over the workpiece. After a month or two of daily use, you'll notice that the glue doesn't grip as well. But if you run a heat gun or torch over the glue and remelt it, it will be as good as new.

—LUKE RICHARD, Lamar, Colo.



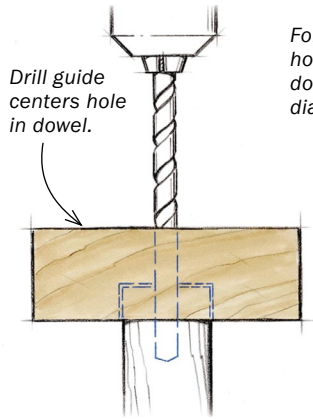


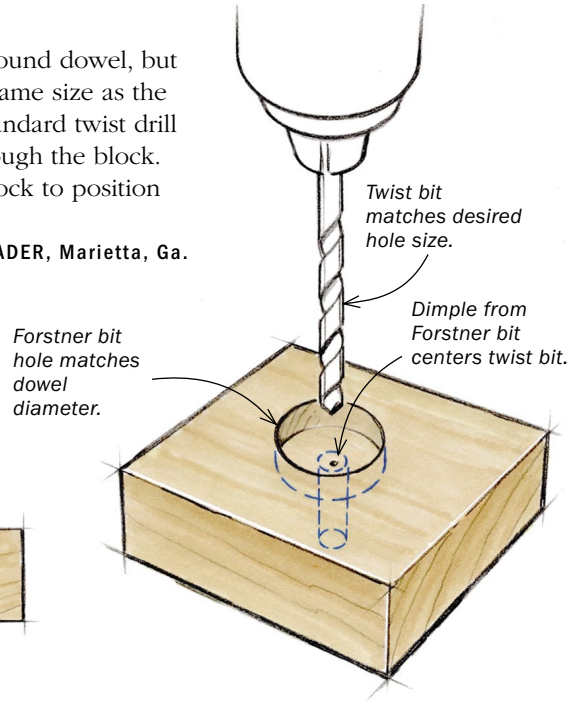


Center a hole in any dowel

It is difficult to drill a perfectly centered hole in the end of a round dowel, but this drill guide solves the problem. Choose a Forstner bit the same size as the dowel and drill partway through a small block. Then, use a standard twist drill the size of the hole you want and drill the rest of the way through the block. To use the jig, clamp the dowel in a vise and use the guide block to position the drill for a perfectly centered hole.

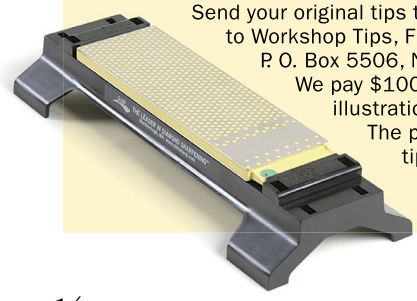
—GARY FADER, Marietta, Ga.





A Reward for the Best Tip

Send your original tips to fwtips@taunton.com or to Workshop Tips, Fine Woodworking, P. O. Box 5506, Newtown, CT 06470. We pay $100 for a published tip with illustration; $50 for one without. The prize for this issue's best tip was a DMT DuoSharp sharpener with base.

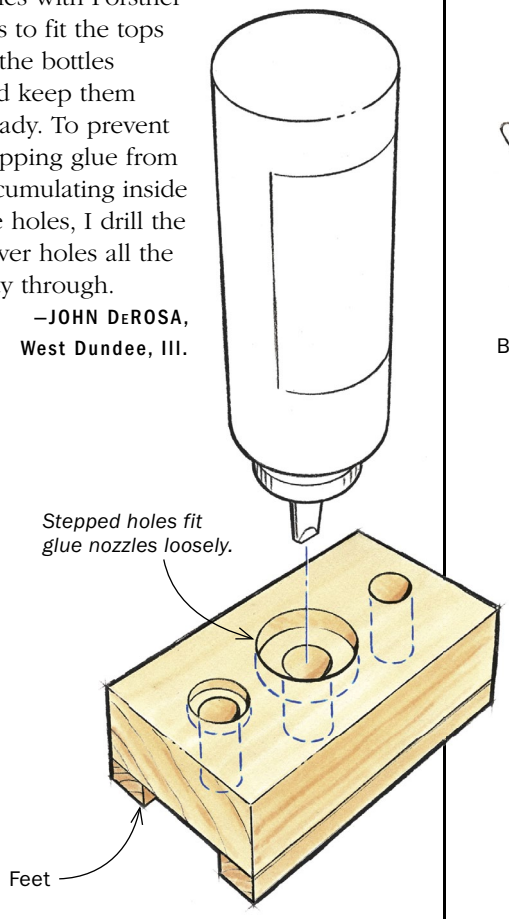


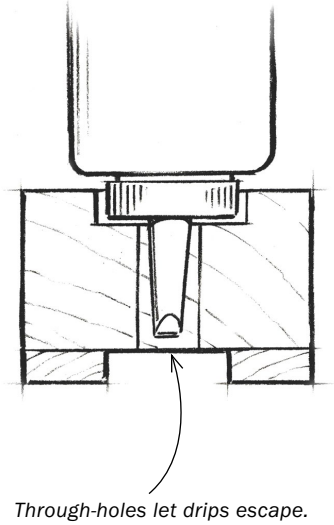
Drawings: Dan Thornton

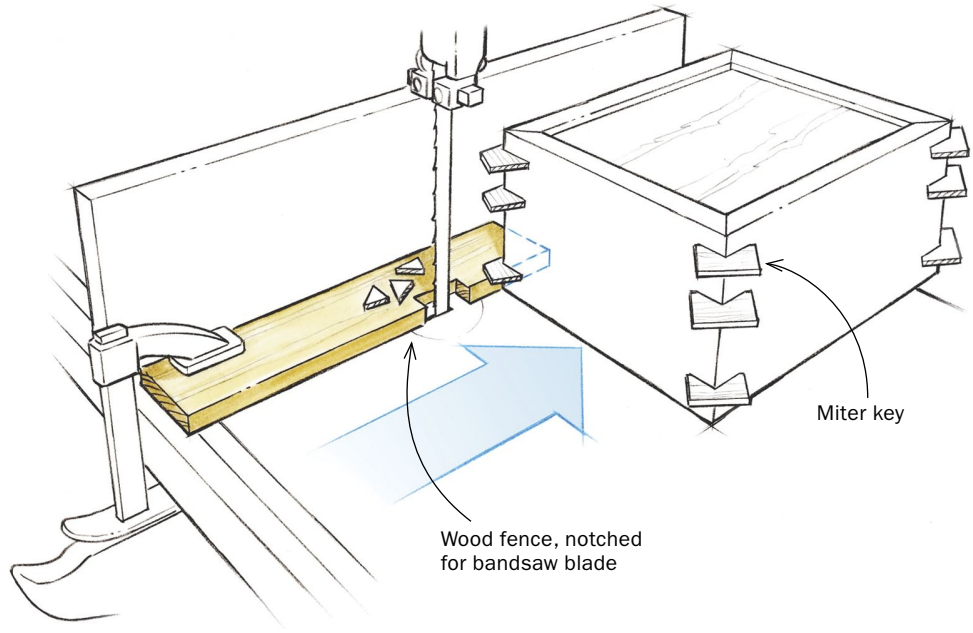
Holder for glue bottles

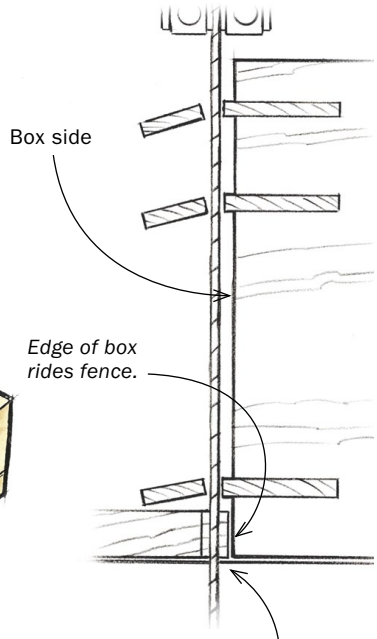
When I reach for my glue bottle, I don't like having to shake it and wait for the glue to drip down to the tip. So I keep the bottles inverted and ready for fast use in this simple stand, made from a few pieces of scrap with a couple of feet. I cut the stepped holes with Forstner bits to fit the tops of the bottles and keep them steady. To prevent dripping glue from accumulating inside the holes, I drill the lower holes all the way through.

—JOHN DEROSA,
West Dundee, Ill.









Trim miter keys quickly

I often make boxes with miter joints reinforced by small splines, or keys. After glue-up, while trimming the keys, I sometimes got a little careless with my Japanese saw and scratched the side of the box. My solution was this bandsaw fence, which I use to trim the keys quickly with no danger to the box, leaving just a bit to be trimmed with a block plane.

The fence is a piece of scrap thin enough to fit under the lowest key on the box, with a notch cut into it for the bandsaw blade. I clamp it to the bandsaw table, against the bandsaw fence, so that the outer edge of the wood fence is just clear of the side of the blade. Run all four sides of the box against the fence, and the job is done. Be sure to save the fence for next time.

—JOHN BATES, Tampa, Fla.

CELEBRATING 40 YEARS

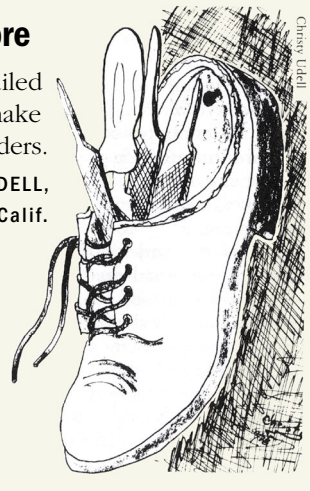
Classic Tip

To mark *FWW*'s 40th anniversary year, we are presenting some classic tips. This one, from *FWW* #15, shows how inventive our readers can be.

Less is more

Old shoes nailed to the wall make great file holders.

—CHRISTY UDELL,
Santa Rosa, Calif.



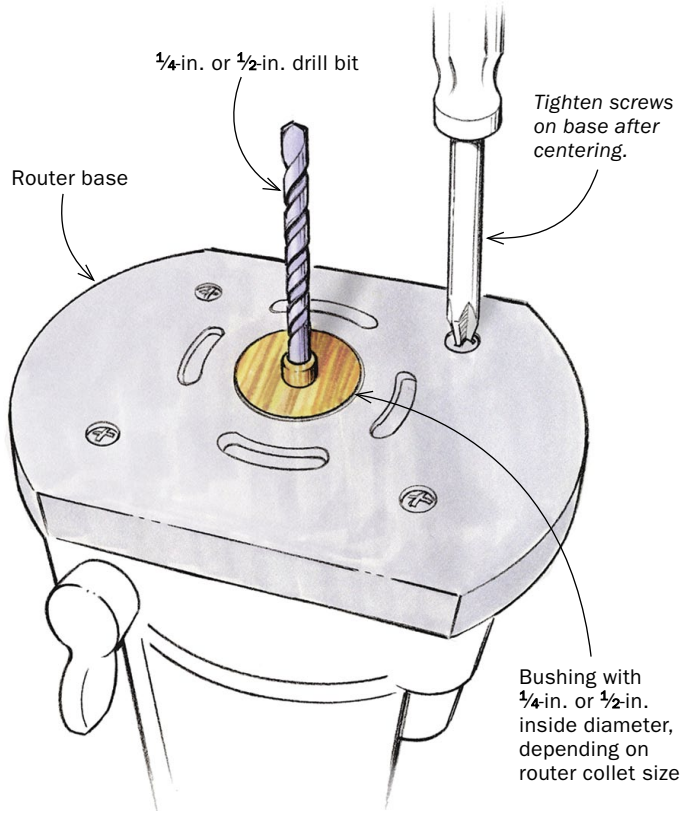
Use a drill bit to line up a router bushing

On many routers, it's hard to be sure template guides (also called router bushings) are perfectly concentric with the bit. And if the bushing isn't centered, it can lead to serious inaccuracies when routing. There are accessories available for lining up bushings, but I found a great solution using a common drill bit.

Depending on the design of your router, you'll need to loosen either the router-base mounting screws or the screws that mount the bushing holder. For my smaller router, which has a ¼-in.-dia. collet, I then install a router bushing with a ¼-in. inside diameter, and slide a ¼-in. drill bit (with a ¼-in.-dia. shank) through the bushing and into the collet, making sure the shank sticks through the bushing. Then I just tighten the collet, tighten the mounting screws, and the bushing is perfectly centered. At that point I can use that bushing or insert another, and know it is centered.

For a full-size router with a ½-in.-dia. collet, you'll need a bushing with a ½-in. inside diameter, and a drill bit with a ½-in.-dia. shank.

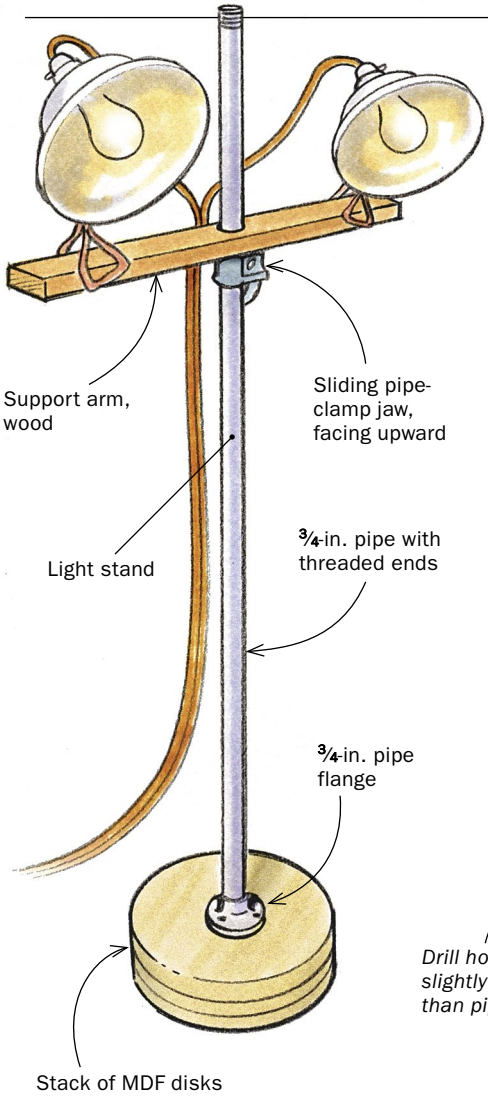
—ROBERT GUNN, Mississauga, Ont., Canada

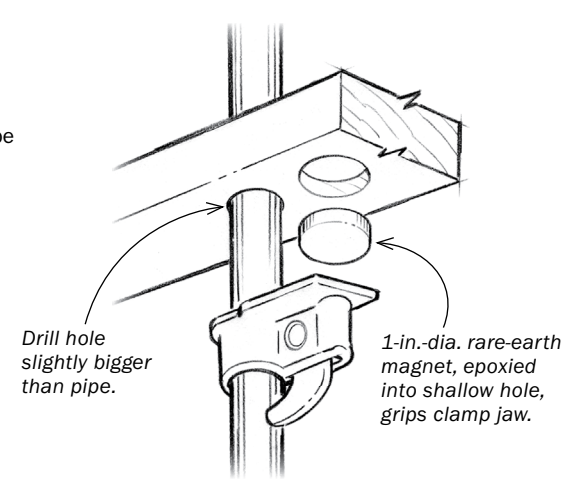


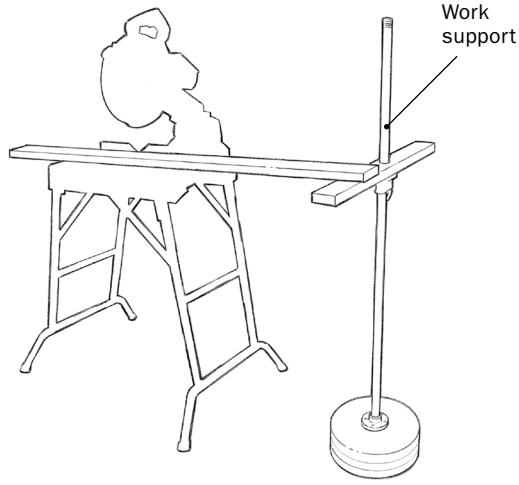
Turn pipe clamps into support stands

When my pipe clamps aren't working as clamps, they double as versatile shop stands. To create a broad, stable base, I glue up a stack of 12-in.-dia. disks of ¾-in.-thick MDF and screw a ¾-in. pipe flange to the top. I then remove the fixed jaw from the pipe and screw the end into the flange, with the sliding jaw facing upward. To make the cross arms, I drill a 1⅛-in.-dia. hole through the middle of a board for the pipe, and a shallow 1-in. hole next to it for flush-mounting a 1-in.-dia. rare-earth magnet. This powerful magnet grabs the adjustable clamp jaw firmly, keeping the arm level. This setup lets me easily raise, lower, and pivot the cross arm to the optimum height for the job at hand. I use the stand to support the ends of long boards at my drill press or miter saw. I also use it to hold work lights, as well as a dust-collection hose at my lathe, drill press, and workbench. You can add more than one cross arm, so one stand can hold multiple items, which saves space in a small shop.

—BOB MITCHELL, Madison, Wis.







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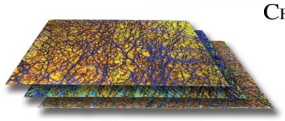

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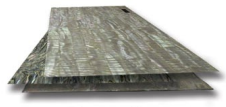

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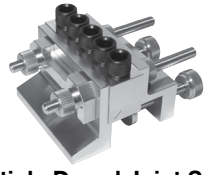

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MACHINES

Compact collector devours dust and chips

ONEIDA'S LATEST DUST COLLECTOR is the mobile Mini-Gorilla cyclone that's designed to be connected to one machine at a time. Its small footprint (30 in. by 36 in.) is great for home shops, and its low height (63 in.) and swiveling, lockable 3-in. rubber casters make it stable and mobile. The 15-ft. power cord means you won't need an extension cord. Just add a short 5-in. or 4-in. flexible hose and a quick disconnect and you're ready to go.

I hooked up the Mini-Gorilla to the 16-in. jointer in the *Fine Woodworking* shop and aggressively jointed a 10-in.-wide white pine board. It had no trouble keeping up with the big chips that were coming at it fast and furiously. I also used it with a 13-in. benchtop planer. Again, it performed flawlessly. In addition to the cyclone separator, there is a HEPA-rated filter, which means it can trap 99.97% of particles down to 0.3 microns in size.

Dust collectors can be messy to empty and clean, but this one makes the job neat and fast. The dust level in the 36-in.-dia. clear bag can be seen through the window in the cover. Cleaning the filter is a breeze, too. Simply connect a shop vacuum to a port at the bottom of the filter, reverse-blow the filter pleats from the outside with compressed air, and the shop vacuum captures the dust.

I have tested a lot of dust collectors and I really like this one. With all of its features, it leaves nothing to be desired.

—Bill Peck is Fine Woodworking*'s shop manager.*

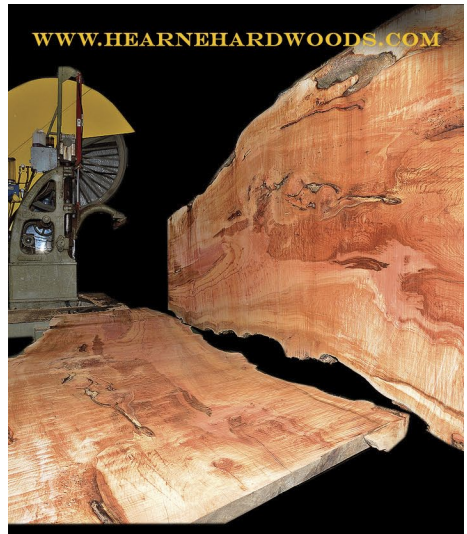
Mobile dust collector by Oneida

Model: Mini Gorilla
$1,049

Big appetite for dust. *White pine tends to generate big chips, which can challenge a dust collector. But the Mini-Gorilla had no trouble with the chips thrown its way by a 10-in.-wide board, even when taking heavy passes with a big jointer (above) and a planer (left).*

No mess, no fuss. *Unlock three latches and the dust bin drops down onto swiveling casters, making it easy to move out from the frame to empty. Emptying the bag of chips is no harder and no dirtier than taking out the kitchen trash.*

Photos: staff



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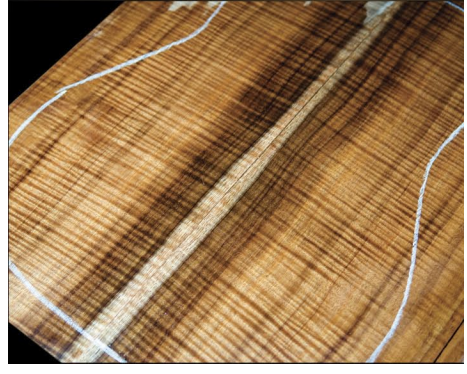

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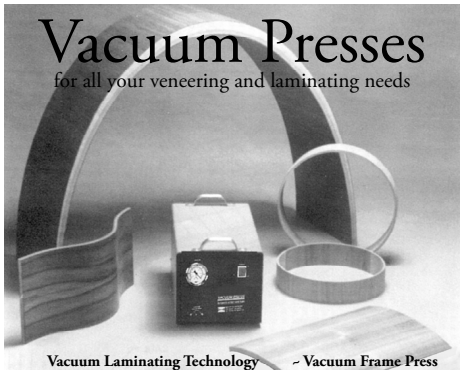

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ACCESSORIES

T-square fence for the router table

KREG'S NEW ROUTER-TABLE FENCE is similar to T-square-style rip fences in that it rides on a rail attached to the side of the table. It can be used with many commercial and shopmade router tables.

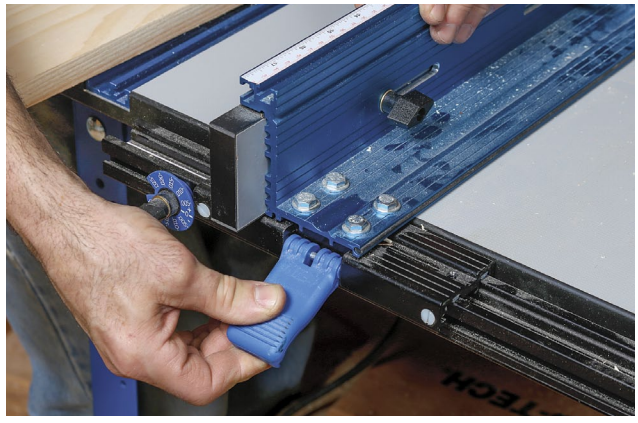
The fence is simple to use, and I liked that it is self-squaring when you lock it in place. As it moves forward and back, the fence remains parallel to the miter slot. I had to move it with my hand on the T-square head, because it would bind when I applied pressure to other areas of the fence. In addition to the clamping T-square head, there is a clamp at the other end of the fence that requires a slot cut through the table to use. Both clamps worked well. A microadjustment feature moves the fence in 0.005-in. increments, up to 0.025 in. in total.

This is a good fence overall, but it has a couple of small negatives. It's hard to see through the blue safety shield. The dust-collection hood, which snaps into the back of the fence, came loose every time I removed the hose. On the plus side, the dust collection was good.

—Kelly Dunton is a woodworker in Terryville, Conn.

