Fine Woodworking

Tools & Shops

17 must-have tools and accessories p. 24

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Tools & Shops

WINTER 2018/2019 ■ ISSUE 272

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Cover photo: Jonathan Binzen

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Visit FineWoodworking.com/272 for online extras, available October 31. And don't miss the collection of free content on our website, including tool reviews, an extensive project gallery, and must-read blogs.

VIDEO

Home sweet shop

Charles Durfee's shop in Woolwich, Maine (p. 62), is more than a place for this veteran furniture maker to work. For years, it was also a home for him and his young family, until he built a new house just a short walk away. In this video, Charlie tells the personal story of his shop.

VIDEO

The polisher

Many woodworkers treasure their Lie-Nielsen hand tools, and with good reason: A lot of labor goes into every tool. The last stop is the polishing shop, where Lynn McMurray and her team make sure each tool lives up to the standards you've come to expect.

VIDEO

Rust removal in action

Rollie Johnson has the recipe for removing rust (p. 80), and we put his methods to the test on our personal tools.

Look around Chris Becksvoort's shop

The view out the back window of Christian Becksvoort's Maine shop can include moose, pine trees, a scenic stone wall, and other awesome sights. The view inside is pretty spectacular, too. Take a 360° look inside Becksvoort's shop.

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VIDEO WORKSHOP

Enfield cupboard made with hand tools

Using only hand tools, Chris Gochnour builds a Shaker classic that is as solidly constructed as it is beautiful. You'll learn how to:

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- Use tongue-and-groove planes and beading planes for backboards
- Cut mortise-and-tenon joints by hand
- Use molding planes to create custom moldings

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Contributing Editors	Christian Becksvoort Garrett Hack Roland Johnson Steve Latta Michael Fortune Chris Gochnour

FineWoodworking.com

Digital Brand Manager	Ben Strano fw-web@taunton.com
Manager, Video Studio	Jeff Roos
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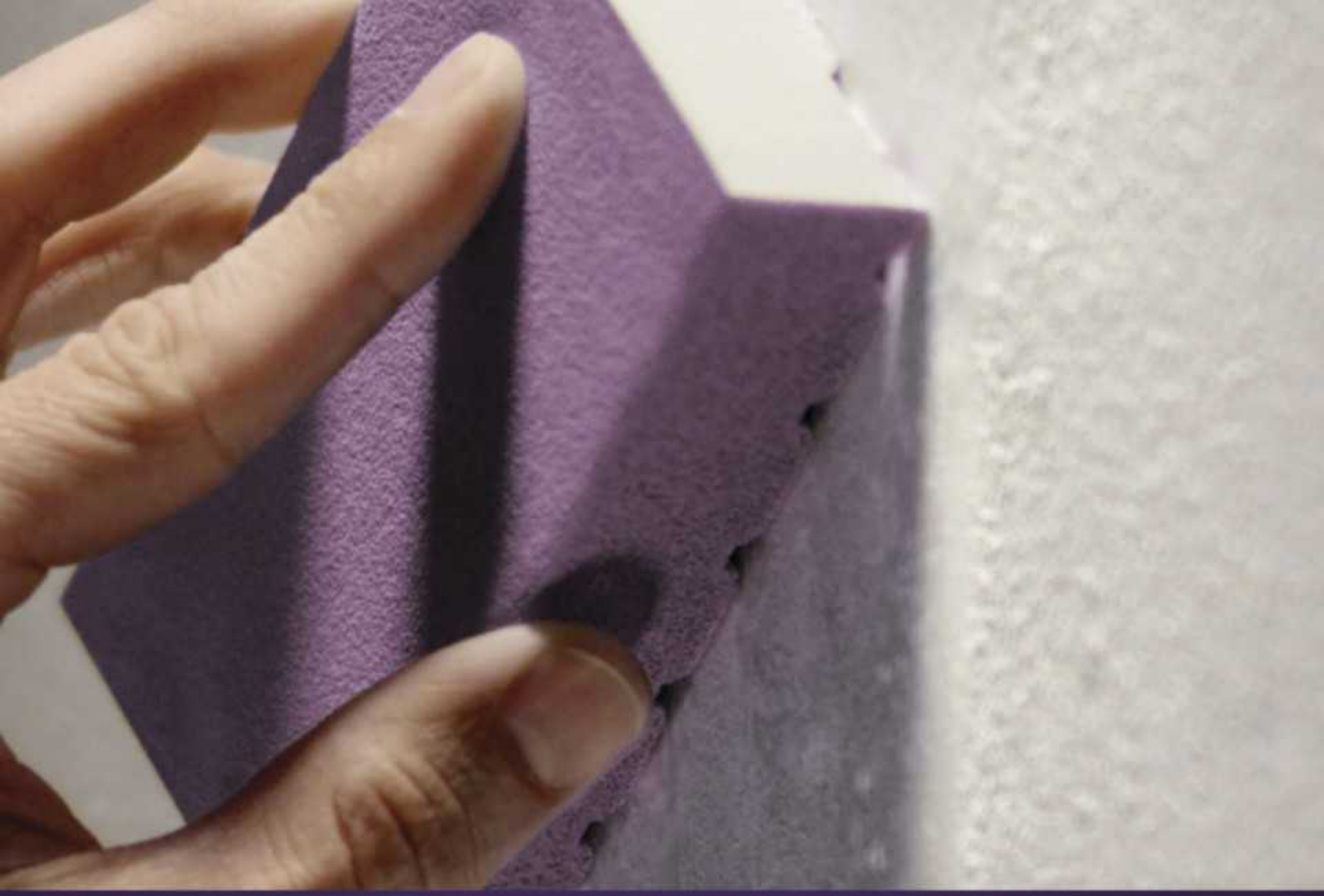