Precision router table fence by Kreg

$199



A rip fence for your router table. *Unlike many router fences, Kreg's fence rides on a rail on the right side of the table, and has a locking T-square-style head (left). There's a secondary lock on the left end of the fence, and good dust collection, too (above).*

HAND TOOLS

English backsaw cuts as beautifully as it looks

SKELTON SAWS, OWNED by a husband and wife in the English countryside, makes dovetail, carcase, and ripsaws. I've been using one of their rip carcase saws. It is exceptionally well-made and performed fantastically. The saw has a 12-in.-long, 0.02-in.-thick blade with 14 ppi (points per inch) and just 0.003 in. of set on each side. There is 2 5/16 in. of blade under the brass spine at the heel, and 2 1/16 in. at the toe.

To get a sense of how easy the saw starts, how fast it cuts, and how straight it tracks, I used it to make several vertical cuts in pine, oak, and cherry. The saw was moderately easy to start. It cut fast and tracked dead straight with no tendency to drift.

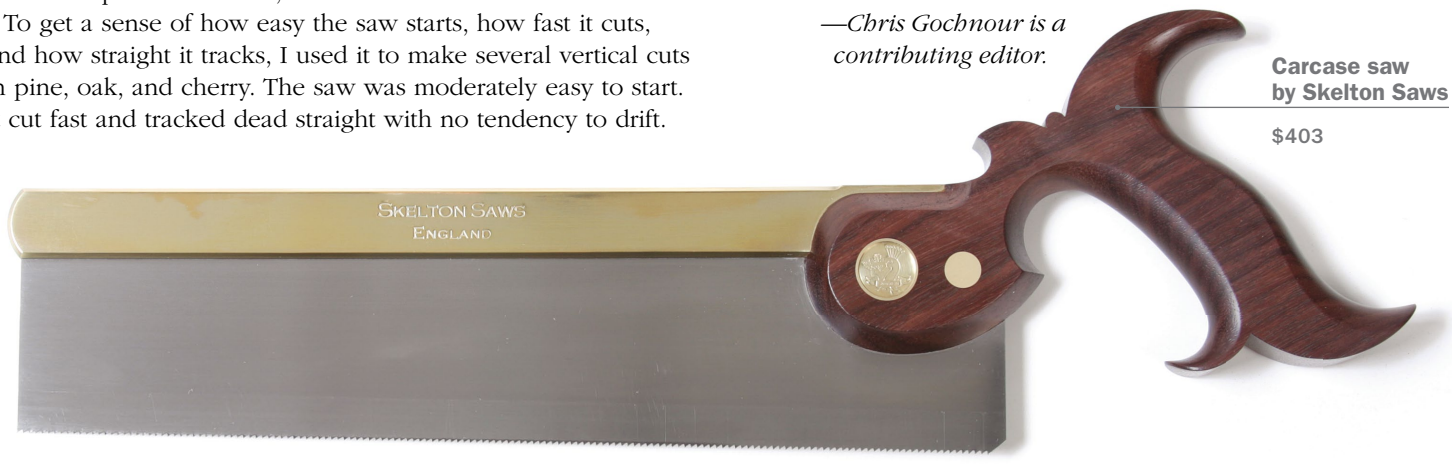
I then put the saw through two real-world tests. I cut a series of through-dovetails and fit a tenon to a mortise. In both cases I was able to fit the joints straight off the saw. The saw became an extension of my hand, making precise joinery easier.

The Skelton Saw carcase saw will serve you for a lifetime, and then will be something great to leave for the next generations of fine woodworkers.

—Chris Gochnour is a contributing editor.

Carcase saw by Skelton Saws

$403



Hinges for sleeker, stronger boxes

BRUSSO HAS INTRODUCED SIDE RAIL HINGES in two sizes for medium and large boxes. Side rail hinges are much easier to install than quadrant hinges, and because they attach to the sides of the box, not the back, they are stronger than butt hinges.

The 5/16-in.-wide hinge is perfect for medium-size boxes with walls at least 7/16 in. thick. Use the 1/2-in. hinges for larger boxes with sides 5/8 in. or thicker. The 5/16-in. size is available in two styles, either with or without a built-in 95° stop, while the larger hinge comes only with the built-in stop.

Mortising for the hinges is very easy with Brusso's routing templates, but I've also had great success doing it with a straight bit at the router table. The hinges come with a steel screw that you can use to thread pilot holes, greatly decreasing the chance of stripping the brass screws that will attach the hinge to the box.

I do have one concern with the hinges: On mitered corners, the outer screw can fall almost directly on the glueline at the center of the joint. So I wouldn't use them on a mitered box. However, they are the perfect hinge for a dovetailed or finger-jointed box.

—Doug Stowe is a professional box maker who teaches woodworking to elementary school students in Eureka Springs, Ark.

Side rail hinges by Brusso

$39 for 1/2-in. hinge with stop
$35 for 5/16-in. hinge with stop
$37 for 5/16-in. hinge with no stop

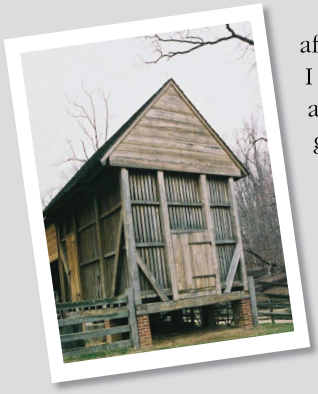
Contemporary chest with Colonial roots

BY DUNCAN GOWDY

Several years ago I was lucky enough to receive some beautiful planks of red oak from a centuries-old tree that grew on the grounds of George Washington's Mount Vernon estate. The wood came from William Jewell, who asked me to build something with it for an exhibition he was curating of furniture made from trees with a historical pedigree.

In search of inspiration for my design, I visited Mount Vernon. Having worked for a timber-frame builder in New Hampshire and spent time on my brother's nearby farm, I have an affinity for farming and wooden farm structures, and

Photos, this page, bottom right: William Jewell; finished chest: Dean Powell; top four, opposite: Duncan Gowdy



after touring the house at Mt. Vernon I went directly to the agricultural area. I took dozens of photos of the gardens and structures there. The spark of inspiration I was seeking came from a corncrib, a small post-and-beam building that had an exposed framework of stout vertical timbers and an infill of vertical slats spaced apart for ventilation. I decided to adapt the idea for my blanket chest.

Most of my furniture incorporates carving, and when I build blanket chests I typically use a frame-and-panel structure with multiple panels on each face of the chest. This approach was inspired by Hadley chests, those heavily carved frame-and-panel pieces built between about 1680 and 1730 in the Connecticut River Valley—not far to the west of where I live in Massachusetts. On my pieces, though, rather than doing the sort of all-over carving found on Hadley chests, I limit the carving to one or more panels in the piece and leave the frame members unadorned. With this blanket chest, I decided to include just one carved panel and give the others visual interest by filling them with gapped slats.

My initial impulse was to have a large carved panel on the chest's front that would be flanked by slatted panels of the same height. I sketched out the idea and then built a full-scale mockup. I built the mockup with ¾-in.-thick oriented-strand board (OSB) sub-flooring, which, if not beautiful, is certainly cheap: It costs $16 or so for a 4x8 sheet. I pinned a sketch of the carving in place and used a marker to simulate the slats and splines. Standing back from the mockup, I was not pleased; my blanket chest was looking like a 1950s console television set.

I went back to the drawing board and changed the proportions, giving the piece more height, less ground clearance, and a little less length. I also reduced the size of the carving and designed a more complex framework of rails and stiles, introducing variation in the height of the slatted panels. Then I built a second full-size mockup, which confirmed the feeling I'd had when I saw the new idea on paper that I'd found a much better design.

I built the sides of the chest as four independent frames with end stiles mitered along their length, and then glued the four sides together. The mitered stiles form legs with the look of heavy posts—but they don't require thick stock or any notching of the inside corner. To keep the grain and color of the legs cohesive, I cut mating stiles from the same board. I ripped the slats from book-matched boards and was careful to keep them in sequence from side to side and also end to end. I made the slat blanks long enough that I was able to go up the front, over the top, and down the back with one board.

The old red oak is not the only historic timber that figures in the blanket chest. The image I carved on the front panel is from a photograph that I took of a massive old poplar tree on the front lawn at Mt. Vernon. I did the carving on a piece of ash from another tree that grew on Washington's estate. After carving the ash panel, I bleached and pickle-stained it, then applied gel stain in the carved areas with a brush. More pigment stays in areas of open grain, darkening and highlighting them. To get the tone I wanted, I repeated this process five times, starting with one application of brown stain, then four applications of black stain. □

Duncan Gowdy works in his one-man shop in Holden, Mass.

Article Extra
For more on Duncan Gowdy's design process.

10 essential layout tools

BY CHRISTIAN BECKSVOORT

Every woodworking project begins with layout, and that layout must be accurate and efficient for each task to be successful. This set of 10 layout tools helps me get great joinery every time.

I have a tape measure, a 12-in. combination square, a 3-in. double square, and a 6-in. rule for measuring. For marking, I use a marking knife, a mechanical pencil, and a marking gauge. Angled and round layout is done using a sliding T-bevel, a dovetail marker, and an 8-in. compass.

I'm confident that with these tools at hand, you'll be able to lay out virtually any joint quickly, efficiently, and most important, precisely. Then all you'll need to do is to actually cut the joints.

Christian Becksvoort is a longtime contributing editor and an expert in Shaker design.

Photos: Dillon Ryan

Measuring

TAPE MEASURE

Article Extra

Is your tape measure accurate? Learn how to check it in our latest Drawing Board.

Let's start with the basics. It's likely you already have a tape measure. These are real multipurpose workhorses. I use a 16-ft. tape, which is a great length for general use. The tape is my go-to measuring tool for roughing out boards, but I also use it to check cases for square and mark out dovetail spacing.

Tapes have a loose hook at the end that moves in and out. Pushed in, it delivers an accurate measurement for the inside of a case or drawer. Pulled out, it can be hooked over the edge of a piece to measure outside dimensions accurately.

Next you'll need a square, or better yet two. A 12-in. combination square is useful for a variety of layout tasks, such as marking across boards for cutting to length and laying out mortises across sets of legs. Plus you can use the angled fence to mark 45° angles. The 12-in. rule can be used as a straightedge and rule as well.

For smaller work, a 3-in. double square is the ticket. The size is less cumbersome than the 12-in. square for things like small drawers and moldings. It's also helpful for transferring dovetail marks onto the end grain of the board. Also, by holding a pencil against the square and sliding it along edges, you can use it to make long parallel marks for laying out tabletop bevels and chamfers.

For finer work, I use a 6-in. precision rule. This tool really shines at any task where I need to measure down to 1/64 in., such as marking out mortise locations on a leg, and any situation where a 12-in. combination square's rule is too cumbersome, such as spacing out dovetails on small drawer parts. It rounds out the measuring side of my layout kit.

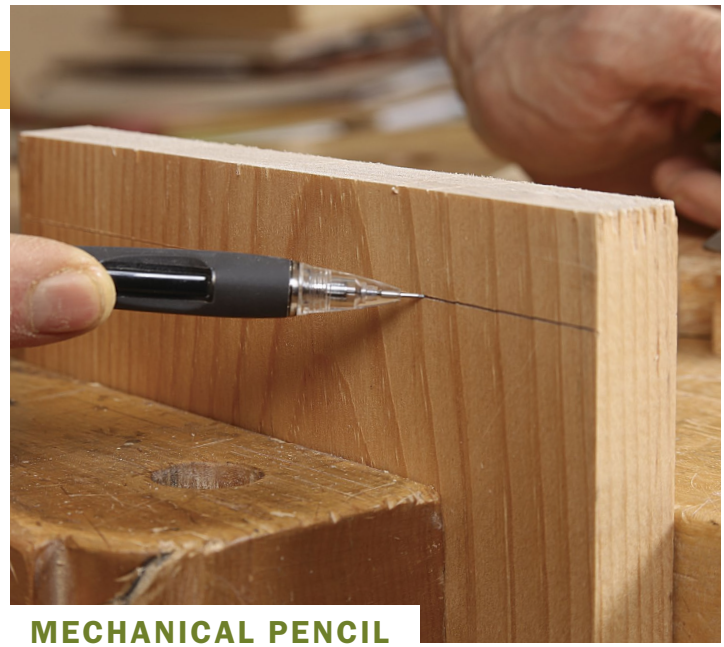
COMBINATION SQUARE

DOUBLE SQUARE

6-IN. RULE

Marking

MARKING KNIFE



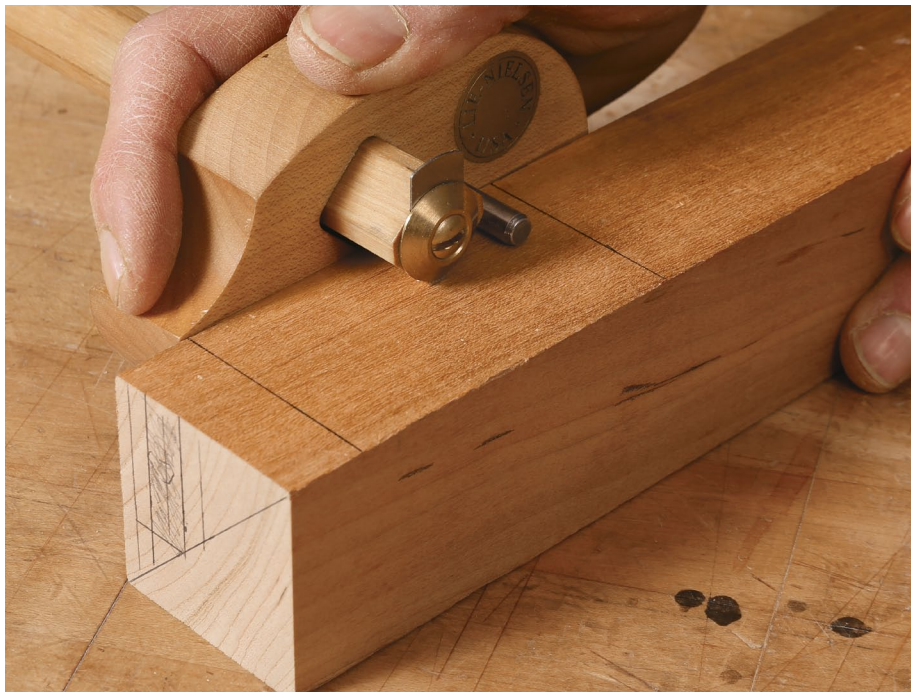
MECHANICAL PENCIL

To accompany the tape, rule, and square, you'll need something to mark with. A good old yellow No. 2 pencil seems an obvious choice and will work well, if kept sharp. The downside is that the longer the line, the wider it gets as you mark. After a while, your line's more than 1/16 in. wide—not great for precision layouts. My choice is a 0.5-mm mechanical pencil. The lead size is halfway between 1/64 in. and 1/32 in., and it won't get wider as it wears, which translates to more accurate marking.

In addition to the pencil, you'll want a marking knife. I use a straight-blade chip-carving knife, which has a narrow blade with a single, long bevel. I use it for transferring tails onto pins and transferring drawer pocket lengths onto drawer fronts, where the width of a pencil mark will result in too much error.

Next is a marking gauge, which creates long scribes parallel to an edge. I use a wooden cutting gauge with a wide bearing face and a wooden beam. I prefer the knife-style blade because it makes a nice, clean cut (especially across the grain). This tool allows repeatable baselines for dovetails and pins, and is also great for marking out the tongues on breadboard ends and scribing mortises on legs.

MARKING GAUGE



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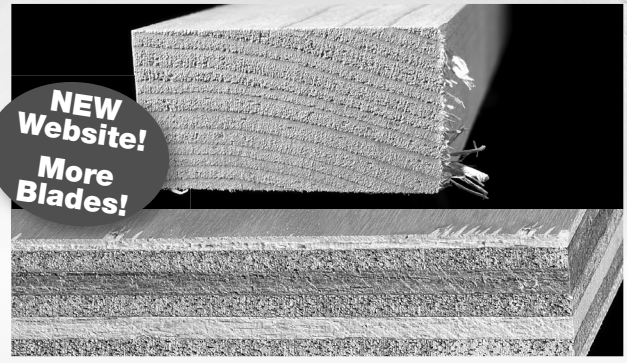

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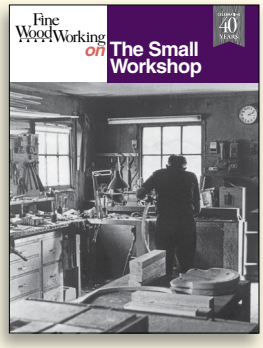

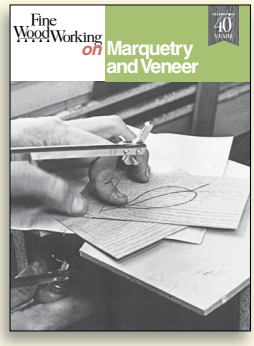

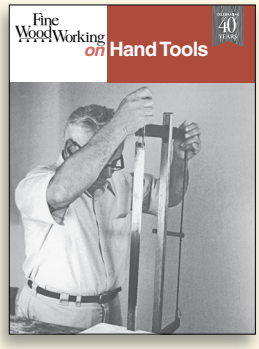

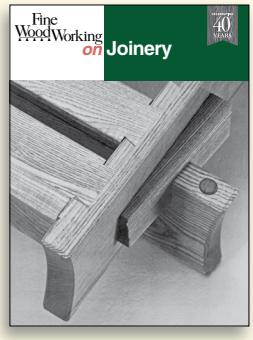

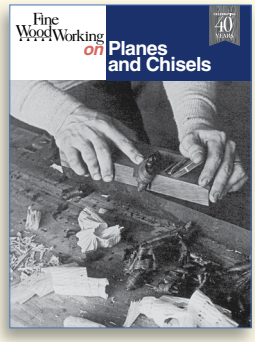

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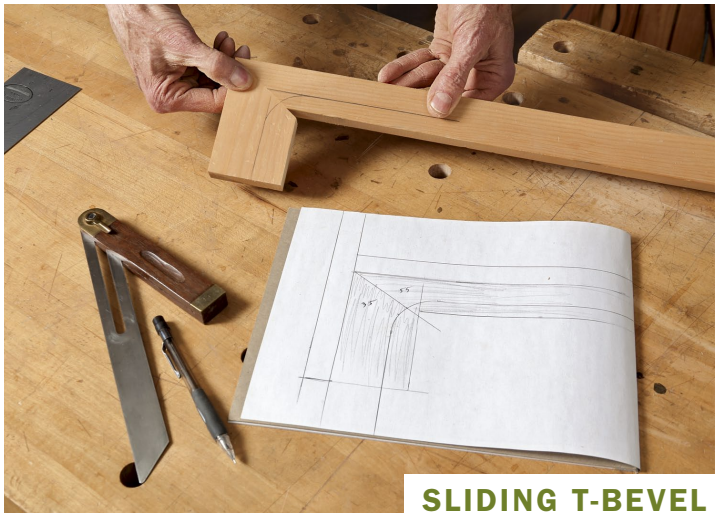
Angles and curves



SLIDING T-BEVEL

DOVETAIL MARKER

For laying out angles, nothing beats a sliding T-bevel. Whether it has a metal or wooden handle, the locking mechanism is the really important part. Some versions have a side-locking nut or lever, while others have a flush cam lock or a knob at the bottom. The locking mechanism must lock solidly. There is nothing worse than a blade that slips when transferring an angle to your work. I use the sliding T-bevel to lay out the miters on my cabinet bases, which are set to equalize the amount of short grain between each half of the joint.

You can mark for dovetails with a sliding T-bevel, but if your work frequently involves dovetails, a dovetail marker is a must. They require no setup time and make marking dovetails faster and more accurate.

Dovetail markers can be bought online from a variety of sources. They usually come set to 7½° (1 in. in 8 in., or 1:8), 8½° (1:7), 9¾° (1:6), or 10¾° (1:5). But I made my own shopmade wooden marker that's about 10°. I've used that same marker for more than 40 years, and it's one I "borrowed" from one of the first Shaker pieces I had the pleasure of restoring.

For any work that requires laying out arcs and circles, rounded corners, or scallops, an 8-in. compass is the tool to use. A compass can also be used as a divider, to mark repeated distances, or to divide a circle into sixths for laying out evenly spaced joinery on columns and spindles.

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A Table for 2, 4, or 6

Gate-leg design expands from small to large in a jiffy

BY CHRIS GOCHNOUR

This gate-leg table is perfect for those living in tight spaces and for anyone who doesn't always need a big table. With the leaves down, it's a table for two (top). Pull up a leaf and swing out the gate leg for support and you have room for four in no time (above). Open the second leaf and you can fit two more friends around the table (opposite).

With their fold-down leaves, gate-leg tables are wonderfully versatile, making them perfect for a small home or apartment. With the leaves down, the table can be pushed against the wall to be used as a buffet or just kept out of the way, and it works as a nice table for two. Raise a leaf and swing out a gate leg, and the table comfortably seats four. Raise the second leaf and pivot the other gate leg to support it, and the table now seats six with ease. This versatility, combined with the warmth of cherry and Shaker design, brings beauty to any room.

For the most part, the base of a gate-leg table is nothing strange. This one has four legs, side aprons joined to the legs with mortise-and-tenons, and a long drawer that can be accessed from each end. All of this can be constructed separately from the gate-leg assemblies on each side, which consist of a leg and a separate apron that swings on a wooden hinge. This sounds complicated, but it's not so tough.

The oval top has three pieces. Attached to the base, the center is sandwiched between two leaves that raise and lower on hinges. A rule joint between them looks clean and attractive whether the leaf is up or down. I make the joint with two router bits, and rout the hinge mortises with a jig that takes the hassle out of layout and ensures that the hinges don't bind.

There's no doubt that this gate-leg table is a mechanical marvel, but don't be intimidated. With the techniques I'll demonstrate, you're sure to make one that works as beautifully as it looks.

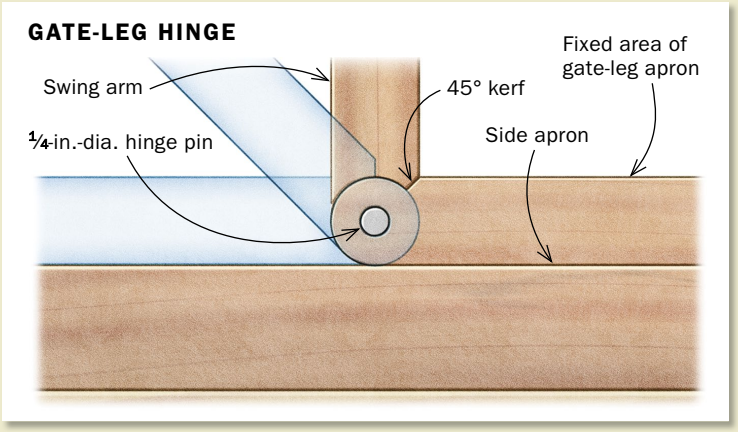
The gate leg swings on a wooden hinge

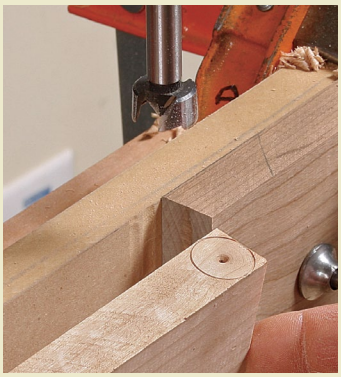
Start by making all of the legs, including the gate legs. Because there are two aprons on the sides of the base, the base

Photos: Matt Kenney

MAKE A WOODEN HINGE

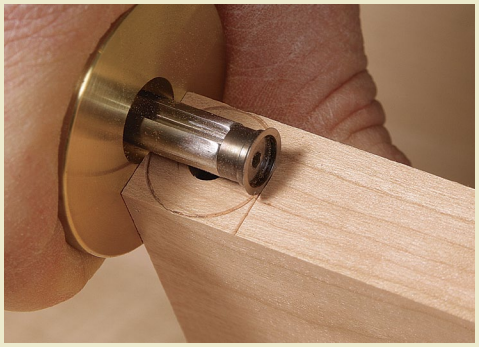
Each side of the table has a gate leg that swings out on a hinged arm to support the raised leaf. This wooden hinge may look intimidating, but it's only a modified finger joint—it is not hard to make.





Mark the center and circumference. *A ¾-in.-dia. Forstner bit does both at once. Use scrap to dial in the location of the fence and stop block so that the bit's cutters hit the end and two sides.*

Drill for the pin. *For the joint to work without binding, this hole must be straight and parallel to the end grain. Use a slow feed rate and drill halfway from each edge.*



Lay out and cut the stop. *Use a marking gauge to scribe a line across the board's edge and across its outside face (left). Then, with the blade angled 45°, cut a kerf on the outside face at this cut line. Repeat for the other half of the joint to create a 90° stop.*

Round over the end. *Gochnour uses a ⅜-in.-radius bullnose bit to form the rounded knuckle in one pass. This allows the joint to swing open and closed.*

Clean up the stop. *The blade of a shoulder plane removes the bit of waste left between the rounded end and the stop cut into the face.*

legs need two mortises on those sides for the apron tenons. After cutting the joinery, turn the legs. Set aside the gate legs for now, and build the base, whose construction is straightforward. Once it's glued up, you can start the gate-leg assemblies.

The gate-leg apron has three parts: a fixed arm, a swing arm, and a filler block. Cut these parts to their final width, but leave them long. For the two hinged arms, the extra length gives you a quick way to recover if you make a serious mistake—just cut off the joint and start again. The filler block is trimmed to length after the gate leg has been installed.

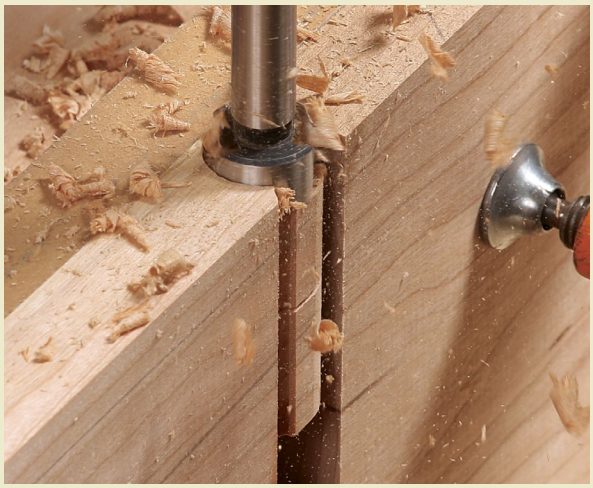
The wooden hinge is cut like a finger joint, but the ends of the knuckles are rounded over to fit concave sockets in the mating part.

Set up a drill-press fence and a stop block to center a ¾-in. Forstner bit on the arm's thickness and ⅜ in. from its end. The

Get symmetrical knuckles with a gauge. *Lay out the knuckles from both edges of the board. Two settings will produce four lines and five knuckles.*

Straight shoulder for now. *After defining the knuckles with a backsaw and removing the waste with a coping saw, pare down to the stop. A straight shoulder helps when you transfer the knuckles to the mating piece.*

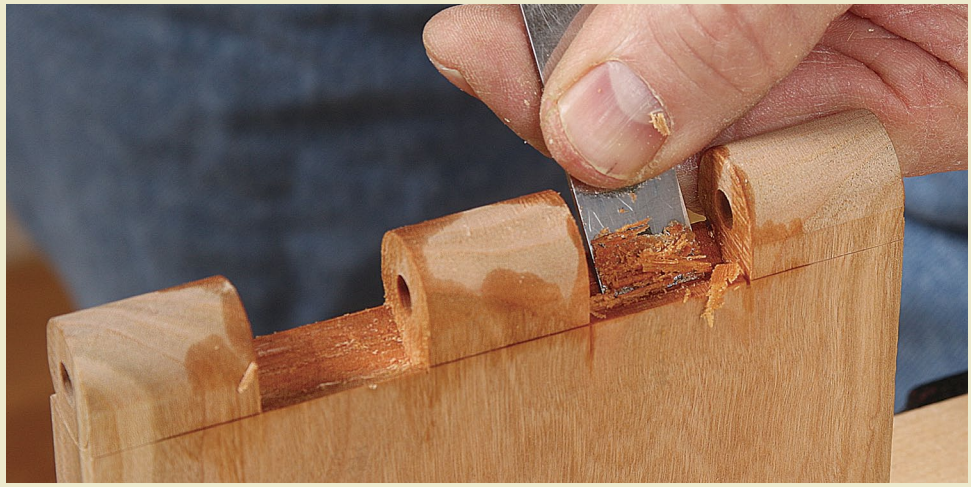
Transfer the knuckles. *After making a small tick with a knife (left), use a marking gauge to complete the layout (right). To do this, put the gauge's blade in the tick mark, set the fence against the board's edge, lock it, and scribe. Repeat for each tick mark.*



Drill where you can. *The swing arm has sockets at both edges that need to be scooped out. Do this at the drill press with a ¾-in. Forstner bit, using the same fence and stop block setup as before.*

bit's cutters should just touch both faces of the arm and its end. When the alignment is correct, drill slightly into the board. This gives a starter hole for the ¼-in. brad-point bit used to drill for the hinge pin, and cuts a perfect guideline for the knuckle's rounded shape. Switch over to the ¼-in. bit and drill for the pin.

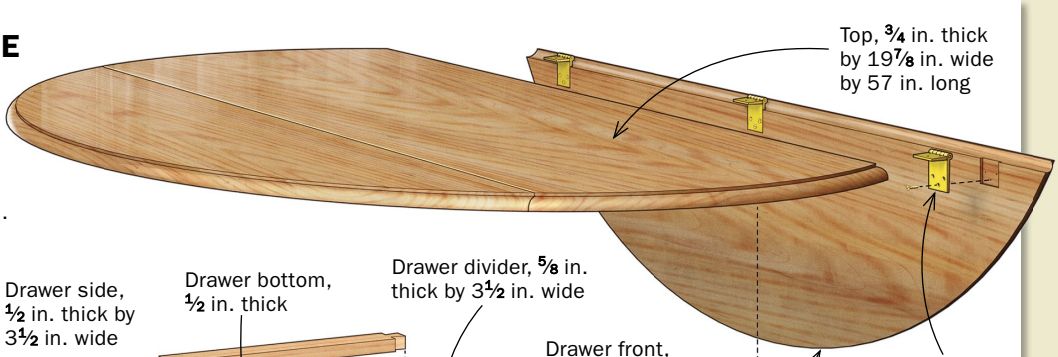
The hinge has a stop to prevent the leg from swinging out more than 90°. To create the stop, angle the tablesaw blade to 45° and cut a kerf across the arm's outside face. Locate the kerf by cutting a line with a marking gauge that's tangential to the circular guideline you cut at the drill press (see left center photo, p. 32). Next, head to the router table and round over the end of the arm with a bullnose



Handwork where you can't drill. *Use a chisel, bevel down, to scoop out the area between knuckles. Gochnour moistens the fibers with mineral spirits—an old carver's trick—to soften them and get tearout-free results.*

ELEGANT AND VERSATILE

Quiet Shaker design is the perfect match for this wonderfully functional and versatile dining table.



Pin, ¼ in. dia.

Fixed arm, ¾ in. thick by 5 in. wide by 21 1/16 in. long

Drawer side, ½ in. thick by 3½ in. wide

Drawer bottom, ½ in. thick

Drawer divider, ⅝ in. thick by 3½ in. wide

Drawer front, ¾ in. thick by 3½ in. wide

Hinge, Horton Brasses, No. H-510

Tenon, 5/16 in. thick by 4 in. wide by 1 in. long

Leaf, ¾ in. thick, starts 14 in. wide by 53 in. long

Tenon, 5/16 in. thick by 4 in. wide by 1 in. long

Kicker, ¾ in. thick by 1⅛ in. wide by 40¼ in. long

Apron, 1 1/16 in. thick by 5 in. wide by 42¼ in. long

Runner, ¾ in. thick by ⅞ in. wide by 40¼ in. long

Top rail, ¾ in. thick by 1 13/16 in. wide by 16¼ in. long

Swing arm, ¾ in. thick by 5 in. wide by 10 5/16 in. long

Filler block, ¾ in. thick by 5 in. wide by 10⅝ in. long

Tenon, 3/16 in. thick by ⅞ in. long

Tenon, 5/16 in. thick by 4 in. wide by 1 in. long

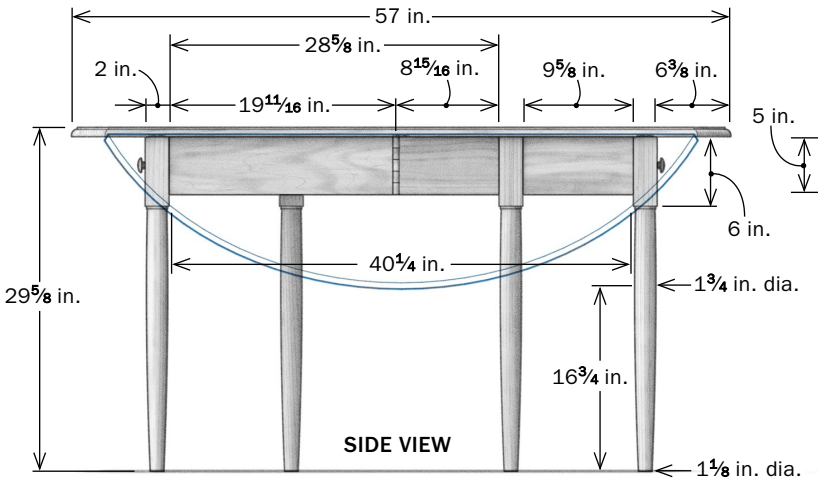
Tenon, 5/16 in. thick by 3 in. wide by 1 in. long

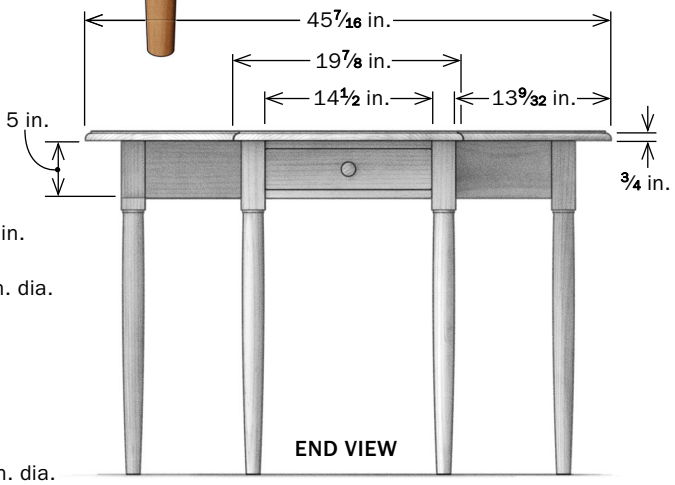
Bottom rail, ¾ in. thick by 1 13/16 in. wide by 16¼ in. long

Notch, 1 1/16 in. deep by 5 in. wide

To purchase expanded plans and a complete cutlist for this table and other projects, go to FineWoodworking.com/PlanStore.

Leg, 2 in. square by 28⅞ in. long

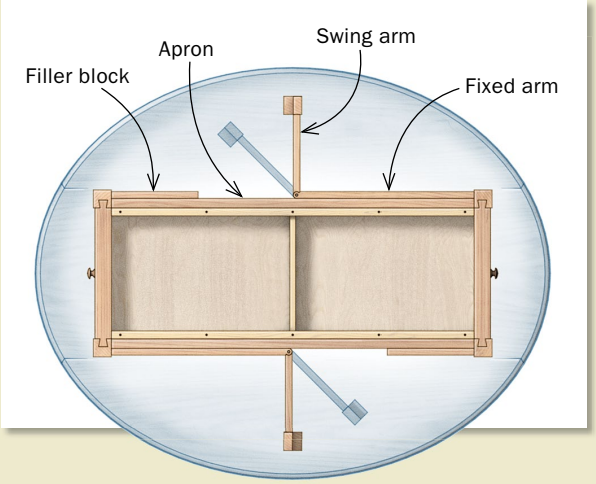




Drawings: John Hartman

INSTALL THE SWINGING LEG

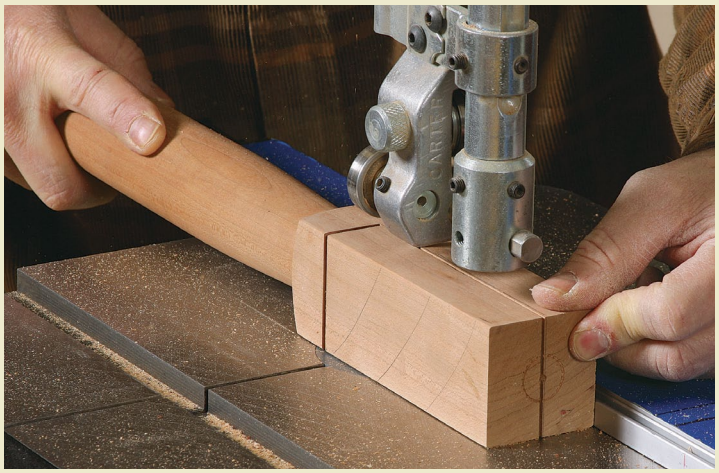
The gate leg is part of a second apron on each side. The apron has a filler block, a fixed arm, and a swing arm that attaches to a pivoting leg.



bit. There will be some waste left between the kerf and the rounded end. Clean that up with a shoulder plane.

Now lay out the knuckles of the joint. There are two knuckles on the swing arm and three on the fixed arm. Start with the fixed arm. I define the knuckles with a backsaw, clear the waste with a coping saw, and pare to the baseline with a chisel. The area between knuckles will be hollowed out later.

Transfer the knuckles to the swing arm and complete the joint. At this point you



Notch the leg. *This allows the leg to fit under the inside, continuous apron. Cut the shoulder at the tablesaw, then the cheek at the bandsaw.*

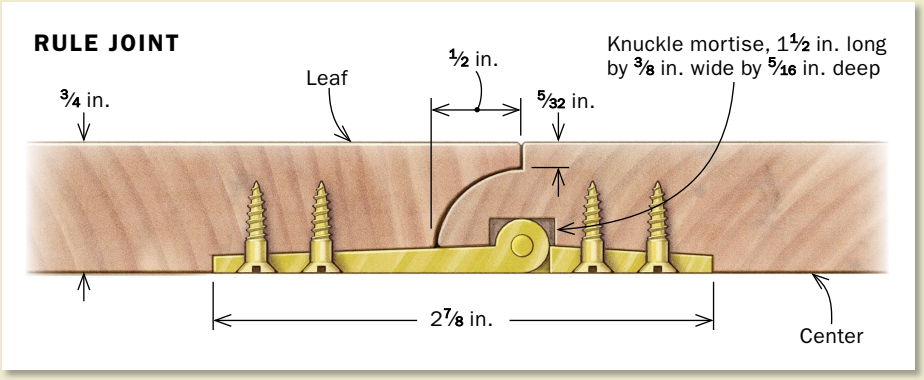
Trim it flush. *After gluing the swing arm to the gate leg, trim the notch's cheek level with the arm.*

Glue on the fixed arm. *Spread glue on both the tenon and the inside face of the fixed arm (left). Leave it in the clamps for several hours. Attach the gate leg (above). Put the two halves of the knuckle joint together and then drive a ¼-in.-dia. steel rod into the hole. Gochnour grinds a chamfer on the ends of the rod.*

ROUT THE RULE JOINT

A cove cut along the leaf's edge mates with a roundover along the top to create an attractive joint that hides the hinges whether the leaf is up or down.

Press down hard. *It's critical that the routed edges of both sides of the joint be uniform and smooth, so use push pads and a featherboard to keep downward pressure on the tabletop and leaves when feeding them through the bit.*



can cut the hollow between the knuckles. On the edges of the swing arm, use a ¾-in. Forstner bit and the same fence and stop block setup as for the hinge-pin hole. Between knuckles, you'll have to scoop out the waste with a chisel, used bevel down. Check your progress with a ¾-in.-dia. dowel. When it sits flush with the rounded end of the knuckles, you're done.

Now you can notch the gate leg, glue it to the swing arm, and trim the notch flush. To install the completed gate-leg apron, start with the fixed arm. Glue its tenon into the mortise and its inside face to the apron. Slide the hinge together and drive in the pin. Now dry-fit the filler block and close the gate leg. Trim the filler block until the gate leg closes flat against the apron, and glue it in place.

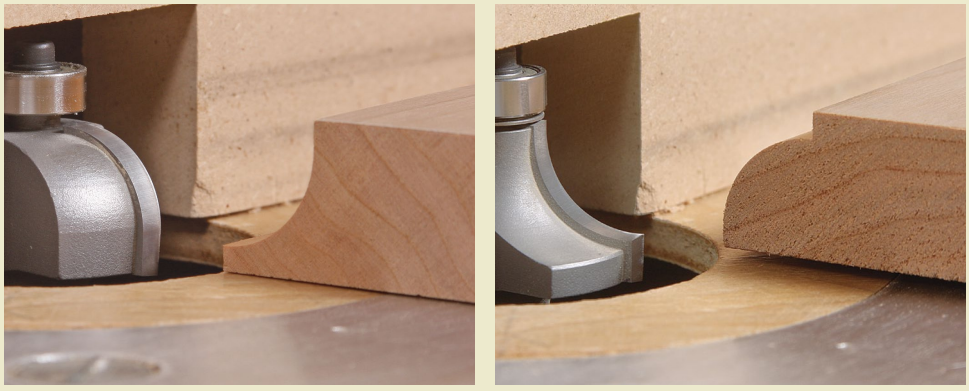
Rule joint has leaves falling smoothly

The hinged leaves that make up the sides of the elliptical top pivot on a rule joint.

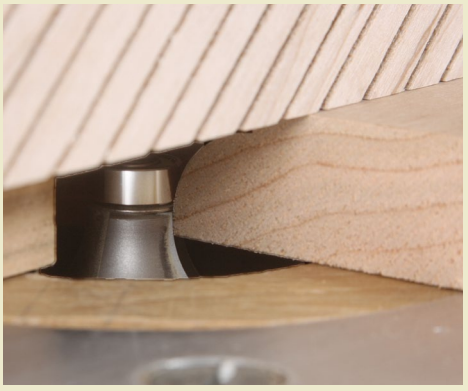
The first step in making the top is to cut the rule joint at the router table. The leaves get a cove down the underside of their inside edge. The middle section of the top gets rounded over along the top surface of both edges (see drawing, left).

Next, clamp the three pieces together and lay out centerlines for the hinge mortises. Each leaf gets three hinges. The centerlines should extend the full width of the top and are used to align a hinge mortise routing jig. This jig stretches across the top and allows you to rout the leaf mortises and the deeper barrel mortises for two hinges without unclamping the jig.

The jig is a long piece of MDF with two rectangular holes that match the dimensions of the open hinge. With a flush-



Two bits make the joint. *Rout a cove into the underside of the leaf, using a ⅜-in. radius cove bit and leaving a 5⁄32-in. flat on the edge (left). Then, put a ⅜-in. roundover bit in the router table and rout both edges of the center section of the tabletop (right).*



Round off the bottom corner. *Flip the top over and slightly ease the bottom corner of the edge.*

MORTISE FOR THE HINGES

There are six hinges on the underside of the tabletop. Gochnour uses a jig that accurately locates each hinge mortise and a channel for the hinge barrel. It also allows him to rout two mortises with one setup.

Place the jig on the top. *A centerline on the jig aligns with a centerline on the tabletop to locate the hinge mortises.*

Rout the mortise for the leaves. *After clamping the jig in place, rout both mortises (left), using a short, bearing-guided flush-trimming bit (above).*

trimming bit in a router, use the opening as a guide and rout the mortise for the hinge leaves. You'll have round corners, but the opening also serves as a chisel guide, so you can square them. Next, drop a spacer in the opening and switch to a bushing and straight bit. The bushing rides against the spacer and allows you to cut the narrow but deeper mortise needed for the hinge barrel. Square the ends of this mortise before removing the jig.

Install the hinges. They'll hold the three parts of the top together as you turn the top into an ellipse with the help of a routing template (for more on that method, see Master Class, pp. 82–85). After the top is done, make the long drawer. It's accessible from both ends of the table and provides storage space.

The last thing to do is apply a finish. Use something durable for the top. I prefer an oil-based polyurethane. The base sees less abuse, so I use lacquer there. After that, put the table to good use and enjoy a nice meal. Whether you're joined by one friend or several, your new gate-leg table is up to the task. □

Contributing editor Chris Gochnour is a professional furniture maker near Salt Lake City.

Add a spacer for the barrel mortise. *The spacer snaps into the jig (left), and provides a bearing surface for a bushing, allowing you to rout the narrow mortise for the hinge barrel.*

Drill for the screws. *Use a Vix self-centering bit to ensure that the pilot holes are centered in the leaf's screw holes. Gochnour saves the hinge's brass screws until after the table is finished. Steel screws the same size are more durable and can be driven in and out during construction without damage.*

TOOL TEST

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BY MARK EDMUNDSON

CLAMPS OPTIONAL

The tracks for these saws have a non-slip grip, so you should be able to place them on your mark and simply make the cut. But for added security, all the saws offer clamps as an option. The clamps slide into a groove on the bottom of the track to lock it down.

Article Extra

Build a simple crosscut table to get the most from your track saw.

I was one of the first people to review the Festool 55 track saw when it came on the market almost 10 years ago, and I went around for several years afterward telling all my woodworking friends to buy the tool. The magic of the track saw is in the track, which has a nonslip surface underneath and a zero-clearance strip along the edge. In seconds, you can line up that edge with your layout marks, drop the saw onto the track, and make a perfect cut, right on the line. Add the ability to plunge in and out of a cut and you have a truly unique tool, unmatched at a number of tricky tasks that range far beyond its original mission: cutting up sheets of plywood for cabinet work.

Since my first review, other manufacturers followed Festool into the market, and *Fine Woodworking* thought it was high time for a lowdown on the whole lot. We reached out to all of the manufacturers and netted seven saws for our test. Shop Fox and Scheppach declined to participate.

Saw and track combinations vary a bit, so in each case we ordered the saw with a track at least 48 in. long, because a track saw should be able to crosscut a sheet of plywood. And for some insurance on critical cuts, we also ordered the accessory clamps that lock the track to the workpiece.

What I tested and why

To evaluate the power and quality of cut, I used the saws to cut through a wide variety of thick hardwoods—ripping 8/4 maple and oak and 4/4 alder, and crosscutting a 1½-in.-thick maple butcher block. I also took a skim cut on the edge of the butcher block to check for blade deflection, and I cut a variety of veneered sheet goods. All of the saws produce clean edges under their zero-clearance strips, and the best deliver a clean edge on the outboard side of the kerf, too. I also noted the smoothness of the plunge action and how comfortable the handle was.