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contributors

After high school, worried about paying for four years of college, Jason Stephens ("Hanging Panels Keep Tools Close at Hand") entered the U.S. Army instead. Knowing Stephens was a drummer in high school, his recruiter suggested the Army band program. Twenty-four years later, Stephens has traveled to 60 countries with the band. One of his warmest memories is playing marches and Glenn Miller tunes in Normandy, France, on the anniversary of D-Day. "French Normans wept at the sound of American music played by American soldiers." Stephens learned woodworking at the shops on Army bases. He recently retired from the Army, and is looking forward to having a shop that stays in one place.

Nathan Murphy ("Shopmade Cam Clamps") lives in a nicely wooded area in Madison, Ind., an inspirational setting for a woodworker. He builds primarily guitars, along with custom furniture made with lumber almost exclusively from a home sawmill. When he's not up to his ankles in sawdust at his own shop, he can usually be found at the Marc Adams School of Woodworking, where he's been a student, intern, and assistant. See his work at zamarinstruments.com.

When **Charles Durfee** ("At Home in the Shop") went into woodworking, the choice wasn't unprecedented in his family—his great-great grandfather ran a sawmill in New Hampshire. Still, it might have been a bit of a surprise, since his father's side of the family is stocked with four generations of college math professors. Durfee moved to Bath, Maine, in 1975 to learn boatbuilding. Although he eventually shifted to making cabinets and furniture, he stayed in Maine, building his shop and home in Woolwich.

Eric Bauer (Shop Design: "Building a barn shop in Vermont") is a classically trained chef who spent more than a quarter century running small, high-end kitchens in inns and restaurants in Vermont. Each year, when tourism slowed in the late fall and early spring, he would pick up work doing carpentry and interior painting. That background in renovation came in very handy when he "burned out completely" on restaurant work. These days, in the freestanding shop he designed, he produces cabinetwork and furniture along with smaller projects.

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

Fine WoodWorking

Publisher: Renee Jordan

Associate Publisher, Advertising & Marketing Director: Alex Robertson, 203-304-3590, arobertson@taunton.com

Director of Digital Advertising Operations: John Maher

Sales & Marketing Assistant: Tricia Muzzio, 203-304-3415, tmuzzio@taunton.com

Marketing Manager: Matthew Ulland

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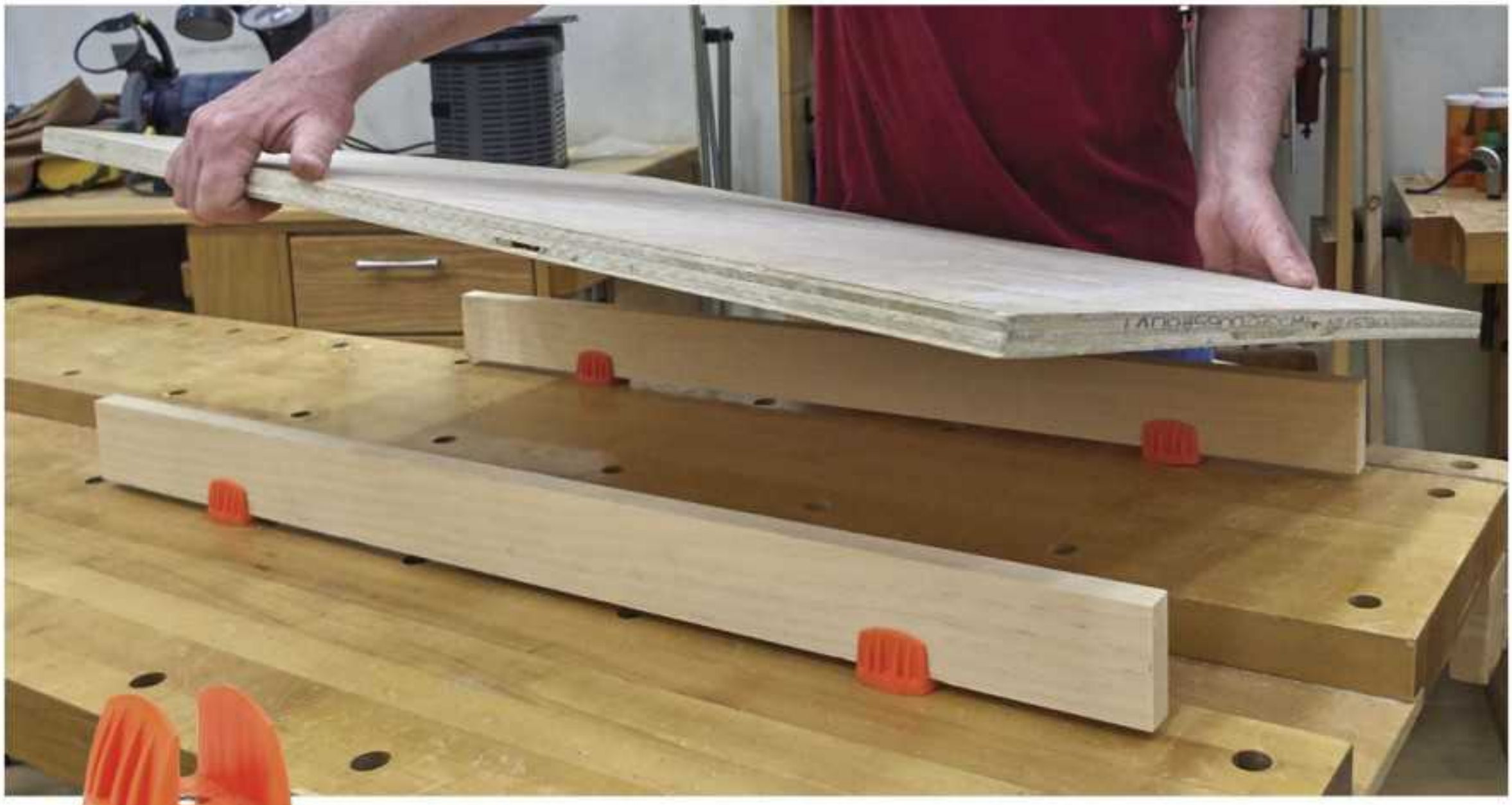

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letters

From the Editor

Time to get back in the shop

The best thing about moving into the winter months is that I'm also moving back into the shop. As much as I love woodworking, in New England, for me spring and summer are all about getting outside. That means coaching my daughter's softball team, bike riding, hiking, yardwork, outdoor projects, and summer vacations. All those activities leave me very little time for weekend woodworking.