Some of the saws set the depth in metric units and others in imperial, but I didn't find the measurement units to be a big issue. However, I do like the fact that some saws factor the track height into the depth measurement.

I find track saws to be very useful when cutting bevels. To test their accuracy, I used the saws to cut two long 45° bevels in plywood to see if the joint would close with no gaps. In the process I evaluated the bevel gauge for accuracy and readability. Some of the saws have a catch that prevents the saw from tipping off the track when bevel cutting, a handy feature.

Dust collection is tricky on track saws, where the hose tends to catch on things as the saw moves. That's why some of the saws have dust ports

MORE THAN A PLYWOOD SAW

If you work with sheet goods, you'll appreciate the track saw's ability to come to the work. Instead of wrestling a plywood sheet onto a tablesaw, you can slide it onto sawhorses and cut without breaking your back or damaging the sheet. The saw also tilts for easy bevel cuts. Best of all, you can cut at any angle, so you can put a straight edge on crooked boards, or align an edge with the grain and even use the saw to fit a door or a panel into an opening.

Break down sheet goods

Put a straight edge on lumber

Trim doors and drawer fronts

Track saws head to head

FESTOOL TS 75 EQ

$780 with 75-in. track,
plus $80 for two track clamps

The Festool TS 75 EQ was the powerhouse of the lot, blowing right through the thickest, toughest materials, and with an unmatched 3-in. depth of cut. There was no blade deflection, cuts were very smooth, and the track side of the blade kerf was super-clean. Bevel cuts were very clean and accurate, but it can't bevel below 0° and there is no stop at 45°, minor inconveniences. The trigger is easy to engage, and the plunge action is the easiest of any saw in the test. The depth-setting adjustment is also the easiest to use, but you have to factor in the track height. The dust collection is efficient. The track did not slide and is long enough to crosscut a sheet of plywood (longer tracks are available, too). The strips on the edge of the track are translucent so that you can keep better track of your pencil line. The Festool clamps are the best, and they fit everything except the DeWalt and Mafell tracks.

Power. *To compare the saws' power, Edmundson made ripcuts on 2-in.-thick oak and hard maple, timing each cut. The Festool 75 powered through without slowing.*

MAFELL MT55CC

$870, plus $154 for 63-in. track
and $62 for two track clamps

The Mafell is compact and powerful, with a motor that was by far the quietest and smoothest. The surprising power might have something to do with its blade, which is the narrowest in the group (but did not deflect in the skim test). The quality of the cuts was also excellent in all materials. Accuracy was just as good, with the 45° bevel joint closing up nicely. And the track is a standout, too, tied for stability with the Festool tracks. We went with the 63-in. model, as the next size down is under 4 ft. long. The track stayed put during the slip test. The depth setting is one of the easiest to change, and, like the Triton, the scale factors in the track height. There are accurate bevel stops for both 0° and 45°, and the saw can also tilt past those settings. The dust collection was the most efficient of any saw in the test.

Track length. *Edmundson opted for the 63-in.-long track on the Mafell, which lets you plunge the saw fully, with the saw fully engaged in the track, before entering the cut on a full sheet of plywood.*

MAKITA SP6000J1

$410 with 55-in. track,
plus $40 for two track clamps

The Makita is not as polished as the Festool or Mafell tools, but it is comfortable to use and performed very well. Power was very good, slowing only in the 8/4 hardwoods. After some adjustment to make the blade parallel to the baseplate, it delivered clean cuts in all materials. Like the Triton, the Makita has a tab on the base that keeps it from tipping off the track when tilted for bevel cuts, and the saw can tilt past 0° and 45°. The bevel scale is not accurate, but if you make some test cuts, you can set the positive stops at 0° and 45° accurately, which is mostly what matters. The plunge action was smooth with a comfortable handle angle. Dust collection was good, and the track did not slide under pressure.

Bevel cutting. *Track saws do a great job cutting long bevels if you keep them steady. The Makita (above) and the Triton have a little clip on the base that keeps the saw from tipping off the track.*

Action photos: Asa Christiana; product photos: Michael Pekovich

DEWALT DWS520SK

$475 with 59-in. track, plus $32 for two track clamps

The DeWalt had no problem in ¾-in.-thick stock but really bogged down in 8/4 oak. It left a smooth cut and a clean edge under the track, the blade showed no deflection, and the measurements are in inches. However, unlocking the trigger to plunge the saw is an awkward experience, and the depth setting is a bit cumbersome to adjust and doesn't factor in the track thickness. The dust port was difficult to pivot but it did a good job at collecting dust. The 55-in. track is longer than most of the others and is the only one to allow cutting on both sides. The track slid under pressure, but the DeWalt clamps work well and will fit all of the tracks except the Mafell.

FESTOOL TS 55 REQ

$660, plus $130 for 55-in. track and $80 for two track clamps

The Festool TS 55 REQ has less power than some of the other saws, but the trigger is easy to engage, and the plunge action is the easiest of any saw in the test. The depth-setting adjustment is also the simplest and easiest to use, but you have to factor in the track height. The saw has positive bevel stops at 0° and 45° and allows for -1° and +45° settings. There was no blade deflection, and cuts were very clean, even when beveling. Dust collection is very efficient. The Festool clamps are the best, and they fit everything except the DeWalt and Mafell tracks.

GRIZZLY T25552 MASTER PACK

$260, includes 55-in. track and two track clamps

The Grizzly's plunge action was much too stiff, and the angle of the handle and locations of the trigger and lock made the saw difficult to use. The blade deflected when taking a skim cut, and the saw rocks on the track a little bit, causing inconsistencies in the bevel cuts. The track slips easily and the dust collection is not very effective. On the positive side, the depth setting is straightforward and uses standard measurements, and the bevel gauge is easy to read.

TRITON TTS1400

$315, plus $85 for 59-in. track, and $50 for two track clamps

The Triton's cuts were not as smooth as those made by the top-performing saws. The plunge action was stiff, and there was some blade deflection when making skim cuts. The depth setting uses an inconvenient twist knob, and there are no positive stops on the bevel adjustment. The dust collection was not very effective, and the track moved. On the plus side, the track clamps worked well, and the saw features a tab that keeps it from tipping when making bevel cuts. Also the depth gauge reads in inches and factors in the track thickness.

that can be positioned at a certain angle and will stay there, keeping the hose away from the track and the edge of the material. All of the ports fit the smaller-size vacuum hoses.

Some of the saws have a riving knife behind the blade and others don't. I didn't find those to be a factor on track-guided cuts, but they are helpful if you use the saw without the track, like a normal circular saw, to crosscut a big piece of rough lumber, for example. However, these saws are awkward to use without the track. You have to push forward while also pushing down.

All of the tracks I tested are capable of reaching across a full sheet of plywood, but some extra length is convenient, because you don't have to be so precise when positioning the track and you have room to plunge the saw fully before pushing it forward to cut.

Conclusions

I have two picks for Best Overall: the Mafell and the Festool 75. For value shoppers, I recommend the Makita. It might take a little fussing with the settings to get it to cut perfectly, but once you do it offers clean cuts, good power, and easy adjustments. □

Mark Edmundson is a professional furniture and cabinet maker in Sandpoint, Idaho.

Learn from Antiques

Avoid construction mishaps by looking at mistakes from the past

BY STEVE LATTA

Let's say a future woodworker examines my furniture 100 years from now and notices a few consistent failures. Now imagine that person visits me in a time machine to tell me where I went wrong. Well, you can bet I would listen to him or her and make some changes to the way I build.

Luckily for us, we already have a time machine, thousands of them, in fact. Antiques let us see what happens to a piece during its life, and I've learned much of what I know by closely examining many of these old pieces.

For this article I scoured a number of my favorite furniture barns and museums, looking not only for cracks and breaks, but also for the most instructive failures—common problems that happen in pieces of all types and styles. I found the perfect collection at Philip H. Bradley Co., an antiques dealer in Downingtown, Pa. Bradley's pieces are iconic and beautifully preserved, and plentiful enough to contain many of the usual issues I've encountered in my decades of furniture study.

Wood movement is the creator of headaches

In most cases of furniture failure, the problem is the same: The maker did not sufficiently accommodate the seasonal shrinkage and expansion of wood parts. In a nutshell, wood barely moves along its length but moves a great deal across its width, and can do so with great force. When that movement is restricted, bad things often occur.

The most common type of restriction is cross-grain construction, where two or more pieces are joined together at opposing angles. One piece wants to expand and contract across its width, while the other piece doesn't move at all along its length. Soon cracks and splits make their debut. If a piece is veneered across the grain of solid wood below, you get buckles and bubbles.

To fix or not to fix

In each case of furniture failures that follow, we've provided an illustration of why the problem happened and how a modern maker could prevent it in their own work. However, for a reproduction woodworker the solutions are not always clear-cut. How far a builder strays from the original is a matter of compromise and choice. Some argue that we should build exactly like our forefathers did. But for me, "because they did it that way" has never been a very strong argument.

One shop in my region was determined to build veneered card tables the exact same way the originals were built. They did not cross-band the bricklaid cores, and they considered the inevitable split veneers to be part of the "charm" of working with solid wood. When I made a table that way for a friend years ago and the face veneer split, neither he nor I found the crack charming. After that, I made sure to cross-band my cores.

While I tend to stay conservative in my approach, I always give top priority to the future integrity of the piece.

Contributing editor Steve Latta teaches furniture and cabinet making at Thaddeus Stevens College of Technology in Lancaster, Pa.

Photo, opposite page: Michael Pekovich

Cracked tabletops

Like all big wood panels, a top will move across its width. If the top is attached rigidly to the aprons and legs below, as is the case on this gate-leg table, it will usually crack. There are several ways to hold a top firmly to a base while letting it expand and contract. Wood buttons—small blocks that are screwed to the top and fit into an extrawide slot cut into the apron—are one. Another method is to attach a top with cleats—often rails at the top of a desk or chest of drawers—screwing up through holes in the rails. Some of these holes will need to be oversize or elongated to allow the top to move across its grain. A round-head screw with a washer works best in these cases, as its flat bottom slides easily.

PROBLEM

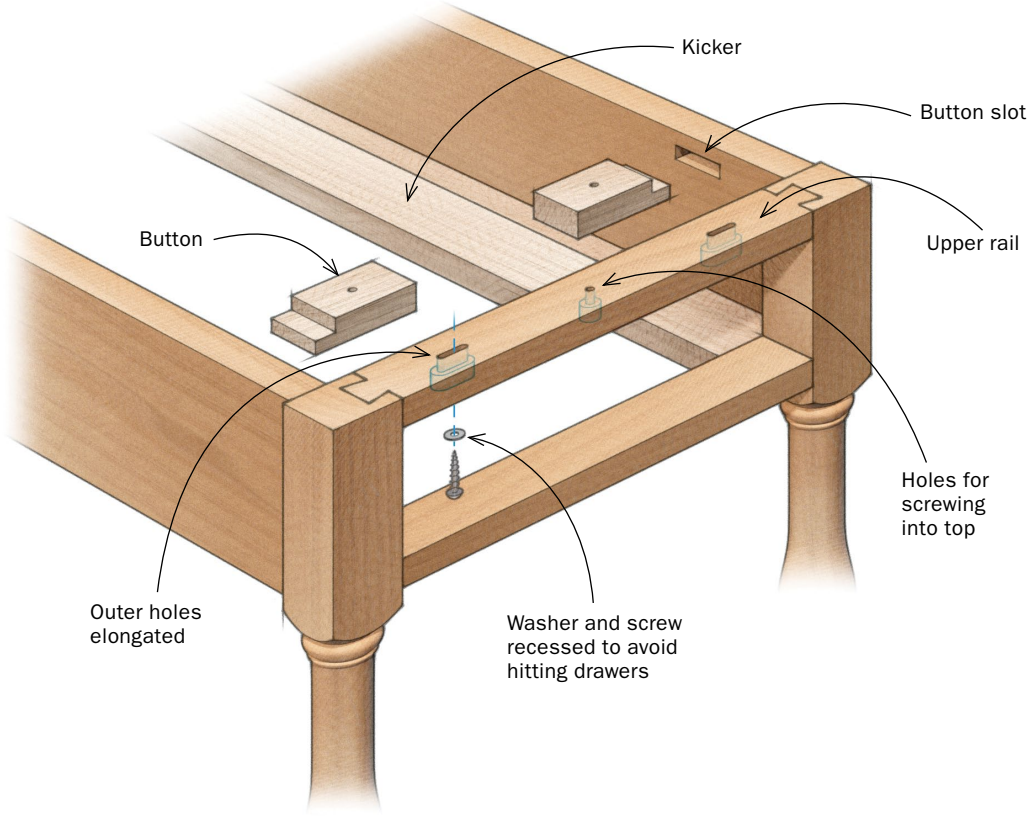
NO ROOM TO MOVE

On old pieces, tops were often screwed on from below through the inside of the apron, or worse, pegged to the aprons through the top as on this gate-leg table. With no allowance for movement, this top cracked as it moved over the years.

SOLUTION

BUTTONS AND SLOTS

On a gate-leg table like the one above, which generally would have a drawer at one end or both, I would use a hybrid approach. I'd add wood buttons along the three aprons and an upper rail dovetailed in at the ends (adding a kicker so the drawer stays level) with three mounting holes in it. The center hole is for a fixed screw, while the two outer ones are slotted to allow for movement. On other pieces, you'll want to fix the top at the front to control the overhang there, and make the center and rear holes elongated or oversize so that all the shrinkage and expansion happens at the back edge.



Photos, except where noted: Asa Christiana; drawings: Christopher Mills

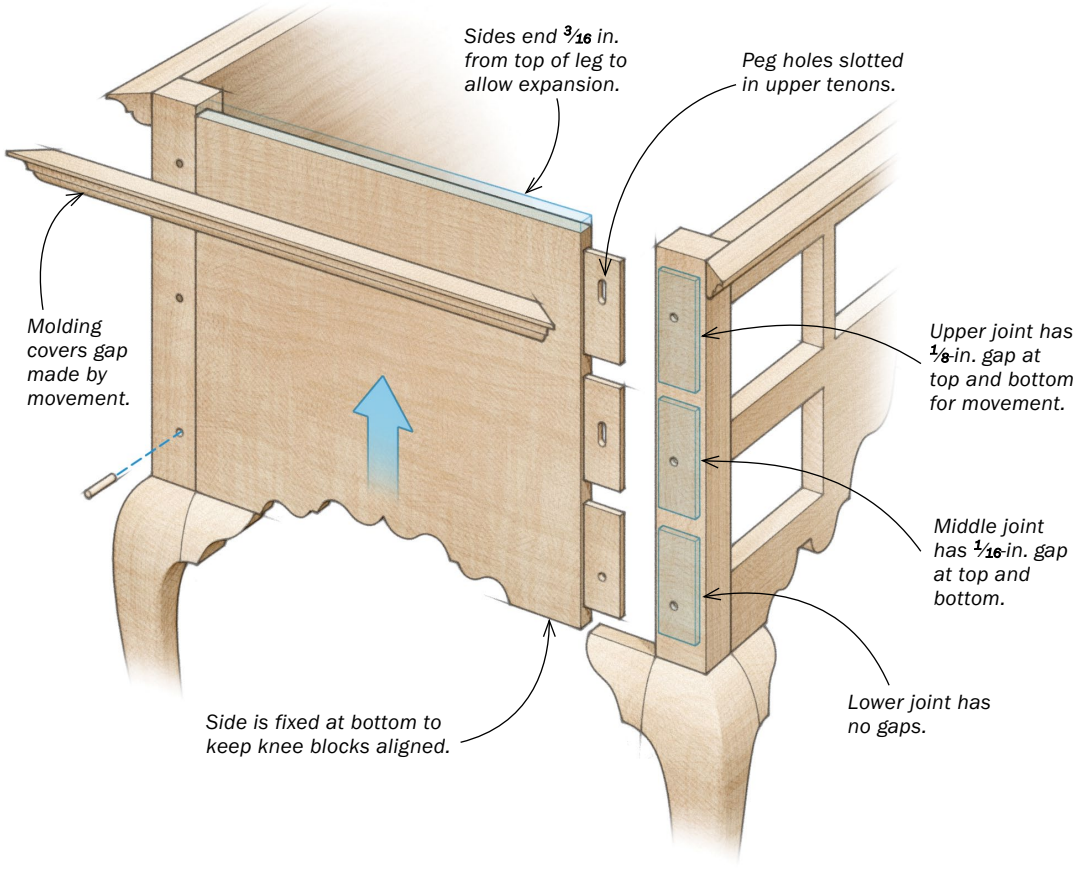
Split sides in sideboards

Splits and cracks also appear on pieces like dressing tables and sideboards where tall sides are pinned to leg posts. You could make the sides from veneered plywood and attach them with floating tenons, but the more traditional solution is to elongate one or more of the holes in the tenons. Typically the top or bottom tenon is pinned and the movement sent in the other direction by elongating the pin holes in the other tenons, and also elongating their mortises. These measures will keep a side in place and intact for generations. Some people leave the lower tenon(s) unglued, but I use white glue, which allows some movement but adds strength.

PROBLEM

JOINERY DOESN'T ALLOW MOVEMENT

Tall aprons or sides usually have multiple tenons inside, which is the right approach. Unfortunately on old pieces, these are held in place with fixed pins. So when the side shrinks across its grain and the length of the leg doesn't change, the side has no choice but to split.



SOLUTION

ALLOW EXPANSION, AND DIRECT IT

If there are cabriole legs on the piece, as on this maple dressing table, with a knee block glued to the leg and side, elongating the lower pin holes will send the movement downward and pop the block. In this case, I pin the bottom of the side, stop it a little short of the top of the leg, and elongate the upper pin holes to direct the movement toward the top. To be sure the sides don't pop the top off its fasteners, I leave a gap at the top of the sides, covered by a small molding. Glue the molding only to the leg posts, and not the side. By the way, all the pegs are drawbored to pull the tenon shoulders tight. See "Drawbore your Tenons" (*FWW* #241) for more on that technique.

Cracked sides in a chest of drawers

Another troublesome cross-grain situation happens where drawer guides and runners are attached inside the solid-wood sides. In antiques these were often glued and nailed into place, leading to split sides. There are a number of good solutions to this problem. The simplest is cutting a shallow dado in the side for the runner, gluing the runner into the dado at the front, and using elongated holes and screws the rest of the way.

My preferred solution is stronger: I create a frame-and-panel, known as a web frame, that is glued to the case only at the front. Its sides float in a shallow dado, allowing the sides of the case to move. To hold the back of the case together, I screw a frame-and-panel back into a rabbet. Be sure always to leave the runners or web frames a little short in the back. I've seen a lot of old pieces where the sides have shrunk and the back boards have been pushed or popped off by the drawer runners.

PROBLEM

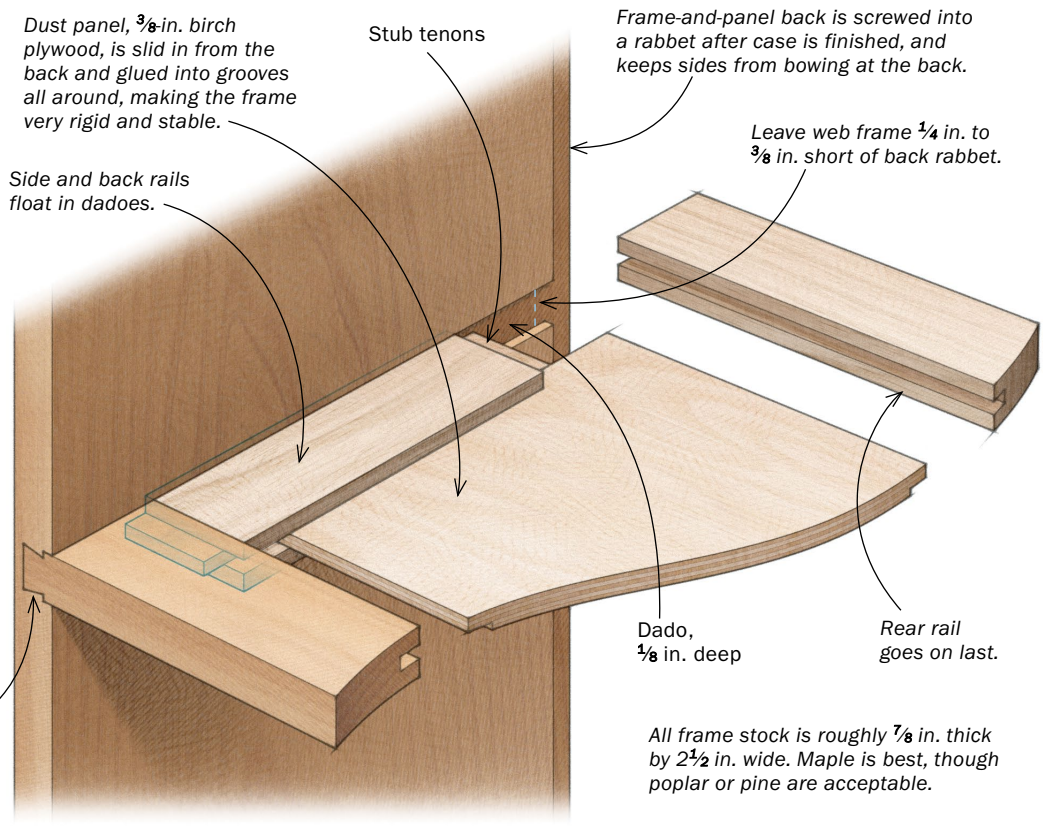
RUNNERS ARE NAILED AND GLUED FAST

When the solid-wood sides shrink and expand, they are restrained by nails and glue and eventually crack.

SOLUTION

FLOATING WEB FRAME

To create a rock-solid frame for drawers to ride on, I first use a dovetail and dado to join a front rail to the case. I cut a groove into the back of it and along the inside edges of the side and rear rail, and slide in ⅜-in. birch plywood as a dust panel, which is rabbeted to fit into the grooves. After the main case is assembled, I glue the stub tenons in the side rails to the front, run a bead of glue around the inside of the slots and insert the plywood panel, and then attach the rear rail. The glued-in dust panel makes the web frame extremely rigid, yet it floats in its side dadoes to accommodate movement.



Broken bracket feet

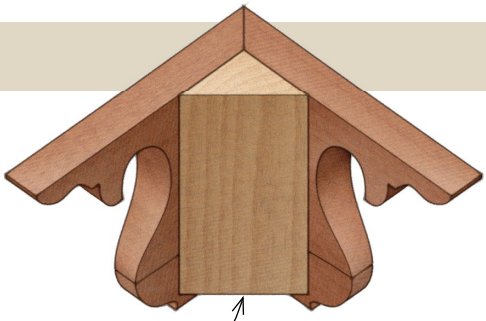
Many old pieces, usually chests of drawers, have cracked bracket feet. On most of the originals, the culprit is the internal blocks glued in to support the joints at the corners of the feet. These blocks are one piece, glued in cross-grain. When the feet shrink and expand, in effect getting shorter and taller, they want to crack. Then years of kicking and dragging finish the job.

Changing the orientation of the internal glue blocks solves the problem. For our bookcase projects, my students stack and glue five big blocks of stock together with the grain running side to side, switching the direction between layers for additional stability. Then they cut these stacks into strips to make the support blocks. When they glue them into the corners of the bracket feet, the grain is sympathetic and there is more than enough face-to-face glue surface to ensure a permanent grip. It's one of my favorite solutions to wood movement.

PROBLEM

CROSS-GRAIN STRESS

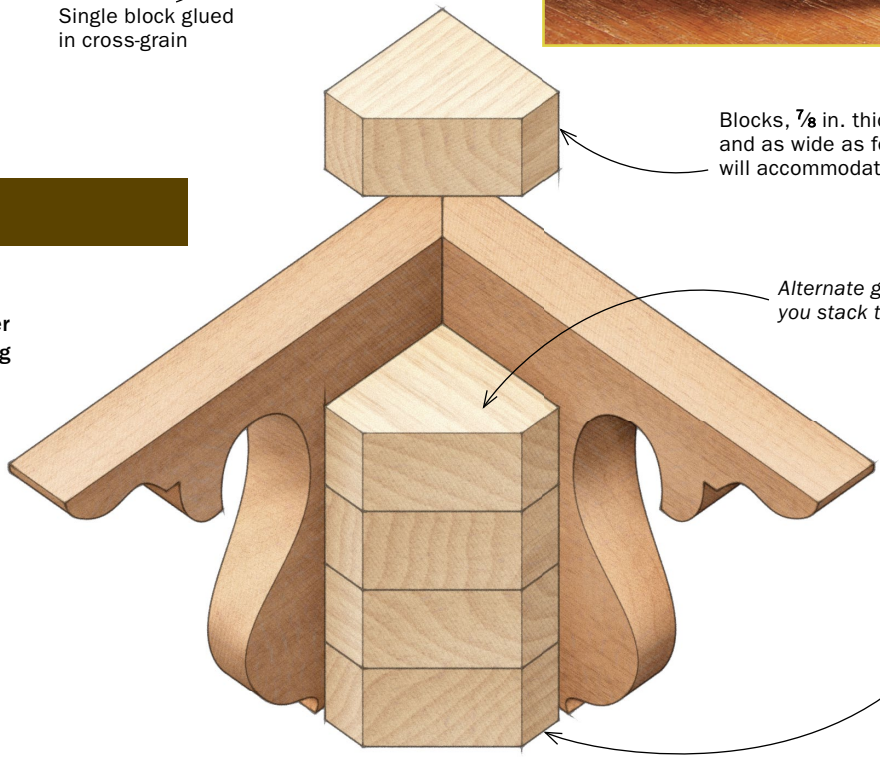
Old makers reinforced bracket feet from behind with internal blocks, glued in cross-grain. Over the seasons, when the brackets want to shrink along their height, the blocks cause them to crack.



SOLUTION

A BETTER BLOCK

For bracket feet, stack smaller blocks with their grain running horizontally like the grain in the feet, so they move in tandem. To create long-grain glue joints on both sides of the block, alternate their grain as you stack them.



Moldings that work loose

Moldings often come loose over time and sometimes pieces are lost. The front molding is usually fine, because its grain runs in the same direction as the rest of the piece, and the nails and glue usually hold. The problems tend to happen on the sides, where the grain of the molding is perpendicular to the grain in the side panels.

There are complicated ways to keep moldings attached tightly to a cabinet while letting the sides move. I prefer to keep it simple by gluing the front few inches of each side molding and nailing the rest of the way. Sometimes I insert unglued biscuits to keep the moldings from shifting up and down. I own several pieces that I made this way more than 25 years ago, and the moldings are just fine.

PROBLEM

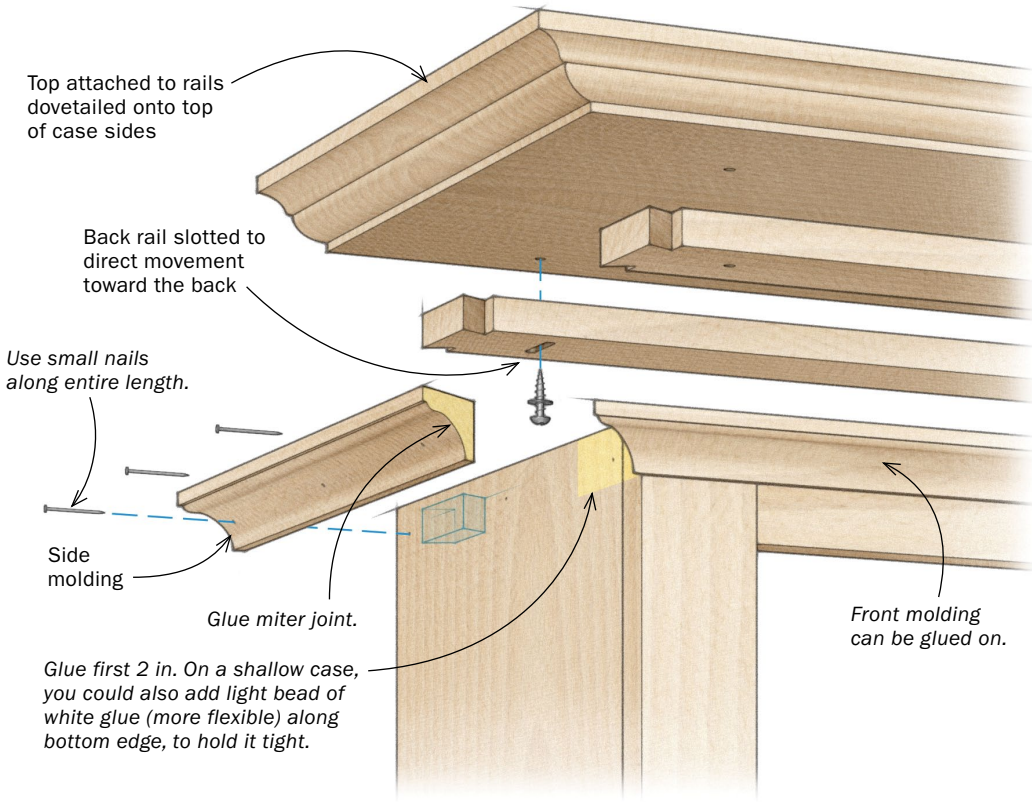
PINNED AND GLUED CROSS-GRAIN

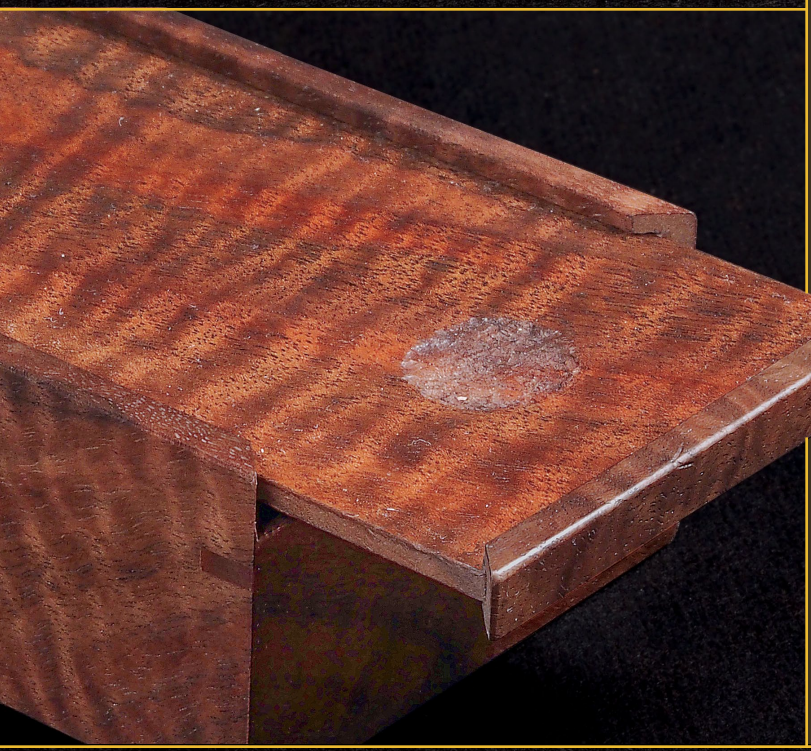
The moldings on this piece were attached using wooden pins, driven into the top. The molding was also glued along its entire length. The movement of the top caused it to split and the moldings to pull away.

SOLUTION

GLUE THE FRONT AND NAIL THE REST

To start with, I would attach the molding to the sides of the case and not to the top as on the original. Glue and nail the first couple of inches and then nail the rest of the way. In this situation, because the case is so narrow, I would glue the miter and the first few inches. I would also run a light bead of white glue along the inside bottom edge of the molding to hold it tight to the case. A small bead will fail and not crack the case if a lot of movement occurs. The same applies to light-duty nails. They will bend before splitting the side.





Sleek Box with a Sliding Lid

Clean, versatile design offers easy access to what's inside

BY MICHAEL CULLEN

Some years ago I decided to make a box for my wife, Barbara, to hold some of her favorite pens. My design was inspired by the memory of a simple wooden pencil box with a sliding top that I had as a child. To me, boxes are a beautiful expression of what working in wood is all about. Of all the things I make, nothing else holds as much mystery or evokes as much curiosity as a box. I loved making that box, and I've since made many more, in a variety of woods and sizes but all hewing to the same basic design: thin parts, mitered corners with slender splines, and a snug but smoothly sliding lid with a carved fingerhold.

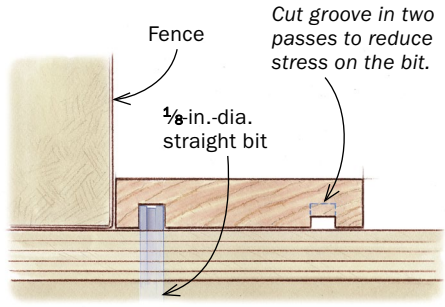
Cut narrow grooves and tiny miters

Because the parts are so thin, I take the utmost care in stock preparation. The lid, in particular, must stay flat over time

Photo, this page: Michael Pekovich

Cut the joinery

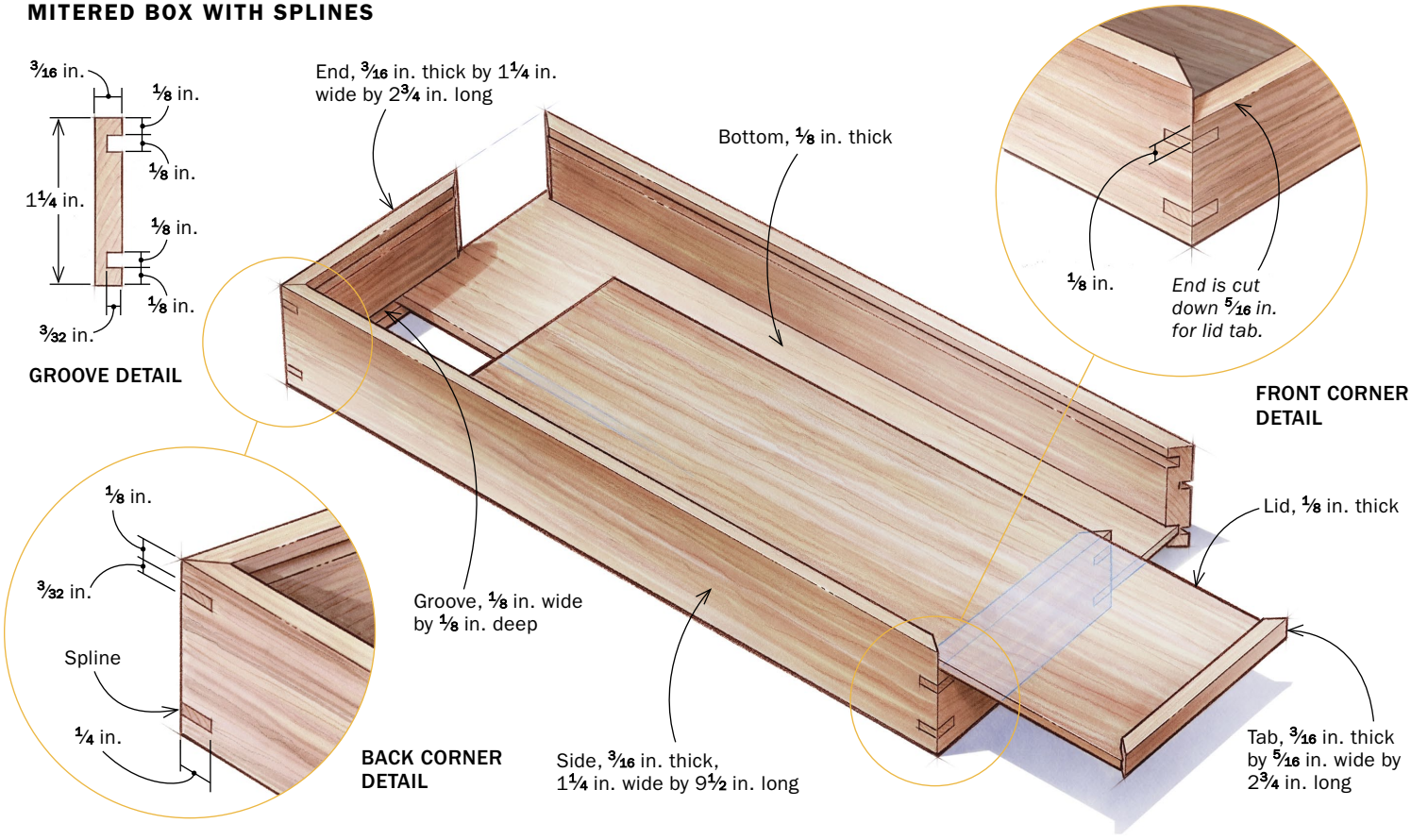
Rout grooves for the lid and bottom. *Because the parts are so small, it's safest to groove the blanks before cutting them to length. Cut both grooves with the fence at the same setting. Fashion a push block if needed.*



Fine miters. *After cutting the sides to rough length on the bandsaw, Cullen cuts the miters in two passes with a jig on the tablesaw. The first pass comes within 1/16 in. of the line, the second skim-cuts to final length.*

Post-miter surgery. *With the miters cut, trim down one end of the box to allow passage of the lid; clean the edge with a block plane. The tab for the lid is cut from an extra piece of end stock that's been mitered to the same length.*

MITERED BOX WITH SPLINES



Drawings: Dan Thornton

Use tape for clamps. *Line up the sides of the box end to end and facedown, then stretch painter's tape across the joints. Prior to assembly, coat all the inside faces first with shellac and then with wax, being careful to keep the miters free of finish.*

Assemble the box

Delicate brushwork. *Flip the parts inside up, then apply glue with a small brush, coating the miters completely but avoiding the grooves.*

so it will always slide without binding. Double and even triple-milling is critical to prevent any twisting or cupping. It's best to use either riftsawn or quartersawn material, especially for the lid. Because the parts are fairly short, I mill them to final thickness in long strips and cut them to length later.

With the stock thicknessed and ripped to width, make the grooves in the sides to accept the lid and the bottom. I use a router table with a ⅛-in.-dia. straight bit, making each cut in two passes to reduce stress on the bit.

After completing the grooves I miter the corners of the box, using a crosscut jig on the tablesaw. This is the most critical step. Only a precise setup will yield joints that go together flawlessly. Use a sharp blade—it's essential for clean and accurate work on small pieces. I attach sacrificial boards to both the base and the fence of the crosscut jig so the parts are supported right to the blade. I test the setup by mitering a pair of long, straight scrap pieces and checking their interior angle for square with an accurate framing square.

Once the setup is dialed in, miter all the box sides. Depending on the species of wood you're cutting, it's sometimes cleanest to make an initial miter cut 1/16 in. shy of the line, and finish with a skim cut. Don't forget to cut three end pieces for the box—you'll need the extra one to create the tab that will attach to the lid.

Fit and glue the box

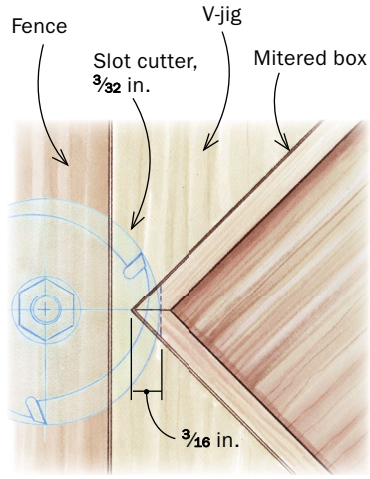
The bottom of the box is fully housed in the grooves, and getting a good fit can be tricky. As I'm putting the bottom through the thickness planer, I go slowly and check the fit often. With the thickness established, cut the bottom to size, ripping it a bit narrow to allow for

Wrap the bottom. *Place the bottom in one long side, then fold the other sides around it (above). Stretch the loose flap of tape to close the last corner tight (left). Then, with fingers on the top edges of the box sides, press down onto the bench to remove any wobble.*

Photos, except where noted: Jonathan Binzen

Add the splines

Slotting for splines. *Use a shopmade V-shaped jig and a slot cutter to cut the spline grooves on the router table.*



Tiny splines. *Mill a piece of spline stock with two clean, parallel edges, then cut it into triangles at the bandsaw.*

seasonal movement. Before glue-up, I finish-sand the entire interior, tape off the miter faces, and apply a very thin coat of shellac, followed by a coat of wax and a good buffing.

Now the parts are ready for assembly. Because they are so small, I use tape instead of clamps. Carefully lay the box sides inside face down and end to end in the correct sequence. Then stretch painter's tape across the joints, flip the whole assembly over to expose the miters, and apply the glue. Coat the miters only, avoiding the grooves. Working quickly, insert the bottom and wrap the sides around it. Set the box aside until the glue is thoroughly dry.

Spline insertion. *Use thumb pressure to push the splines home (above). After the glue has dried, Cullen chisels away most of the protruding spline (right), then finishes flushing it to the surface with a block plane.*

Make the lid

The fit of the lid is critical. *It should slide easily but with almost no play. After milling the lid just oversize, sneak up on a perfect fit by hand-sanding the faces and handplaning the edges.*

Cut and fit the splines

I cut the grooves for the miter splines at the router table using a V-shaped jig and a 3⁄32-in. slot cutter. You could make this cut on the tablesaw, but I like the slot cutter because it creates a clean, square-bottomed groove, making for a perfect fit with the spline. I also like the narrowness of the groove; to me, a box this small needs very thin splines. To make the jig, cut a V-shaped notch in a thick scrap. The jig should hold the box 45° to the router table's fence and should back up the cut where the bit exits the corner of the box.

The next step is to make and glue in the triangular splines. I mill a piece of spline stock that's just wider than the deepest part of the spline groove. Then I make the angle cuts on the bandsaw. When gluing them in, be sure the splines bottom out in the joint.

Slide in the lid

The action of the lid is a vital part of the user's experience of a box. There should be slight, even friction when opening and closing the lid. You'll want just enough resistance so it will stay shut when the box is picked up. When you rip the lid to width, leave it slightly oversize and achieve the final fit with a handplane.

To make the finger hold, use a gouge to create a depression that has a fine-tooled texture, with the cuts arcing inward from all angles. After completing the carving, size and fit the end tab to the lid so that when the box is closed, the seam between the tab and the side below is virtually invisible. Glue on the tab, finish-sand the entire box, and apply several fine coats of shellac. Even out the sheen with 0000 steel wool, then add a thin coat of wax. □

Michael Cullen has been working wood in Petaluma, Calif., since 1990.

Scoop out a finger pull. *Cullen uses an ellipse template to establish the perimeter of the finger pull. Then he carves it out with a gouge, cutting radially from the edge to the center and leaving the facets visible.*

Press on the tab. *After testing it for fit to the miters, glue the tab to the end of the lid with finger pressure.*

Which Waxes Work Best?

A close look at price, performance, appearance, and smell

BY MARK SCHOFIELD

On almost every piece of furniture I've made, the final step has been to apply a coat or two of wax. Nothing beats its slippery feel, the luster is just right, it hides minor imperfections in the finish, and hands down it is the easiest finish to work with. So when *Fine Woodworking* asked if I was interested in testing more than 20 different brands of wax, you'd think I'd have jumped at the chance. Instead I was a little skeptical. You see, although I've used a number of different clear and colored waxes, they never struck me as varying greatly in quality or ease of use, so I feared it would be as exciting as testing bottled water.

How wrong I was. After testing 21 brands of wax, I found that while the majority produce a good result, the effort required varies enormously. You can get excellent waxes for a modest cost, but there are a few that I wouldn't use again at any price.

Testing the waxes

While you can use wax on bare wood or wood that has only a thin penetrating finish, you must apply several coats before you begin to get a modest sheen. At the other extreme, on a very high-gloss finish such as rubbed out lacquer or a French polish, wax

Article Extra
Watch tips on applying wax.

is superfluous and can actually detract from the finish. I decided to use cherry for the test boards and to finish them with a washcoat of shellac and three coats of a wiped-on poly. This resulted in a moderate sheen, but with the grain structure still easily visible.

On this type of board, wax will not only raise the sheen but will reduce the size of the open pores and result in a smoother surface, particularly if you work it well into the surface and apply more than one coat. I applied the wax, waited for it to dry, and buffed it out. The next day I repeated the process. I also tested how easy the wax was to spread and remove by applying each brand to a mirror and buffing it off.

There wasn't a substantial difference between final appearance in most of the waxes. There were a few clunkers in the bunch, and a couple that stood out from the large middle of the pack. In the end, it's the elbow-grease commitment, price, and odor (very subjective criteria) that should dictate your purchase.

Mark Schofield, a woodworker in Southbury, Conn., served as FWW's resident finishing expert for more than a decade.

Wax on, wax off

In testing the waxes, we looked at how easy each was to wipe on and buff off, as well as how they looked.

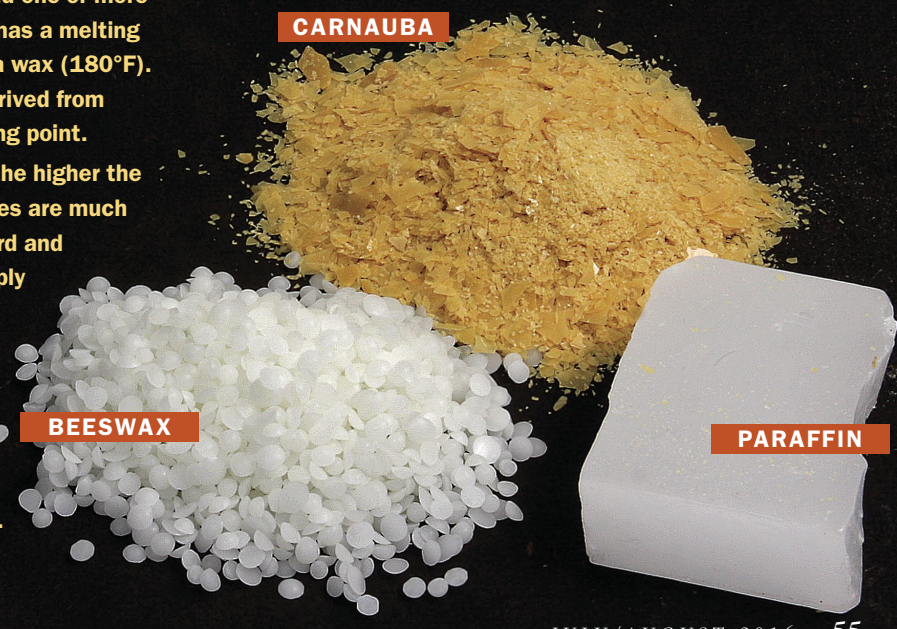
Apply, then buff. *Schofield applied each wax using the outside of a fairly open-weave cotton cloth, monitored how long it took to dry, and then buffed the surface with some soft cotton flannel from an old pair of pajamas.*

The mirror test. *Applying the wax to a mirror (left) was a great visual way to illustrate how some waxes spread beautifully, while others are sticky and lumpy. Equally, some waxes buffed out completely to leave a clear, shiny surface (right), while others remained smeary no matter how often Schofield turned the cloth to a clean section.*

What goes into a paste wax?