I'm not unlike other hobbyists. Our research shows a decline in woodworking activity in summer, and we watch it reach a crescendo in the dark winter months. It's no coincidence also that we get fewer article submissions in summer.

So the autumn in-home arrival of our *Tools & Shops* issue could not be more perfect. This year's issue is loaded with useful shop ideas, tips, and tool advice. Take, for instance, Jason Stephens's article on hanging tool storage. Like many woodworkers, I'm constantly thinking about getting better organized. One area that needs immediate attention is my hand-tool collection, which despite my best efforts continues to grow. So I plan to adapt Jason's ideas on hanging panels to keep my tools neat and within easy reach.

Woodworkers will also really appreciate the shop profiles of pro woodworkers Charles Durfee and Eric Bauer. Their well-designed shops offer great insight on tool and materials storage and machine layout—plus the back stories about their shops are inspiring.

If you're in the market for a new tablesaw outfeed table, contributing editor Chris Becksvoort has you covered with a simple solution that won't break the bank in terms of money or time. And tool hounds will not be disappointed here. Associate editor Barry NM Dima got very dusty testing 5-in. random-orbit sanders (see the winners on p. 43), and Rollie Johnson reveals his secrets for removing pesky rust from tools (hint: one method is "the real thing").

With *Tools & Shops* on my bench, I won't worry about what's happening outside my basement shop. Let it snow, sleet, rain, and freeze. I'll be plenty warm building stuff. I hope you will be, too. Now please excuse me while I get back in the shop.

—Tom McKenna, editorial director

Cabriole leg grain direction?

I've been a big fan of *Fine Woodworking* magazine for some time. I'm a novice at all of this, but since I retired, I'm looking forward to trying many new things, one of which is a cabriole leg inspired by Steve Brown's article ("One Leg, Three Feet," *FWW* #270).

I do have one question: I know it is best to have straight-grain wood, but what about the end grain? Does this make a difference when making these legs? Should the wood be quartersawn or any cut, so long as it's straight grain?

I live in West-Central Georgia and the winters here aren't too bad, so I could end up with more kindling than necessary for one winter; that is, if I don't do it right the first time. Please keep your fingers crossed for me!

—LEE NALLEY, Ellerslie, Ga.

Steve Brown replies: This is one of the subtle but important considerations for making cabriole legs. In my mind it separates an ordinary leg from a top-quality one. And does it without making it any more difficult a task.

I try to select lumber for cabriole legs that allows me to mill the blanks so that each one has straight grain along the faces and rift or diagonal growth rings on the ends of the blank. It's my opinion that most legs will look better with the rings running from the inside corner to the outside, as shown here. This, along with the straight grain running along the length of the blank, will reveal a growth-ring pattern on the bandsawn faces that accentuates the profile of that view.

The other option is to orient the growth rings diagonally from side to side. This produces a bull's-eye pattern on the knee, which in turn will create undulating patterns on the convex and concave lobes of a carved shell on the knee.

I hope this helps. Thanks for your interest in the article and topic.

Fine WoodWorking

To contact us:
Fine Woodworking
The Taunton Press
63 South Main St.
PO Box 5506
Newtown, CT 06470-5506