Paste waxes are a combination of one or more waxes and one or more solvents. The main waxes used are paraffin wax (which has a melting point of 130°F), beeswax (140° to 150°F), and carnauba wax (180°F). Some use microcrystalline wax, which like paraffin is derived from crude oil but which has finer crystals and a higher melting point.

The higher the melting point, the harder the wax, and the higher the gloss or sheen that it will produce. However, harder waxes are much more difficult to buff, so manufacturers tend to blend hard and soft waxes to come up with a product that is easy to apply and produces a good sheen. Consequently, most paste waxes have a similar melting point and yield a similar sheen. Solvents are added to soften the wax so that it can be used at room temperature. How quickly the wax dries depends on the solvent used. Toluene evaporates faster than mineral spirits, so brands with it, such as Briwax, harden faster than most other waxes.



Photos, except where noted: Anissa Kapsales

21 waxes

Wax adds luster and protection, and can even minimize flaws. Finding the right wax is as much personal preference as it is a result of scientific data.

ANGELUS CLEAR SHOE POLISH

3 oz./ $6*

This is a hard, dense wax with almost no smell. It's easy to get a thin, even coat. It contains no silicone, an oil that can cause refinishing problems. It buffed out very easily to leave a smooth, even, slick finish.

ANTIQUAX ORIGINAL WAX POLISH

100 ml/$14

Antiquax has a slight traditional wax smell, which is a combination of beeswax and mineral spirits. It has a medium density and is very easy to apply. It took some effort to buff out. While the finished sheen was average, it wasn't quite as slick as most.

BRIWAX ORIGINAL

1 lb./$18

The strongest smelling wax, probably from its toluene solvent, this fast-drying wax was hard to apply evenly, which meant that buffing out took more effort. The result, though, was one of the highest shines of all the waxes.

CLAPHAM'S BEESWAX POLISH

7 oz./$23

Not a pure beeswax—it also contains a little carnauba—it has almost no smell. It was the softest wax and felt rather oily and gooey, but I wiped it around and got an even coating. Buffing also felt different, with less of a transition from sticky to slick, but the shine was about average.

*Prices shown are per smallest container available.

CONSERVATOR'S WAX

125 ml./$12

One of three microcrystalline waxes, this had almost no smell. It felt oily and slippery to wipe on but was easy to spread to a thin film. It was a bit sticky at first but buffed out to an above-average shine.

DADDY VAN'S UNSCENTED BEESWAX FURNITURE POLISH

5 oz./$11

This wax contains olive oil and carnauba wax, but no solvents or petroleum by-products. It is quite hard in the can, but it has an oily feel when applied. The wax never dried completely and I was unable to remove all the smearing during the mirror test. It yielded the lowest shine of all the waxes.

DR. KIRK'S VERSA-WAX

4 oz./$9

A microcrystalline wax, Versa-Wax has a soft consistency instead of being hard. It goes on sticky and is very difficult to spread out to a thin layer. Getting this wax buffed was extremely difficult but I was able to obtain an average sheen after a lot of work and cloth turning. Even so, the surface stayed squeaky and not slick.

DURA SEAL PASTE WAX

1 lb./$20

Dura Seal is designed for floors. Nevertheless, the soft wax was easy to apply. It buffed out fairly easily, and had a medium sheen and a slight smell of mineral spirits.

FIDDES & SONS SUPREME WAX POLISH

500 ml./$19

With a fairly strong mineral spirits smell, this wax is soft and slippery when you start to apply it but dries fast, so you need to avoid using too much. It was easy to buff out as long as the coating was thin. It produced a slightly above-average sheen.

GODDARD'S CABINET MAKERS WAX

4 oz./$7

Goddard's has a strong scent of mineral spirits and lemon oil, and a deep yellow color. It was quite greasy to apply, and you need to apply it thinly. It buffed out the easiest of all the waxes, leaving a very slick surface.

HARRELL'S TRADITIONAL WAX POLISH

400 grams/$39

This wax has a mineral spirits smell and is quite hard. It was slippery and very easy to apply as an even coating. Buffing does require some effort but the resulting shine is pleasant.

Photo: Michael Pekovich

HOWARD'S CITRUS-SHIELD PREMIUM PASTE WAX

11 oz./$13

This wax has a pleasant orange scent. It was very easy to apply, with an almost wet feeling. The instructions say to wait 3 to 5 minutes or until a haze develops before buffing. After 15 minutes it smeared rather than buffed, and even after nearly 40 minutes it didn't seem to really buff out. The shine is toward the lower end of the range.

LIBERON WAX POLISH BLACK BISON

500 ml./$30

With a slight vanilla scent and soft consistency, this wax was rather oily and greasy to apply. It required some rubbing and turning of the cloth to remove all the surplus, but it did yield a good sheen.

LUNDMARK PASTE WAX

1 lb./$8

This product was so hard in the can that it was quite difficult to get any on the cloth, but once on the wood it spread easily to an even coat. It took longer to dry than most of the other waxes and when buffed produced only a low sheen.

MINWAX PASTE FINISHING WAX

1 lb./$13

This tan-colored wax was quite hard in the can, but it went on fairly easily, and buffed out with no trouble. It has a slightly lower sheen than some of the other waxes.

MYLANDS WAX POLISH

1 lb./$19

Mylands had the same solvent smell as the Briwax but not as strong. It was difficult to apply in a thin layer and, like the Briwax, it dried very fast. It was easy to buff except in areas applied thickly, which took some effort. The result was a higher shine than most of the other waxes.

ODIE'S WAX

9 oz./$38

The only wax that comes in a glass jar, it looked more like a foodstuff, complete with a freshness seal across the lid. The "scientific proprietary formula" is the result of "30 years research and development," but my advice is to go back to the lab. Applying the wax felt more like spreading suet, resulting in a thick, smeary film. Buffing it up was even more of a chore, and even with frequent cloth changes I was unable to remove all the smearing, resulting in a shiny but slightly sticky surface.

RENAISSANCE WAX

65 ml/$14

This wax was my personal favorite. It has a white appearance like the other microcrystalline wax from Conservator's, but with a stronger, mineral spirits smell. It is the most expensive wax and comes in the smallest container, so it is just as well that a little goes a long way. Renaissance was the easiest wax to apply; a very small amount gave thin, even coverage. It dried very fast but buffing it was no problem, yielding a very slick surface with a medium sheen.

S.C. JOHNSON PASTE WAX

1 lb./$13

A mass-market wax, Johnson's is almost as good as the best waxes. It has a rather strong mineral spirits smell but it went on almost as easily as the Renaissance wax with a slippery, wet feel. Buffing it was also simple, both on the wood where it produced a slightly lower sheen and on the mirror where all the wax came off easily. It gave some of the best results and was among the least expensive.

STAPLES CRYSTAL CLEAR PASTE WAX

1 lb./$13

Not linked to the office-supply store, this wax has been made in New Hampshire since 1897. Whereas most waxes make a virtue of containing beeswax, this one specifically excludes it (along with silicones). Like the S.C. Johnson wax, it was easy to apply and manipulate with a wet feel, but it was harder to buff away all the surplus, with some smearing left on the mirror despite frequent cloth changes. It produced a slightly lower-than-average shine.

TREWAX CLEAR PASTE WAX

12.35 oz./$14

Trewax is the only wax that comes with its own applicator sponge, but curiously the directions only mention using a soft cloth, or 00 steel wool, which seems too aggressive. One of the hardest waxes, it took some rubbing to get any on the cloth. This wax went on the wood rather thick and smeary and was a chore to even out. Buffing required a lot of elbow grease but the finished result was a high, even shine. Other waxes yield equal or better results with a lot less effort.

Marriage of Metal and Wood

Woodworkers in search of a perfect union of materials

BY JONATHAN BINZEN

Wood is such a compelling material that it's easy to spend a career building with nothing else. Its range of textures, tones, and aromas, its strength and warmth, its adaptability and flexibility—all these make it inexhaustibly interesting to use and explore.

But for some dyed-in-the-wool woodworkers, the enjoyment and challenge of using wood is deepened by pairing it with other materials. We've brought together here a handful of the many makers currently advancing the art of combining metal with wood.

Greg Klassen, a furniture maker trained in woodwork in the program founded by James Krenov, speaks for many other materially adventurous makers when he says, "Wood is my first love, but I'm always searching for a material to pair with it, something that makes the wood even more beautiful."

And Seattle furniture maker Stewart Wurtz, who builds primarily with wood but includes a wide range of metals in his work, says, "When you pair metal with wood you create contrasts—of hard and soft, cold and warm, bright and matte—that emphasize the best attributes of both. It's a marriage of materials, and they really sing when they're combined."

Photo, this page: Tor Erickson

Michael Robbins

PHILMONT, N.Y.

When Michael Robbins has an idea for a new piece of furniture he'll start with some "quick, intuitive sketching," but the design process really comes to life, he says, when he gets his hands on the material. "I've never been great at drawing, so I'll just pull out some material and start making something." The material is most often wood, but Robbins, being largely self-taught in woodworking, is not afraid to dive into other materials and learn them as well.

His Bridle benches, with their bows of brass bar, were born when he had a prototype for an all-wood bench in progress in his shop. "One day I ordered some brass bar and just tried it out," he says. Purchasing free-machining flat brass bar stock from Onlinemetals.com (his go-to source), he found he could cut it cleanly with a chopsaw and bend it by hand without kinking. For the benches, he uses brass bar stock ⅛ in. thick and 1 in. wide and pins it at the midpoint to the underside of the bench with a wood screw. At the ends he uses Chicago screws sealed with Loctite to attach the bar to the stretchers. On pieces that require bends of a radius too tight to make by hand, Robbins has a metal shop bend the brass bar for him with a ring roller.

The brass bonus. *Blending brass and wood "brings a piece into a new realm," Robbins says. Like the leather he often uses on seating surfaces, brass offers a contrast with wood in color, texture, and warmth. Robbins polishes the brass with Scotch Brite and brings it to a shine with Brasso brass cleaner. He leaves it without a finish, so it develops a patina over time.*

Photos, this page: Jonathan Binzen (portrait), Michael Robbins (furniture)

Greg Klassen

EVERSON, WASH.

For Greg Klassen, live-edge slabs are an ongoing inspiration. "I always put a huge value on celebrating and showcasing the beauty of the wood," he says. One way he does that is by seeking out other materials to pair with it that emphasize wood's attributes. Steel, Klassen finds, is a perfect complement to wood, allowing the wood to shine while delivering structural properties that wood lacks. For his series of Longhorn tables, Klassen designed a leg with a shape that would have been weak in solid wood. By sandwiching wood between ¼-in.-thick sheets of mild steel, though, he created a leg that delivered both strength and style.

Klassen had the steel cut at a metal shop, where they used a CNC-driven laser to cut the perimeter and create the screw holes. From the waste areas of the sheet, Klassen had them cut butterflies, which he mortised into the tabletop.

To make the interior portion of the leg, Klassen milled rectangular pieces of 10/4 walnut and connected them with mortise-and-tenon joints. He used the laser-cut steel as a template, first tracing it onto the wooden blank and bandsawing near the line, then screwing the steel in place and using it to guide a flush-trimming bit in the router table.

Klassen creates a slightly cloudy surface pattern on the steel by sanding it with a fine-grit pad in an angle grinder. He wipes a poly-oil finish on the completed leg.

Style and substance. *Steel, whether in sheet form or rod, brings out the warmth of wood while providing structural solutions that wood can't. For his side chair, Klassen worked with a metal sculptor, who bent most of the side frame from a single bar, then welded in the seat rail.*

Photos, this page: Greg Klassen

Stewart Wurtz

SEATTLE

Stewart Wurtz has been building furniture with wood for 40 years, and it's still the predominant material in his repertoire. But in more and more pieces lately he's finding a role for metal. "What draws me to metal," he says, "is the simplicity, minimalism, and practicality it provides." It enables him to bring lightness to his designs without sacrificing strength. "And when wood and metal are juxtaposed, both materials really jump."

Aluminum was the entryway into metals for Wurtz, because he could easily work it with woodworking tools. And when he saw the design opportunities aluminum offered, he was encouraged to explore further. He'd used aluminum mainly as an accent element, but he turned to steel for its structural muscle.

Wurtz developed relationships with local metal shops, and through working with them learned the strengths and nuances of each material, enabling him to design with those attributes in mind. Once folded, even thin sheet steel becomes totally rigid, he learned. He was able to build his outdoor bench with 3⁄16-in.-thick stainless steel brake-formed to an L-shape. Bending creates a radiused corner, as in his ash and blackened steel desk. In a design where he wanted sharp corners instead of rounded ones, he would specify welded joints rather than bent ones.

When wood and metal are juxtaposed, both materials really jump.

Levitation in steel. *Wurtz uses sheet steel in ways that emphasize its thinness and apparent lightness: He left the back of his nightstand open, created a void at the center of his side table's steel base, and offset the drawer box from the steel frame of his desk. Steel can be powder-coated, a paint-like process, but Wurtz's blackened steel pieces have a patina produced through chemical oxidation by spritzing the surface with a solution and wiping it off.*

Photos, this page: Jonathan Binzen (portrait), Timothy Aguero (furniture)

Robert and Tor Erickson

NEVADA CITY, CALIF.

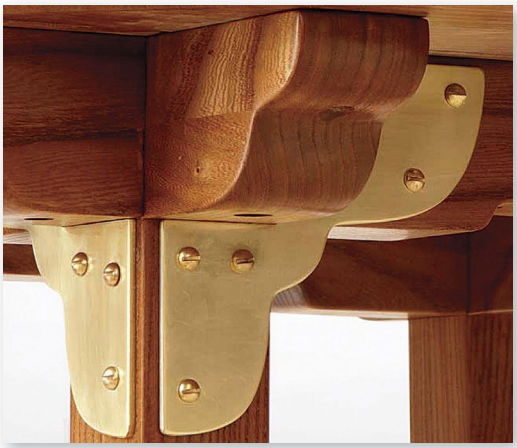
In Robert and Tor Erickson's shop, perched among towering pines in California's Sierra Nevada Mountains and powered by solar panels, outstanding wood has been at the heart of things since Robert began making chairs 45 years ago. He had used wrought steel in his work (see the back cover), and had used aluminum as an accent material. But now that his son, Tor (right), has joined him in the business, a wide range of metals are becoming commonplace in their furniture.

Brass meets burl. *Tor Erickson turns a burl detail that's placed at the junction between the upper and lower portions of the leg. The round screw plate, machined to their specs along with the leg, provides ample attachment for a rock-solid table even without aprons.*

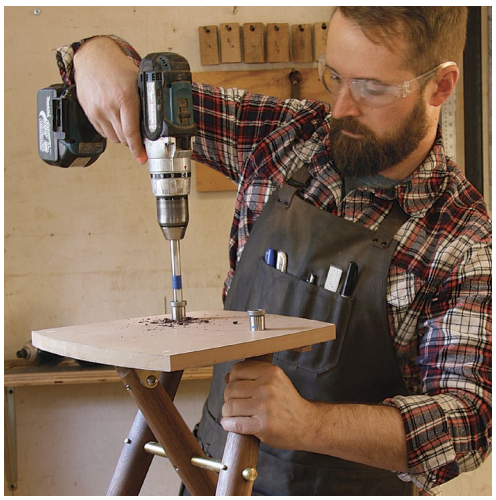
The Ericksons work with traditional blacksmiths for their pieces in wrought steel, and with a machine shop with CNC capability for much of their work in brass and machined steel. For their dining table at right, with its top of claro walnut, Tor envisioned very thin legs. He was inspired by Mid-Century Modern legs in wood but wanted them made in brass. When he heard that their machinist's lathe was not long enough to make the legs in one piece, he decided to add a turned burl detail at the joint—"a happy accident," he says.

For their Langhorne stool (opposite), the Ericksons wanted a piece that felt totally solid in use yet would fold flat with ease. To achieve both objectives, they needed a piston fit for all the moving parts. They got it by sending the legs out to be turned and drilled on CNC machinery.

Photos, this page: Jonathan Binzen (top, center left, center), Tor Erickson (center right), Iker Basterretxea (bottom right)



Elm above, brass below. *For this outdoor table in European elm, the Ericksons made brass gussets to reinforce the leg-to-apron joinery. They used woodworking tools—bandsaw, router, files, and twist drills—to shape the parts, and 0000 steel wool to burnish them. They ordered the brass from the McMaster-Carr catalog (mcmaster.com).*



Tightening the tolerances. *For maximum precision, the Ericksons had the legs and rungs machined by shops with CNC equipment. To match those tolerances while they drilled holes by hand, they used MDF templates with steel bushings.*

Photos, this page: Tor Erickson (top left, top right), Jonathan Binzen (center left, bottom left), Revisit (bottom right)

Peter Harrison

MIDDLE GROVE, N.Y.

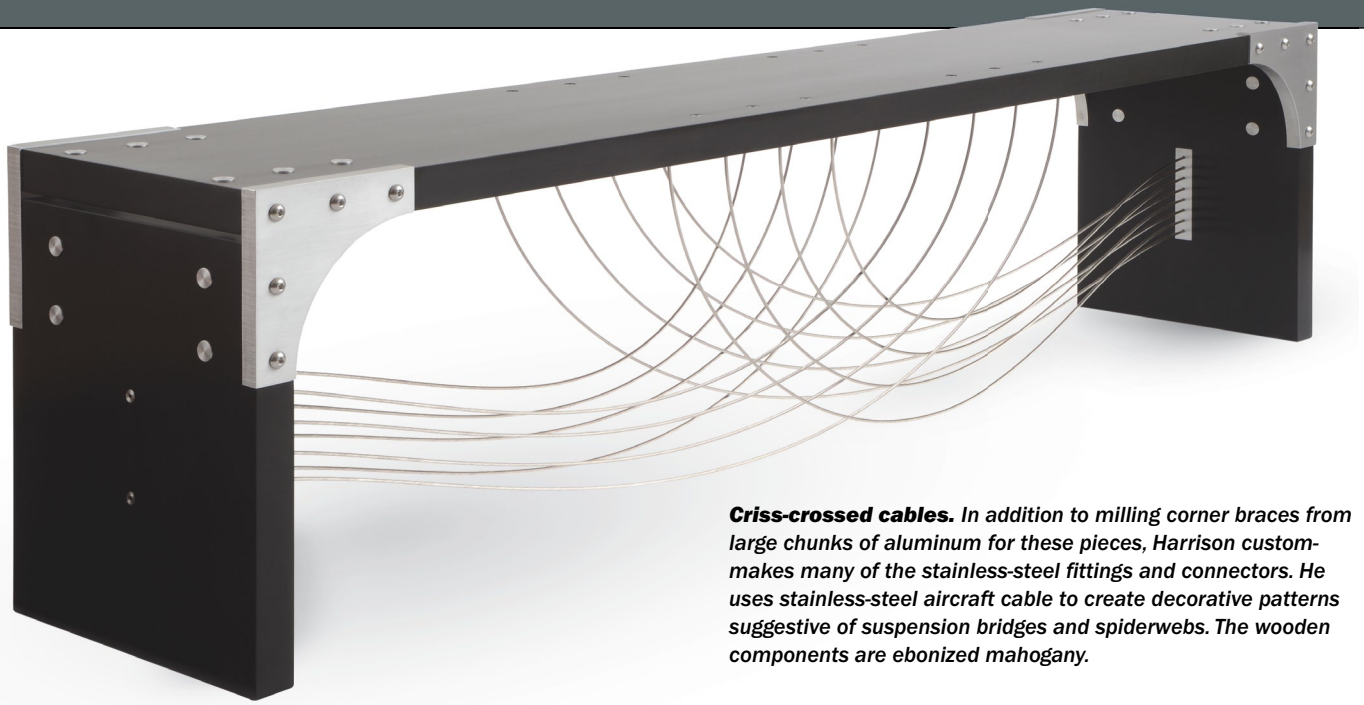
While studying in the renowned furniture program at Rochester Institute of Technology in the 1990s, Peter Harrison received a thorough indoctrination in working wood. But even before he left school he was delving into metals. And in the years since he has become entirely ambidextrous in the two materials. In the shop he built near Saratoga Springs, N.Y., he has a full machine shop to complement his impressive woodworking setup, and he can shape and machine metal parts for his furniture as fluidly as ones in wood.

An early impetus for blending metal and wood was to avoid traditional woodworking joints. He thought it would be more efficient to machine his own fasteners than to lavish time on cutting and cleaning up complex glue joints. Along the way, his metal components have become as decoratively powerful as they are structurally dependable.

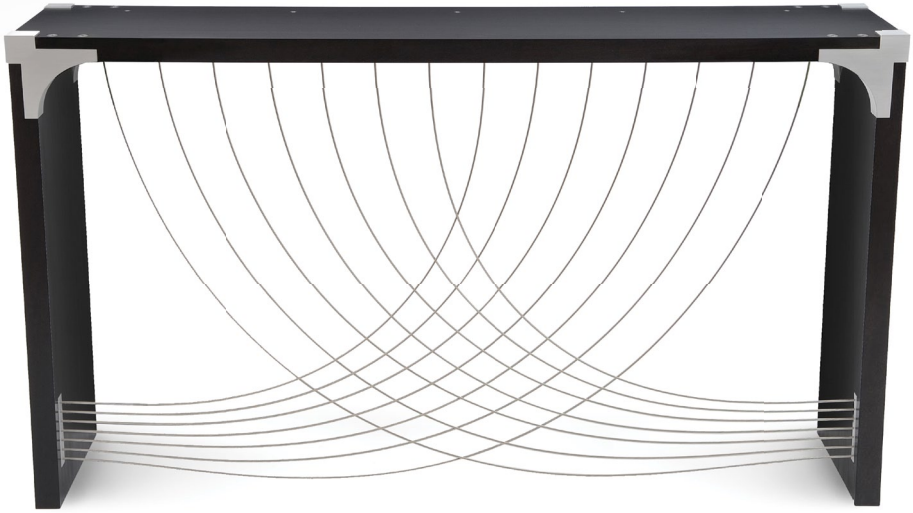
Beauty in a box. *Harrison's Oahu table was designed for a client in Hawaii so it could be transported in a suitcase and assembled on arrival. The system of brackets he devised was fun and effective, and has since spawned a series of other pieces.*

Working metal in the woodshop

Many of the machines in Peter Harrison's shop serve double duty, proving equally useful for shaping wood or metal. To make the gussets for a recent piece, he began by cutting aluminum sheet stock to rough shape at the bandsaw. On a typesetter's tablesaw that he finds indispensable for fine crosscutting of both wood and metal, he makes square cuts on three sides of the gusset. With a template-routing jig on his shaper, he trims the curved parts of the gusset to shape. And finally, at the drill press he cuts screw holes, which he'll then de-burr with a hand drill.



Criss-crossed cables. *In addition to milling corner braces from large chunks of aluminum for these pieces, Harrison custom-makes many of the stainless-steel fittings and connectors. He uses stainless-steel aircraft cable to create decorative patterns suggestive of suspension bridges and spiderwebs. The wooden components are ebonized mahogany.*



Photos, this page and opposite: Jonathan Binzen (portrait and action shots), Stock Studios Photography (furniture)

Turn a Bowl

Make a functional and beautiful bowl from a chunk of green wood

BY MIKE MAHONEY

Wooden bowls no doubt have a utilitarian appeal. Truly organic, they're a natural for holding fruit and mixing dough but work just as well for a cereal-and-milk breakfast or a popcorn snack. Wooden bowls also can be beautiful, the highlight of any kitchen. Perhaps it's this potential for attractive, organic utility that makes them so popular.

Bowls are also fun to turn and don't require a lot of tools. All you really need—in addition to the lathe—are a bowl gouge, a spindle gouge, and a round-nose scraper. As for the wood, kiln-dried is fine, but it's hard to find a chunk big enough for a bowl that's not cracked. Green wood is a better choice. You rough out the green-wood bowl, let it dry, and then turn it to its final shape a few months later.

The species of wood is important, especially if you want to use the bowl in the kitchen. Many North American hardwoods make great functional bowls, with the exception of very hard woods like locust, hickory, and osage orange. The density of these woods makes them brittle, and they can't take the shock when dropped on the floor or banged on a hard surface. Avoid red oak, too. Its pores are too open, so liquid in the bowl soon becomes liquid on your counter. I like claro walnut. Not only is it beautiful, but it also works exceptionally well and is easy to dry. It's

Start green, then let it dry

A chunk of dried wood big enough for a bowl can be hard (and expensive) to come by, so start with a blank cut from a trunk or branch. After roughing it out, set it aside to dry.

From log to round blank. *Mahoney always begins with green wood cut from a section of trunk or branch. At the bandsaw, he roughs out the bowl, following a plywood template secured with a nail.*

Mount the blank on a screw center. *This is the simplest and safest way to mount a rough blank, but it's important that the blank be in solid contact with the chuck. Use the tailstock, too.*

what I'll use here as I demonstrate how to turn a bowl.

Rough turning speeds drying

I cut all of my bowl blanks straight from the log with a chainsaw. It would take forever for the blank to dry if left as a big chunk of solid wood, so I rough out the bowl first and then set it aside to dry, which cuts down the wait time from many years to just a few months. After it's dry you can turn the bowl to its final shape.

Begin the roughing process by cutting the blank round on the bandsaw. Then it goes directly onto the lathe. The best way to mount a bowl blank is with a screw center. Drill a pilot hole (as close to center as you can get it) and thread the blank onto the screw center. Bring the tailstock into place and tighten it against the blank. Set the tool rest just below center and parallel to the bed, then rotate the blank by hand to ensure that it spins without hitting the rest.

Now you're ready to turn the blank round, but before you put tool to wood, give some thought to how fast the blank should spin. The blank's diameter multiplied by the lathe's rpm should equal between 6,000 and 9,000. This blank is 12½ in. in diameter, so it can be safely turned between 500 and 800 rpm.

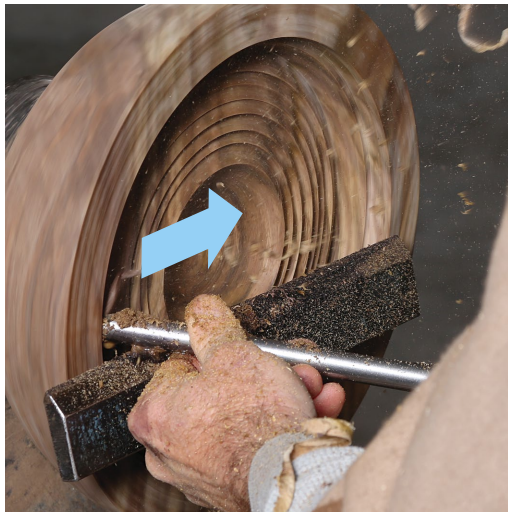
First, use a ½-in. bowl gouge with a fingernail grind. Start at

Rough-turn the bowl's outside. *After turning the blank round using a ½-in. bowl gouge with a fingernail grind, begin to shape the bottom half so that you can turn a tenon. Cut from the middle of the blank toward the tailstock.*

Add a tenon. *Cut it with a ⅜-in. spindle gouge—the flute is rotated 90° counterclockwise. The tenon's diameter should be 40% of the bowl's diameter.*

Chuck the tenon and true the face. *The bottom of the blank should sit firmly against the chuck's rim (above). With the tool rest parallel to the blank's face (and as close as you can get it), true the face with a ½-in. bowl gouge. Rotate the flute 90° counterclockwise and work from the outside in (right).*

Hollow the interior. *Rotate the gouge clockwise until the flute is between two and three o'clock. Always work from the outside in toward the center, cutting more deeply as you go to avoid end-grain cuts.*



Chamfer the rim's edges. *This slows down the drying process on the bowl's rim and prevents the cracking that occurs when the corners are left sharp.*

Seal it for drying. *Write the date on the bowl, coat it with a green-wood sealer, then let it dry for at least 30 days. Depending on the species, it could take 120 days or more for the blank to dry completely.*

Photos: Matt Kenney

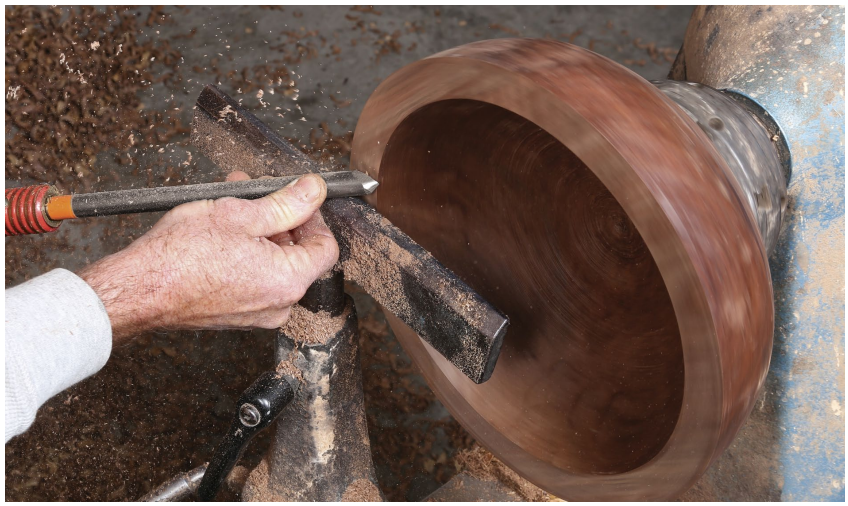
Turn the dry bowl to its final shape

The blank will move and distort as it dries, but once it is dry, you can safely complete the turning. The process is much the same as before: Start on the outside and then hollow the inside.

Pinch the bowl between the tailstock and chuck. *Open the jaws as wide as they go, and spin the blank by hand to check its balance.*

Turn the tenon round again. *As the bowl blank dried, it most likely deformed, and the tenon will not fit the chuck securely. So first turn it round again.*

Clean up the rim. *After chucking the tenon, true the rim's top edge by holding the gouge with the flute rotated 90° counterclockwise. This creates a scraping cut.*



the tailstock and work toward the headstock, turning off the lathe frequently to check for defects in the wood that could fly free, or cause the tool to catch.

After the blank is round, shape the bowl's exterior. The reason to do this now is to remove enough material to allow you to form a tenon on the tailstock end of the blank. Eventually this tenon will become the bowl's base, so keep in mind that a well-made, finished bowl should have a base diameter that's one third of its overall diameter. At this stage of turning the bowl, I aim for a tenon that's 40% of the blank's diameter. I use a ⅜-in. spindle gouge to cut tenons. It has a very long grind that makes it easier to cut the dovetail-shaped "cheek" required by my chuck.

Take the blank off the screw center and mount the tenon in the chuck, making sure that it sits firmly against the chuck. True the blank's face, using the bowl gouge with the flute turned to the 9 o'clock position (90° counterclockwise), and scraping back and forth.

Next, rotate the gouge's flute to the 2:30 position and hollow the bowl. Work from left to right. Aim for a wall thickness that is 10% of

Complete the outside. *Before you move on to the inside, turn the exterior of the bowl to its final shape, including any decorative beads and channels.*

Turn the interior to match. *Turn the outer third, then the middle third, and the inner third last. Leave the bottom rough for now.*

Consistent wall thickness is important. *Keep the walls between ¼ in. and ⅜ in. thick. To minimize distortion, the thickness should be uniform.*

Two steps to determine the depth. *First, measure the interior's depth, sighting across the rim to gauge it (far left). Then, measure down from the rim on the outside of the bowl (left). This gives you a good idea of how much material you can remove.*

the blank's diameter. Hollow the blank in stages, starting with the top third, then the middle, and then the bottom third. Take the blank out of the chuck and coat it with a green-wood sealer like Anchorseal to prevent the bowl from drying too quickly, which can cause cracking. Let the blank dry for at least 30 days. Keep in mind, though, that it might take 120 days or more to dry depending on the species and climate.

Repeat with the dry blank

After the blank has dried, put it back on the lathe, between the tailstock and the chuck. True the tenon, then mount the tenon in the chuck. Now true up the rim, using

Scrape the bottom. *After removing most of the material with a gouge, switch over to a round-nose scraper to finish the bottom.*

Complete the outside and bottom

It's time to trim the tenon and turn it into a foot. Use the tailstock to press the bowl against a jam chuck (a wooden block that fits inside the rim), so that you can work on the bowl's bottom.

Sand inside and out. *Mahoney starts with an 80- or 120-grit sanding pad in a drill, depending upon how rough the surface is (right). The drill spins the pad at 2,400 rpm, while the lathe is spinning at 500 rpm. He then switches over to hand-sanding, working from 120-grit paper up to 400-grit (below).*

the same technique used on the blank's face. Next, turn the bowl's exterior to its final shape. Because of the chuck, you won't be able to do the base at this point. You'll turn it a bit later in the process.

If you want to give the rim a decorative profile, do it now. I put a small ogee on the inside of the rim—a place for your thumb to land when you pick up the bowl.

Next up is the interior. As before, turn the top third, then the middle third, and finally the bottom third. I keep the wall of the bowl between ¼ in. and ⅜ in. thick. Check the thickness with a pair of calipers. Measure the bowl's depth with a tape measure to determine how much material to remove there.

Fair the interior curve using a round-nose scraper. You also can use the scraper to finish the bottom.

VIDEO WORKSHOP

Watch Mahoney turn a bowl from start to finish in a members-only video.

The jam chuck needs a rabbet. *Mahoney keeps a large jam chuck on hand, which he can quickly tune for the job at hand. Using a spindle gouge, he turns a rabbet on its face (above). The rabbet should fit snugly into the bowl without distorting it (right).*

Blend the sides into the bottom. *You're looking for a fair transition from the sides to the bottom.*

Turn a foot for stability. *After turning the tenon shorter, pull the tailstock out of the way and hollow out the center of the tenon. The rim created becomes a foot that sits nicely on a table or counter.*

Sand the interior and exterior of the bowl up to 400 grit and then take it off the chuck. It's time to turn the lower section of the bowl's exterior and create a foot from the tenon. To do this, you'll need a jam chuck that fits snugly inside the bowl. It should be tight enough to hold the bowl in place by friction alone.

Fit the bowl over the jam chuck and slide the tailstock into place. Blend the base into the bowl sides, working until the tenon is a third of the bowl's diameter. I also turn off much of its length. With the tailstock still in place, turn the bottom of the tenon concave. Do as much as you can with the tailstock in place, then pull it out of the way and finish off the job with light cuts.

Sand the freshly cut areas. Turn off the lathe and tap the back of the jam chuck to vibrate the bowl off the chuck. For bowls that will get used, I prefer a penetrating oil finish like mineral or walnut oil. They're easy to replenish. If the bowl is for display only, a film finish like polyurethane is fine. □

Professional turner Mike Mahoney lives and works in the beautiful foothills of the Sierra Nevada mountains near Sacramento, Calif.

An oil finish is easy to maintain. *Mahoney prefers walnut oil, which doesn't dry to a film finish. You'll need to rejuvenate the oil from time to time, but you'll never have to refinish the bowl.*

gallery

HANS-GÖRAN HÅRDEMARK
Stockholm, Sweden

A table similar to this one caught Hårdemark's eye while he was watching a television show that visited a Swedish author's home. "I contacted his publisher and was invited to come to his home and measure it. He thought it was built in Germany in the early 1900s." Hårdemark reproduced the table he admired, but made it a bit lower so it could serve as a coffee table.

ELM AND EBONY, 34 DIA. X 23H

Beethoven's Fifth. *Each horizontal row represents a line on the musical staff. The short ebony segments are quarter notes while the longer ones are whole notes.*

ROGER MYERS
Stratham, N.H.

There are a lot of stunning details in this Federal-style music stand, but the most subtle of them is likely to be appreciated most by the musician who uses it. A custom ebony and holly banding on the desk pays homage to one of the great composers: The first four measures of Beethoven's Fifth Symphony are repeated in its geometric pattern. For more on Myers's stand, go to FineWoodworking.com/extras.

MAHOGANY, BRAZILIAN SATINWOOD, HOLLY, AND EBONY,
18W X 14H (MUSIC HOLDER ONLY),
18D X 18W X 48H (OVERALL)

MAGGIE JUDGE
Mill Valley, Calif.

Judge designed and built this small rocking toy for her son, Asher, about a year ago. "It still stands up to his more ambitious rocking, which is often accompanied by a rousing round of 'Row, Row, Row Your Boat.'" An architect by profession, Judge enjoys making things for her home. She says she may soon get to make another rocker, or something "equally unique and playful," for Asher's new baby sister.

CHERRY AND BASSWOOD,
8½W X 25L X 14H

EARL KELLY
Pensacola, Fla.

This cabinet is one of a series Kelly made using different colors and patterns of veneer. The front door panel is Macassar ebony veneer, and the side and back panels are engineered veneer in a herringbone pattern. Inside, the shelves are adjustable so it can be used to store anything from books to liquor to lingerie.

WENGE, MACASSAR EBONY, AND ENGINEERED VENEER, 16D X 20W X 50H

JERRY LAUCHLE
State College, Pa.

Lauchle designed this desk to showcase classic elements of the Chippendale style, which is his specialty. The ball-and-claw feet, acanthus-leaf carvings on the knees, and the fan on the gallery door were all carved by hand with chisels—no power carving for this period furniture maker.

MAHOGANY, 18D X 34W X 42H

NICHOLAS G. BRYGIDYR
Montreal, Que., Canada

Brygidyr's hall table is a symphony of curves. "The sides and back are poplar, hand planed to the curve, then veneered over with shopsawn walnut veneer. The drawer fronts, which took the longest—about a month for practice and a month for the real things—have dovetails cut on a curve. I spent many hours shaping the legs with a spokeshave, stopping to feel the facets disappear after every few passes."

WALNUT, 12D X 38W X 32H

GARY ARTHURS
Pottstown, Pa.

Arthurs built several prototypes before coming up with the final design of this dining table. Since the bottoms of the laminated and veneered legs were about 8 in. wide, he used a bandsaw jig and sled to cut the compound angles. "My favorite part of the table is how the sculpture of the legs changes depending on the viewing angle." Arthurs teaches woodworking at The Hill School in Pottstown.

TIGER MAPLE AND WENGE, 98W X 134L X 30H

Photo: Nancy Coe

PETER PESTALOZZI
Ely, Minn.

Pestalozzi calls this rocker "Surf's Up" because its shape and rocking motion remind him of being in a kayak in the surf and waves. "For the last 10 years many of the pieces I have done have been based on imagery from Lake Superior," he says.

WALNUT, 42D X 23W X 44H

JACK WEST
Fort Jones, Calif.

West got inspiration for this table from two projects. The shape was inspired by Ray Finan's "Triangle Table" (*FWW* #232), as was the beam-compass method for laying out the tabletop. The spin-out drawer was inspired by Garrett Hack's table in *FWW* #234. West added the curved, laminated lower stretchers for strength.

BLACK WALNUT AND SPALTED MAPLE, 19D X 19W X 24H

Photo: George Post

KYLE TOTH
Temecula, Calif.

Toth received the veneer for this box in 2011, while he was a student at North Bennet Street School—a Boston furniture maker left it to the school when he passed away. The box has a sliding tray and the drawer bottom is carved with a leopard print design and lined with aluminum. To see a video of the box being made, check out Toth's website at woodbytoth.com.

CHERRY, REDWOOD BURL, BLACK VENEER, EBONY, AND ALUMINUM,
8½D X 16W X 4¼H

STEPHEN SHANKLES
Maryville, Tenn.

This cabinet-on-stand owes its existence to the Tennessee Arts Commission's Master Artist Apprenticeship Program. Shankles worked alongside furniture maker Scott Dewaard to design the piece. "The real trick was getting the curved door mortise-and-tenon joints accurately cut."

CHERRY, 13D X 30W X 67H

JEFFREY WATSON
Fayetteville, N.Y.

Watson designed this curio cabinet, complete with blown, curved glass, to display a collection of antique china. "We already had a semicircular piece in our dining room and I wanted a wall-hung piece above it. I thought that a square cabinet over the circular piece just wouldn't work." Watson, a dentist, says he was looking for a challenge and this project provided it. The cabinet is finished with Bush Oil.

MAPLE, 22D X 38W X 28H

Two block planes are better than one

BY GARRETT HACK

One for coarse work and one for fine. *The apron plane (right), works quickly at roughing out curves, profiles, and chamfers. The adjustable-mouth block plane (left) follows to fine-tune and smooth the surface.*

Every handplane has its own personality. It may take a few months to figure out, but once you discover what a plane does really well, how best to tune it, how tight the throat can be, and which bevel angle works best on the blade, the tool really begins to sing.

This is certainly true of my two favorite block planes, which are always close at hand. The larger, a Lie-Nielsen No. 60½, is set up to be precise. It has an adjustable mouth that I keep tight, a firmly bedded blade, and ample weight, making it perfect for taking thin, delicate shavings. The other, a small Veritas apron plane, is set up to take thick shavings. It has a wide throat, is light in my hand, and is nimble, three features that make it a snap to work the plane quickly.

But I don't think of these block planes as independent tools. Rather, they are a complementary pair that work great together. I use each to its strength. I call the apron plane into service first, using it for rough work, getting things close. Then, I set it aside and pick up the adjustable-mouth block plane to take the last few, delicate, shavings. By the way, I keep both blades sharpened at an easy-to-maintain 25°.

Garret Hack is a contributing editor.

Photos: Matt Kenney

Refine curved parts

COARSE FINE

Whether it's been cut at the bandsaw or bent with steam, a curved part needs to be cleaned up and faired to look its best. Set up to remove wood quickly, an apron plane (above) is the perfect tool to get rid of machine marks and the rough grain left behind by steam. It's also a great way to dial in the curve's shape. When it's time to make the last small adjustments to the curve and smooth the part's surface, set down the apron plane and pick up the adjustable-mouth block plane (right).

Create custom edge profiles

COARSE FINE

When you've worked hard to make a table or cabinet, it's a shame to finish it off with a routed edge. A custom edge profile is more suitable for handmade furniture and is no trouble to make. Rough out the shape quickly with the apron plane (left), and then tune its shape and smooth its surface with the adjustable-mouth block plane (above).

Knock out chamfers

There are many ways to cut a chamfer, but none are as flexible as a block plane. You can cut a straight chamfer, one that tapers in width, and even chamfer around a curve. Do the bulk of the work with the apron plane (above). You might get some tearout, but don't worry. The adjustable-mouth block plane, with its fine shavings, will remove it (right).

Trim inlay flush

After gluing a piece of stringing into its groove, quickly work it down near the surrounding surface with the apron plane (left). Speed is what you're after at this stage. Then use the adjustable-mouth block plane to trim the stringing flush with the surface. But don't stop there. Take another pass or two to smooth the inlay and the surrounding wood (above). With its tight mouth and the light shavings, the adjustable-mouth plane can handle even reversing grain and multiple inlay in one area.

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master class

Make an elliptical tabletop

BY CHRIS GOCHNOUR

Between the practicality of a rectangular top and the elegance of a circular one lies the elliptical tabletop. Stretching out a circle into an ellipse increases the usable space around a table while maintaining the beauty of a fair curve. It's why I used one on the Shaker-inspired gate-leg table project (pp. 30–37).

An elliptical top can be more difficult to make than a rectangular or circular one, but this jig takes all the pain out of it. It's similar to a circle-routing jig, but instead of swinging around a single point to create a circle, it uses two points to create an ellipse. Two guides, attached to a trammel arm, ride in grooves cut into the jig's base. As you walk the router around the base, the guides slide in the grooves, and move the

trammel arm in an elliptical path. Once the jig is made, there's no layout or complicated setup to make an elliptical tabletop.

Because I don't want to screw the jig to my top, I use the jig to rout a template, and then I use the template to make the top.

Router jig is easy to make

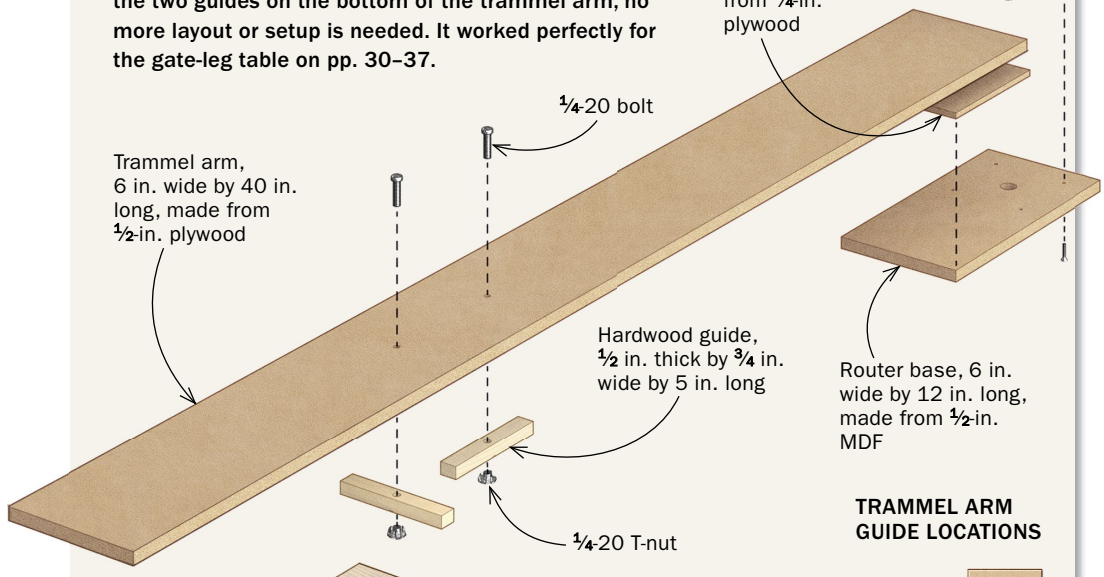
The most important step in making the jig is locating the guides accurately on the trammel arm, because this determines the ellipse's length and width.

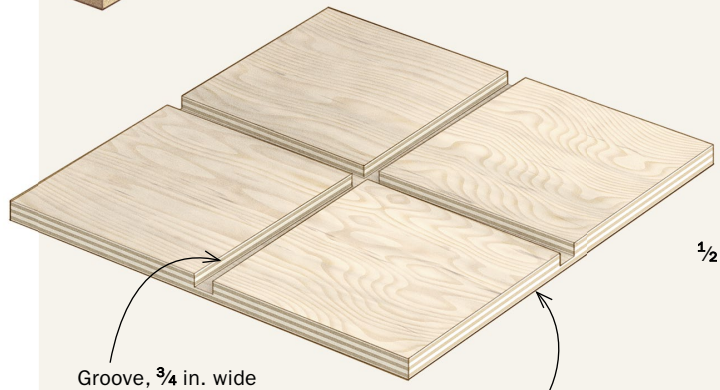
Make the trammel arm first. It holds the router base and two guides. After cutting all the parts to their final dimensions, drill the router base to hold your router. Then drill a hole for the bit. Glue a ¼-in.-thick spacer to the bottom of the trammel arm, and then glue the router base to the spacer.