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workshop tips

Best Tip

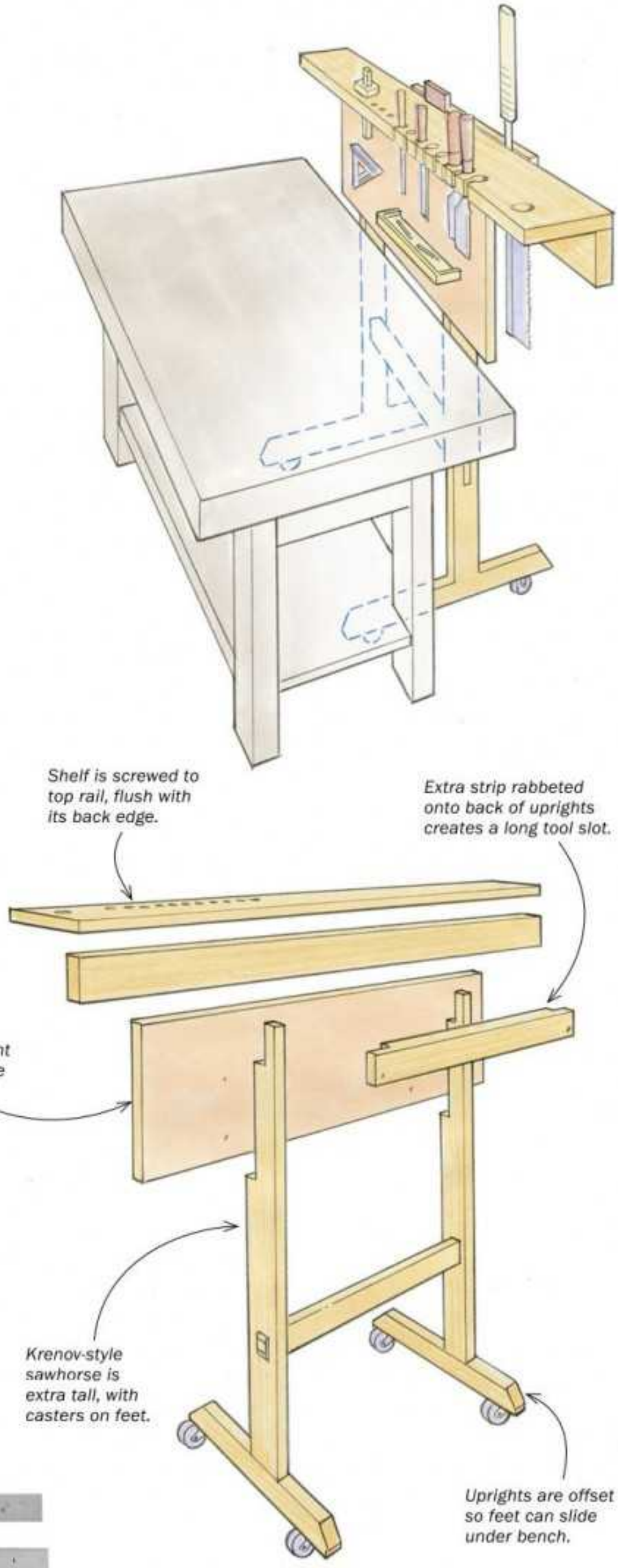
Dr. Jim Hennefield has been enjoying woodworking for 40 years. He does most of his joinery and handwork over the winter in a crowded Queens basement shop, but takes advantage of the larger workshop at his second home in upstate New York during the warmer seasons. Hennefield is a member of the Long Island Woodworkers Association.

Rolling tool rack follows your workbench

Like a lot of woodworkers, I prefer to keep my workbench out in the open, away from the wall, so I can access it from all sides. To keep my favorite hand tools within reach, I adapted James Krenov's classic sawhorse design to create this rolling rack. It can go wherever the bench goes or roll out of the way.