Chuck a ⅜-in. straight or spiral bit into the router, then attach the router to the trammel arm. Now attach the two guides. Measure from the cutting edge of the bit down the jig's centerline. The distance from the bit to the center of the first guide is half the width of the ellipse. The distance for

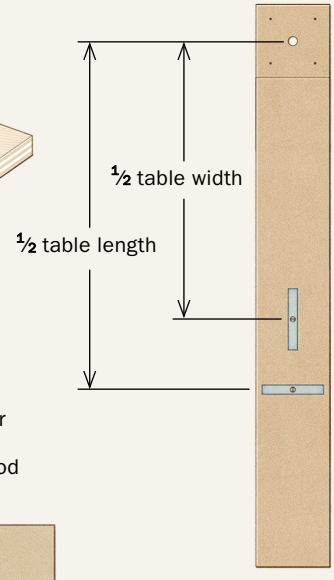
JIG DOES ALL THE WORK

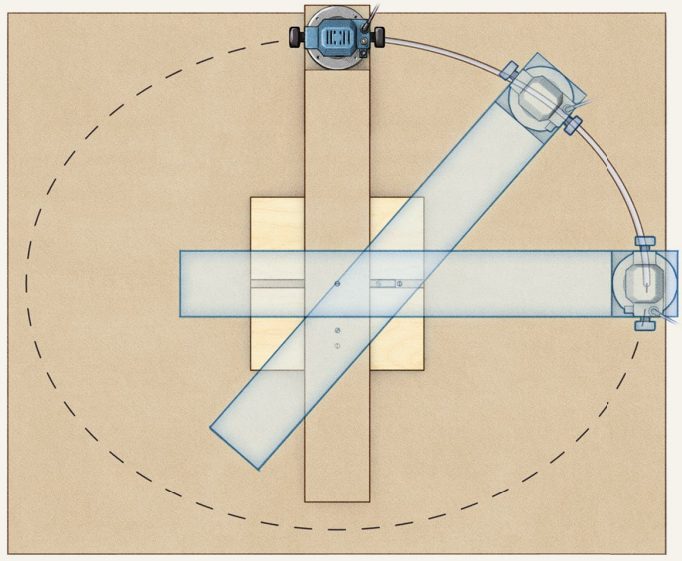
The best thing about this jig is that after you've located the two guides on the bottom of the trammel arm, no more layout or setup is needed. It worked perfectly for the gate-leg table on pp. 30–37.





TRAMMEL ARM GUIDE LOCATIONS





FREE-SPINNING GUIDES ARE THE SECRET

Unlike a circle-routing jig, which has a single, fixed centerpoint, this jig for ellipses has two anchor points (because ellipses have two foci). Guides attached at these points travel in the base's two grooves, resulting in an elliptical cutting path.

Photos: Matt Kenney; drawings: John Hartman

MAKE THE TRAMMEL ARM

Glue the router base to the arm. *Because it's made from ½-in. MDF, Gochnour uses a ¼-in. plywood spacer between the base and arm (top). The ¾-in. height equals the thickness of the base that guides the arm's elliptical travel. You'll need longer screws to get through the MDF and still have good purchase in the router's base (above).*

Guides control the trammel's travel. *They fit into grooves in the base that you'll make next and keep the arm on an elliptical path. Measuring from the bit's cutting edge, locate the first guide half the table's width away, and the second guide half the table's length away (left). Tap T-nuts into the guides, and then bolt the guides to the arm (right).*

MAKE THE BASE

Cut tracks at the tablesaw. *Start with a square base and then cut two grooves for the guides. The grooves must be perpendicular to one another. Use a dado set, and cut to final depth in a single pass guided by the rip fence (top). Screw down the jig base (above). Centerlines drawn on the base align with centerlines on the MDF blank for the template.*

the second guide is half the length of the ellipse. Drill a clearance hole at these two locations for the bolts used to attach the guides. Bolt the guides to the arm.

Next, make the jig's base. Its size is determined by the top's dimensions. Cut two grooves in its top face, centered on the sides and intersecting at 90°. Now you're ready to use the jig.

Make a template for the top

To ensure a smooth ellipse, the jig's base must be screwed down. I don't want four screw holes on the underside of the tabletop, and I bet you don't either. So I use the jig to make a template for the top, then I clamp the template in place and rout the top flush to it.

Screw the base to a piece of MDF. Put the trammel arm on the base, and rout the template. Cut through the MDF in a single pass with a slow, steady feed rate. It's best not to stop during the cut, because this can introduce small bumps into

the template. There really isn't more to it than that, because the jig keeps the router on an elliptical path.

After routing the template, trace it onto the top. Cut away the waste with a jigsaw. The entire line is on waste material, so you can cut next to it and still have material left to rout.

Clamp the template to the top in the same orientation as when you traced it. To minimize tearout, rout one quarter of the ellipse at a time, working from the top's widest point down to the center of its length. You can rout two quarters with the template on top. For the other two quarters, the template needs to be on the bottom. After the routing is done, you have a beautiful elliptical tabletop. □

Contributing editor Chris Gochnour is a professional furniture maker near Salt Lake City.

START BY MAKING A TEMPLATE

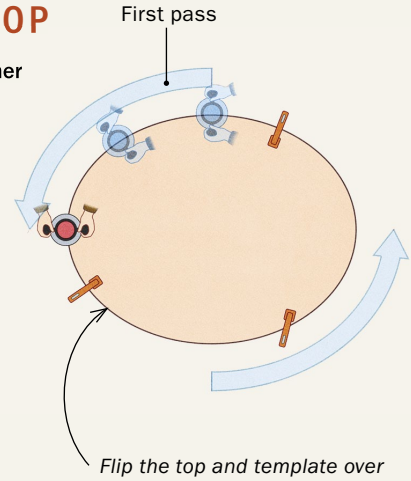
Put the trammel arm on the base. *The guide farthest from the bit fits into the track that's perpendicular to the template's length. The other guide fits into the other track (left). With the bit set to cut all the way through the MDF in a single pass—raise the MDF off the bench to allow for clearance—simply walk around the top. The jig ensures that the router travels an elliptical path (right).*

Trace the template on the real top. *Hand pressure is enough to hold it still at this stage. However, place an X on the template and a matching one on the top so that the template goes back on in the same orientation when it's time to rout. Cut away the waste. Don't leave too much waste—just the pencil line is enough.*

USE THE TEMPLATE TO MAKE THE TOP

At this point, making the elliptical top is no different from any other pattern-routing job, but you'll need top- and bottom-bearing trim bits, or a single bit with a bearing above and below the cutters.

Always rout downhill. *Start at the widest point and work toward the end. You can rout two sections with the template above the top (left). Flip the top and template over to rout the other two (below).*



One bit makes all the cuts. *It can be used with the template above or below the top.*

In my imagination, all of my tools are sharp

A TOUR OF A TOOL JUNKIE'S SHOP AND PSYCHE

BY ANDY ROONEY

If I had known when buying them which tools I would use regularly and which tools I would almost never use, I might have saved enough money to take over Bill Gates's share of Microsoft. I would also have enough room left in my shop for tools I do use, space now taken up by the tools I do not use.

It is certain that the tools I own exceed the total value of anything I have ever made with them, but the satisfaction they have given me simply by their presence is priceless.

My family has a summer place 150 miles north of New York City where most of my woodworking takes place during the three months plus seven weekends a year that we live there. My shop is 25 ft. by 25 ft., not huge but adequate if it were being used by a careful space-planner, which, as you might suspect, is not me.

When strangers come into my shop, they often look at a tool and ask, "What do you do with that?" They don't understand that having the tool, like having good wood, is an end in itself. If I owned a Rembrandt, no one would ask, "What do you do with it?" I like looking at a tool, feeling it, and even using it once in a while. I dream idly of the wonderful pieces I could make with its help. I don't usually make them; I just dream.

In desperation, I have misused tools

In my shop, surrounded by my toys, I'll often sit in the bucket seat of a comfortable stool I made and thumb through an article in *Fine Woodworking*. I am transported out of my routine life into a wonderful world where I am Tage Frid and George Nakashima rolled into one. In my imagination, my tools are all sharp, perfectly tuned, and obedient servants in the capable hands of their master, me.

The facts of the matter are different, of course. My tools are all first quality, with the exception of a stand-up drill press that is an adequate Korean knockoff. But each has a personality of

EDITOR'S NOTE

To help celebrate *FWW*'s 40th anniversary, we've been reaching into our archives all year to reprint classic articles. This one from *FWW* #146, our 25th Anniversary Issue, comes from the pen of the late Andy Rooney, CBS news correspondent and inveterate tool collector.

Photos: Ellen Rooney

its own that is not always compatible with mine. My chisels are not all sharp because, in desperation, I have misused them on a job they were not designed to do. The teeth on some saws need resetting. Many small tools have been put down hastily, not where they belong but where they were used, and are as hard to find when I need them again as a library book returned to the wrong shelf in the wrong aisle.

One tool scares me

In the middle of the shop is a good 5-hp tablesaw. With the exception of the tablesaw and the 6-in. jointer, all other pieces of heavy machinery are on locking wheels so they can be rolled out of the way. Or into the way. In one corner, and least used but a grand tool, is a heavy-duty resaw bandsaw. It is difficult to adjust, and it is almost impossible to shove wood through it and get a board of uniform thickness. Revved up with its 16-ft. blade humming, the saw is a monster. I'm scared stiff of the tool, but I enjoy using it. A woodworker can't have a more satisfying time than slicing crude logs into beautiful boards. I've used it most successfully on short trunks of apple trees—apple being one of the world's most beautiful, least-used woods. It's best to know someone with an orchard.

There's also a small bandsaw, which I worry about because I have frequently used it and then forgotten to reduce the tension on the blade, as the advisory under DANGER! admonishes me to do. I wonder what leaving the tension on, against the warning, has done.

WHEN I YEARN FOR EASY SATISFACTION AND FEEL I SHOULDN'T EAT, I BUY A TOOL.

My 15¾-in. thickness planer is one of my most satisfactory tools. Last year I removed the original blades and installed razor-sharp carbide replacements. The first time I used it was on some 12-in.-wide by 14-ft.-long old pine boards that I had salvaged from a tumbledown barn. I had gone over the boards with a magnet to locate and remove any nails. I did an almost perfect job. Almost! I got all but one. The one nail nicked my new blades the first time I used them. For weeks I lived with a little ridge in every board I put through it, until a woodworker more knowledgeable than I suggested that I simply loosen one blade and tap it slightly from one end to move it a fraction so that the nicks in the blades were no longer in line. Presto! No more ridge.

The last of my major power tools is a combination disk and belt sander. If I were a teacher, I'd give it a barely passing grade. I don't have a dust-collection system, so when I'm going to use it, I roll it over to the open door and hope most of the wood dust ends up outside. The 36-in. belt is difficult to replace, and the glue, no matter how amply applied to the metal disk, does not always hold the round piece of sandpaper to it when it spins. No one likes flying sandpaper.

One wall of my shop is taken up by shelves divided into open boxes 18 in. square. These shelves are for storing power or hand tools, wood finish, turpentine, and the sorts of things that accumulate in a shop, such as cords that have become separated from the machines they came with, lengths of rope, books of directions (in English, French, Spanish, and Japanese), rags, sandpaper used and new, and a wide variety of useless gadgets that seemed like a clever idea when I bought them.

When I yearn for easy satisfaction and feel I shouldn't eat, I buy a tool. So I have a lot of them. If you can name it, I probably have it. My bins runneth over. They hold several ¼-in. and ⅜-in. drills. There are circular saws, dagger-blade saws, oscillating sanders, vibrating sanders, heart-shaped inside-corner sanders, power screwdrivers. Everything I have, I have two of—and for two reasons. One, I like both plug-in and cordless tools; and two, when I saw the second one, I was in need of the satisfaction that comes with buying a new tool.

Phases of furniture making. *Rooney has built many of the pieces used daily in his homes. He now works almost exclusively with native American hardwoods.*

I have tools I haven't used in 17 years but can't bring myself to throw out because I remember how much they cost, and tools that are in constant use when I have a project going.

Some tools are friends, and some I can't get close to

Most of my small hand tools hang on, above, near, or under my workbench. These are my closest friends among tools. There are planes for which I feel an outpouring of affection when I grasp them in my hand. I have four good Japanese draw saws. I even have a screwdriver with which I have a special relationship. I harbor this notion that it has never failed any job, even an unscrewdriverly one, that I have asked it to do and, as a result, in the past few years I have not been asking it to do anything it could possibly fail at. I don't want to ruin its record.

looking back continued

Over the years, I have found it more difficult to get attached to some tools. While there are hammers I like and squares and levels I prefer, I have never used a pair of pliers that I'm completely happy with. Those two holes at the hinge designed to allow the jaws to open wider are an incomplete invention. I own as many as seven pairs of pliers, each designed to be right for a job, but mine are all a little wrong for any job.

I LIKE LOOKING AT A TOOL, FEELING IT, AND EVEN USING IT ONCE IN A WHILE. I DREAM IDLY OF THE WONDERFUL PIECES I COULD MAKE WITH ITS HELP. I DON'T USUALLY MAKE THEM; I JUST DREAM.

If I were asked for advice on buying tools for a beginning woodworker, it would be easy. "If you decide to buy a tool for a job that you do all the time and it is made by three different companies offering it at $129, $139, and $174, buy the one that costs $174. If you don't have the money, don't buy the tool. Wait until you have $174—by which time it will probably cost $183—but wait anyway." One of the most unfair things about both life and woodworking is that the most expensive is usually best.

There also are tools with which I have what feels like a personal relationship. When I use them, I recall some previous job I did with them. I think that when I die they ought to die with me, because no one will ever know what we had going between us. I'd hate to have them fall into the hands of a callous stranger who picked them up at a yard sale and didn't know what I know about them. When I see good, old tools lying in a box in the corner of an antique shop, I weep a dry, silent tear: There but for the grace of a few more years go mine.

If only I had two lives to live

In our home in Connecticut, I am more apt to be at my typewriter in the part of the basement laughingly called my office than in the "shop," which also houses the washer, the dryer, the furnace, and 18 legal-sized boxes of papers. Over the years one of my chores has been closing up my shop upstate and deciding which tools to bring home to that small, basement workshop. Every year I've brought fewer and fewer, partly because I duplicated more of them and partly because I was doing more writing and less woodworking.

The tools I transferred were mostly small, cherished hand tools that were too expensive to duplicate. I bring a small box of good chisels wrapped in cloth, several small Japanese saws, two of my favorite handplanes and, of course, that great screwdriver. I bring the handplanes because I love the lore of planes, even though I am an inept user of the simplest of them. When I read of truing a twisted plank with a plane, I am in awe of anyone who can do it. Several of my handplanes are collector's-item quality and, while I can collect them, I'm not good at using them. I often reach for my power planer, a tool with which it is easily possible to do major damage quickly.

Country workshop. *The author's summer workshop in rural upstate New York is 25 ft. by 25 ft. and holds his broad collection of wood and tools.*

While most of my knowledge of woodworking has been acquired by trial and error, with an emphasis on error, I take advice. Last summer our son Brian and I were making an outdoor octagonal table of teak with a pedestal base. We figured out what we needed and set out to cut eight boards 34 in. long, each with both ends mitered at an angle of 22.5° so that they'd fit together to make a perfect octagon.

We had cut five pieces when my friend, the nicked planer-blade expert, showed up for a casual visit. He looked at our project and gave us advice that saved wood, time, and anguish.

"Don't cut them all at 22.5," he said. "Cut seven of them, then put those together and cut the last piece to fit." It was great advice because the angle at which we had to cut the eighth piece to fit was not exactly 22.5°.

Over the years I've gone through half a dozen phases of furniture making. The decision about what to make usually comes from looking over my stacks of wood. I am reluctant to cut almost any good wood because of my well-founded fear of bungling it. But if I see a pile of tiger or bird's-eye maple that would make a chest of drawers, I'll pull them out and study them. I determine what cuts I could make that would be least wasteful.

For years I used mahogany and a few exotic species like rosewood, but lately I've worked almost exclusively with native American woods such as cherry, maple, walnut, and oak. I ignore flaws like knots or checks. They are part of the character of a board, and I incorporate them in my furniture. I use a nice supply of genuine ebony for the Nakashima dovetails to curb further checking in boards that are split at their ends.

I am a writer who loves to write, but if I had two lives to live, I'd be a woodworker in the other. □

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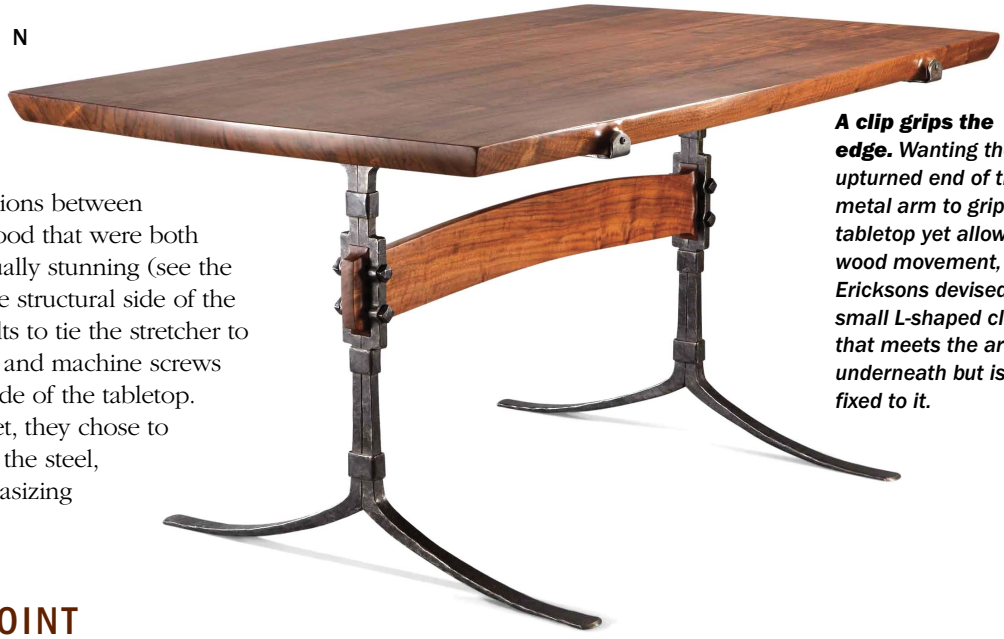
how they did it

When metal meets wood

BY JONATHAN BINZEN

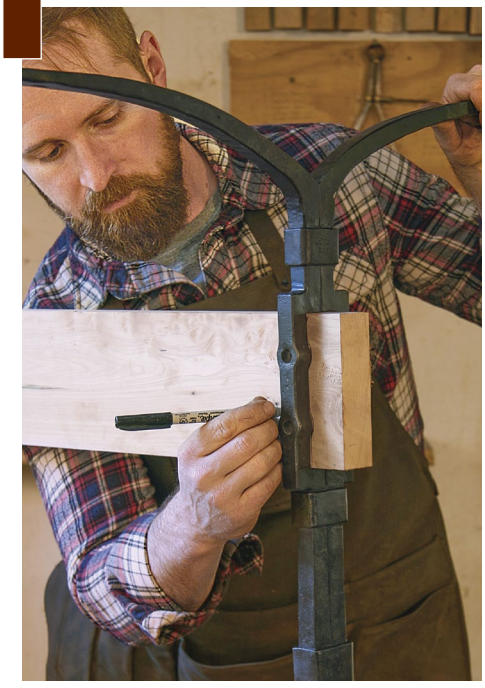
EDGE DETAIL

The challenge for Robert and Tor Erickson was twofold—to make connections between wrought steel and solid wood that were both structurally sound and visually stunning (see the back cover). To address the structural side of the equation, they used heavy nuts and bolts to tie the stretcher to the legs, and relied on threaded inserts and machine screws to attach the upper arms to the underside of the tabletop. For beauty, where the two materials met, they chose to sculpt away the wood on both sides of the steel, articulating the connection while emphasizing the contrast in strength and hardness.



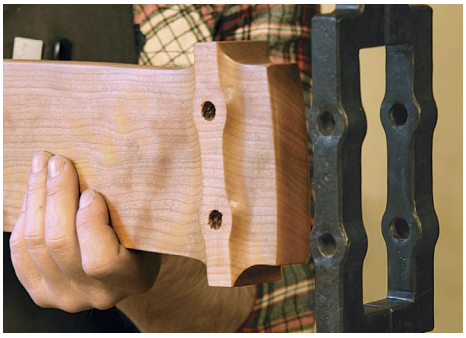
A clip grips the edge. *Wanting the upturned end of the metal arm to grip the tabletop yet allow wood movement, the Ericksons devised a small L-shaped clip that meets the arm underneath but isn't fixed to it.*

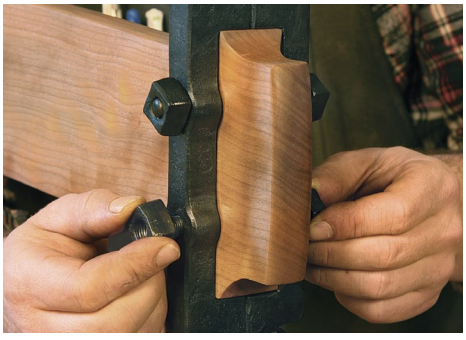
SCULPTED TRESTLE JOINT



Steel pattern. *To begin sculpting the joint, Tor Erickson mills a plank to fit the opening in the leg, then traces the outline of the metal.*

Addition by subtraction. *Tor Erickson routs away the waste along both faces of the stretcher, leaving only the areas that will meet metal. He trims to the line and creates a radiused corner using a bandfile belt sander.*





The versatile compression joint. *Using nuts and bolts is an extremely strong way to secure the joint, allows for tightening the joint over time, and makes the table simple to disassemble for storage or transport.*

Photos: Sugar Pine Studios (finished table); Jonathan Binzen (all others)

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Re-enter the Iron Age

Robert Erickson had been working exclusively in wood for 15 years in his off-the-grid shop in Nevada City, Calif., building chairs from beautiful local timbers, when he was invited in the mid-1980s to collaborate on a metal and wood table with Berkeley blacksmith Daniel Dole. Excited by the challenge but stumped at the prospect of designing ironwork and mating it with wood, Erickson sought inspiration from the California Arts and Crafts-era designers Charles and Henry Greene. At their 1909 Thorsen House, Erickson saw beams artfully bound with iron strapping, and that was the spark he needed. He soon had his trestle-table design, with strapped steel uprights clinching a wooden stretcher and with steel fingers seeming to grip the edges of the table. Since that first collaboration, Erickson and Dole have built a number of other tables in the same vein. And for Erickson, wrought steel has opened the door to many other metals. These days he and his son, Tor, who has joined him in the shop, combine brass, aluminum, bronze, copper, or stainless steel with wood in their furniture. For more examples of furniture makers mixing materials, see "Marriage of Metal and Wood," pp. 58–65.

—Jonathan Binzen

Photo: Sugar Pine Studios

How They Did It Turn to p. 90 to see how the Ericksons craft strong and beautiful joints where metal and wood meet.

To see a wide range of contemporary work that combines metal with wood, go to FineWoodworking.com/extras.