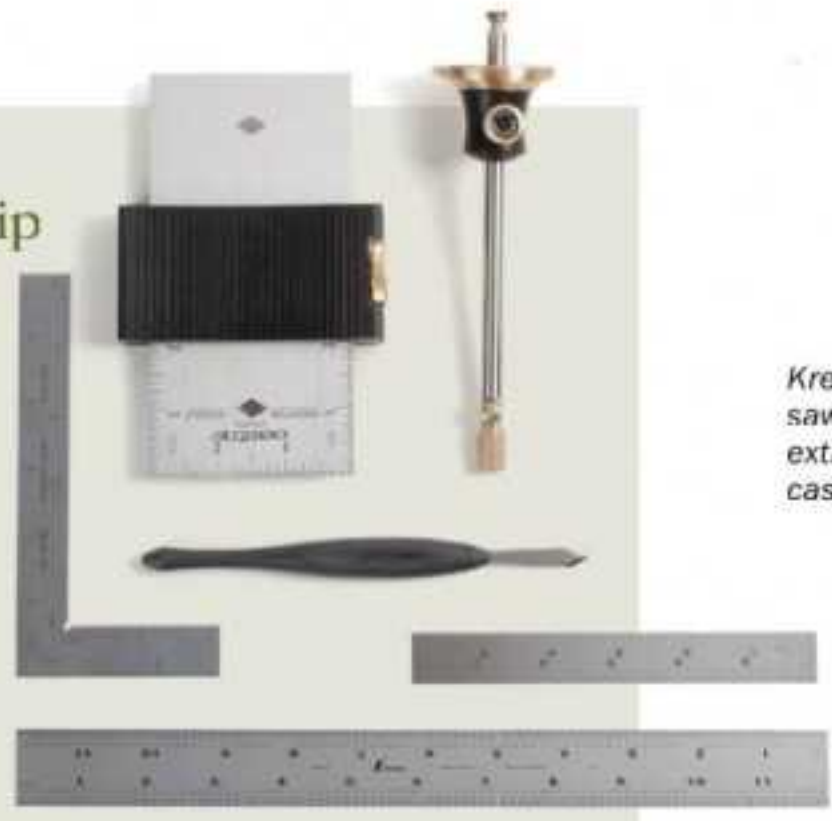
To turn the sawhorse design into a tool-storage rack, I made a few slight changes. First, I built it taller and offset the feet. The longer ends go under the bench so there is less sticking out to trip me up. Then, for tool storage, I screwed a shelf to the top rail and a panel to the uprights. Last, I screwed an extra strip to the back of the uprights, creating a narrow space where I hang handsaws and other long tools.

–JIM HENNEFIELD, Little Neck, N.Y.



A Reward for the Best Tip

Send your original tips to fwtips@taunton.com. We pay $100 for a published tip with illustration; $50 for one without. The prize for this issue's best tip was a Veritas layout kit that includes a precision square, marking knife, sliding square, 12-in. rule, and pocket rule.



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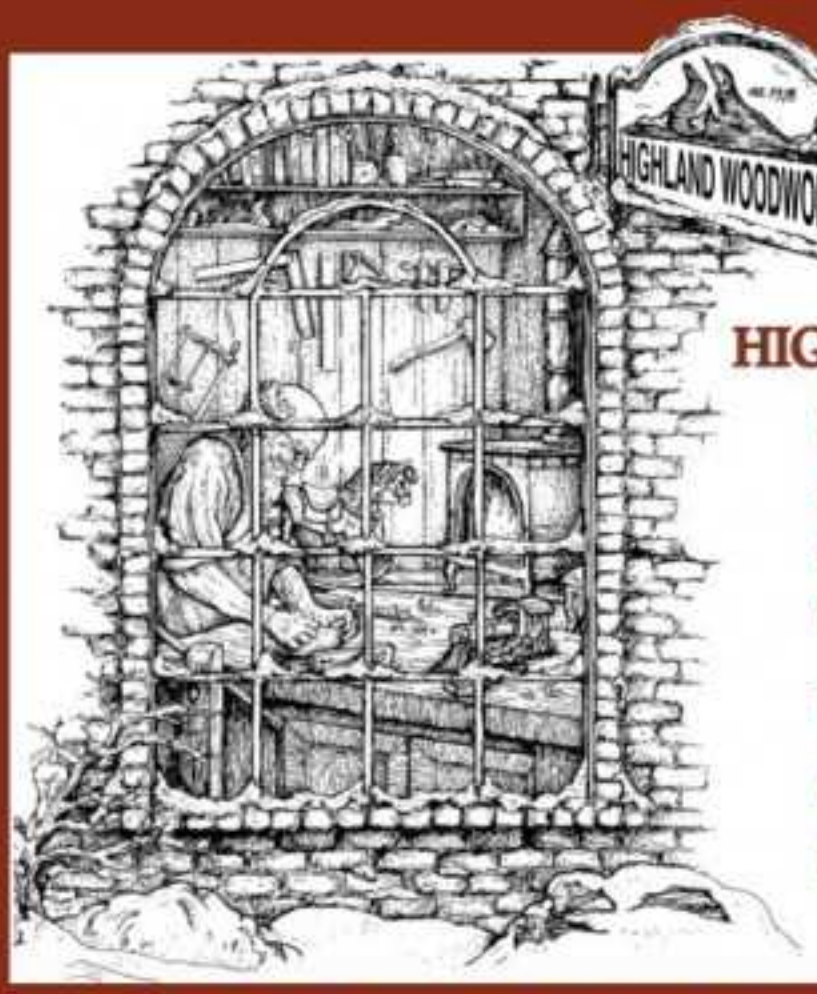

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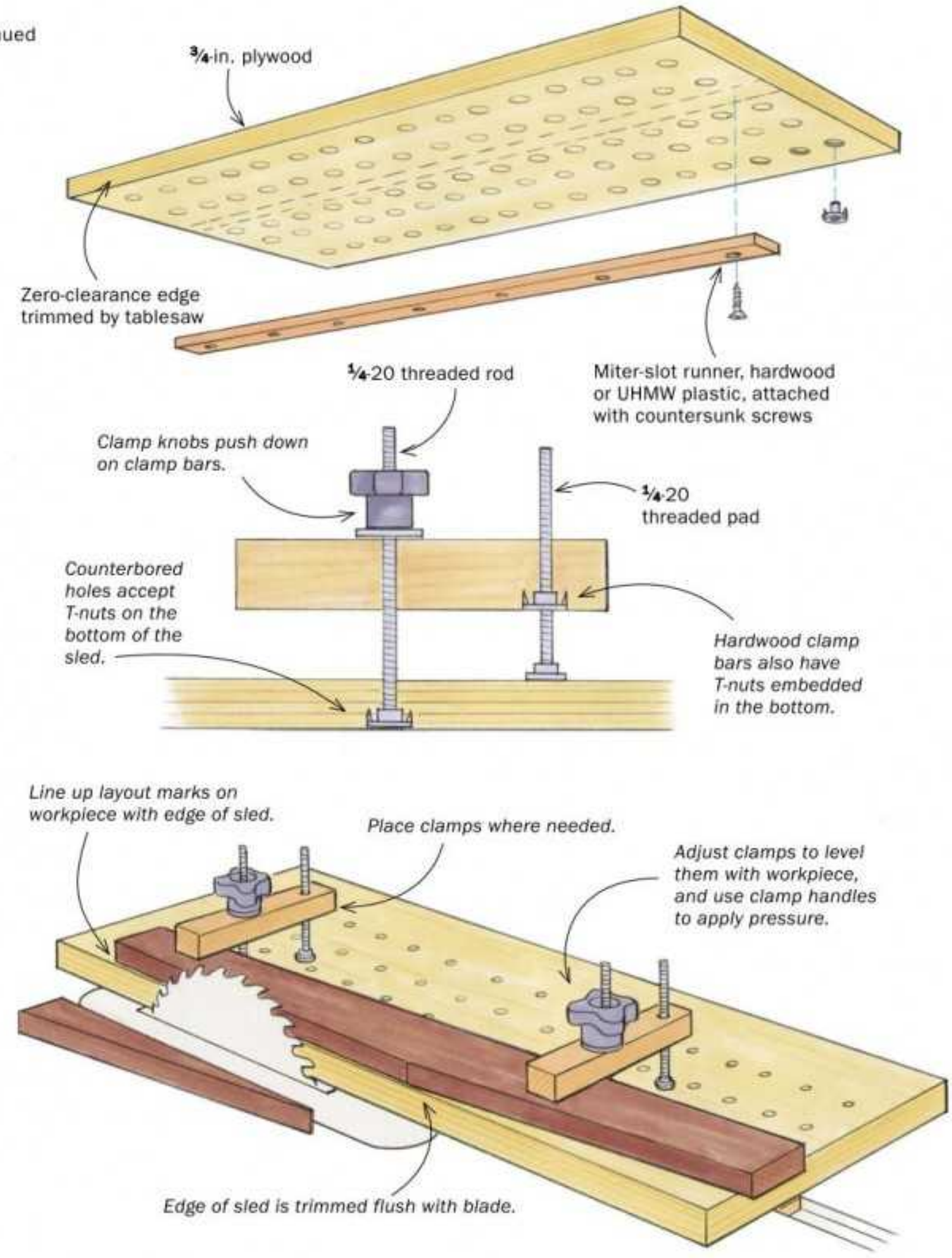
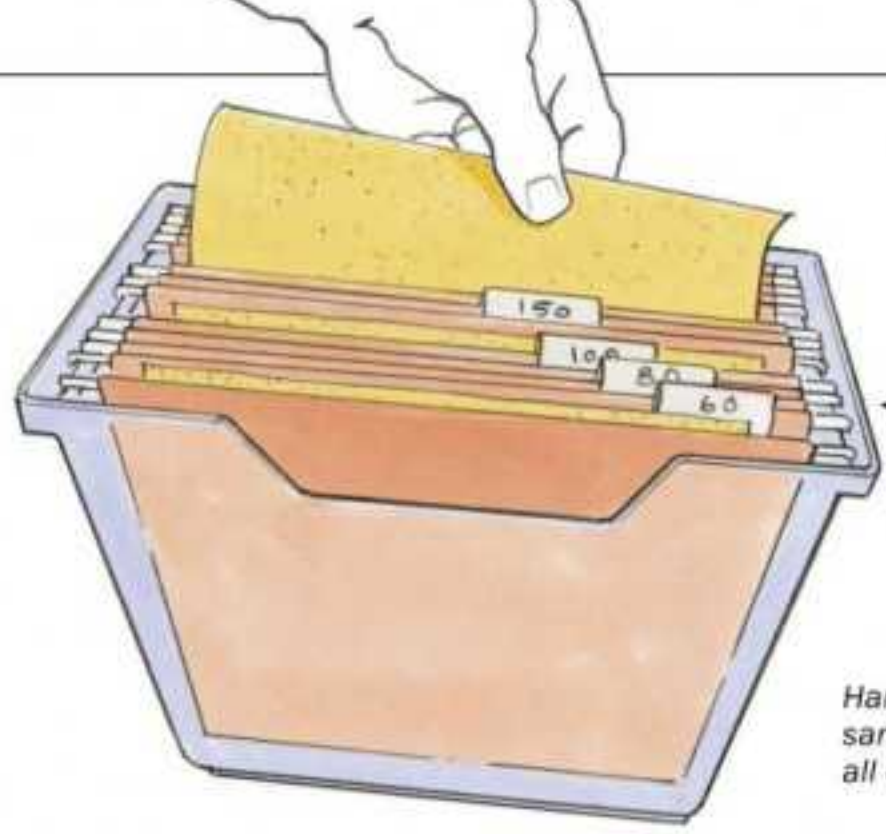
Tablesaw sled makes safe, precise cuts at any angle

Like a lot of ideas, this simple but very adaptable tablesaw sled is a hybrid of several others. I don't know of another sled that is as versatile, accurate, safe, and simple to make. Whether you are making tapered legs or irregularly shaped workpieces of any kind, this sled can do the job.

It's made from a leftover scrap of high-quality plywood with a matrix of holes drilled in it, each counterbored on the bottom to accept T-nuts. The T-nuts accept the ¼-20 threaded rods I use to to create simple hold-downs on top. Underneath, there is a runner made of UHMW plastic sized for the miter slot on my tablesaw. A hardwood runner will also work. Because the sled is made in the usual way—oversize and trimmed with an initial pass on the saw—there is a zero-clearance edge that shows you exactly where the blade will cut. Position the clamps as needed, line up your layout marks with that edge, and make perfect cuts right on the line every time. You can make the sled any size; if you have an outfeed table just make sure you have a clearance slot in it for the long miter-slot runner.

–BILL LINDENFELSER, Rochester, N.Y.





Hanging file folder box organizes sandpaper grits, and lets you bring all of them to the task at hand.

Store sandpaper in hanging file folders

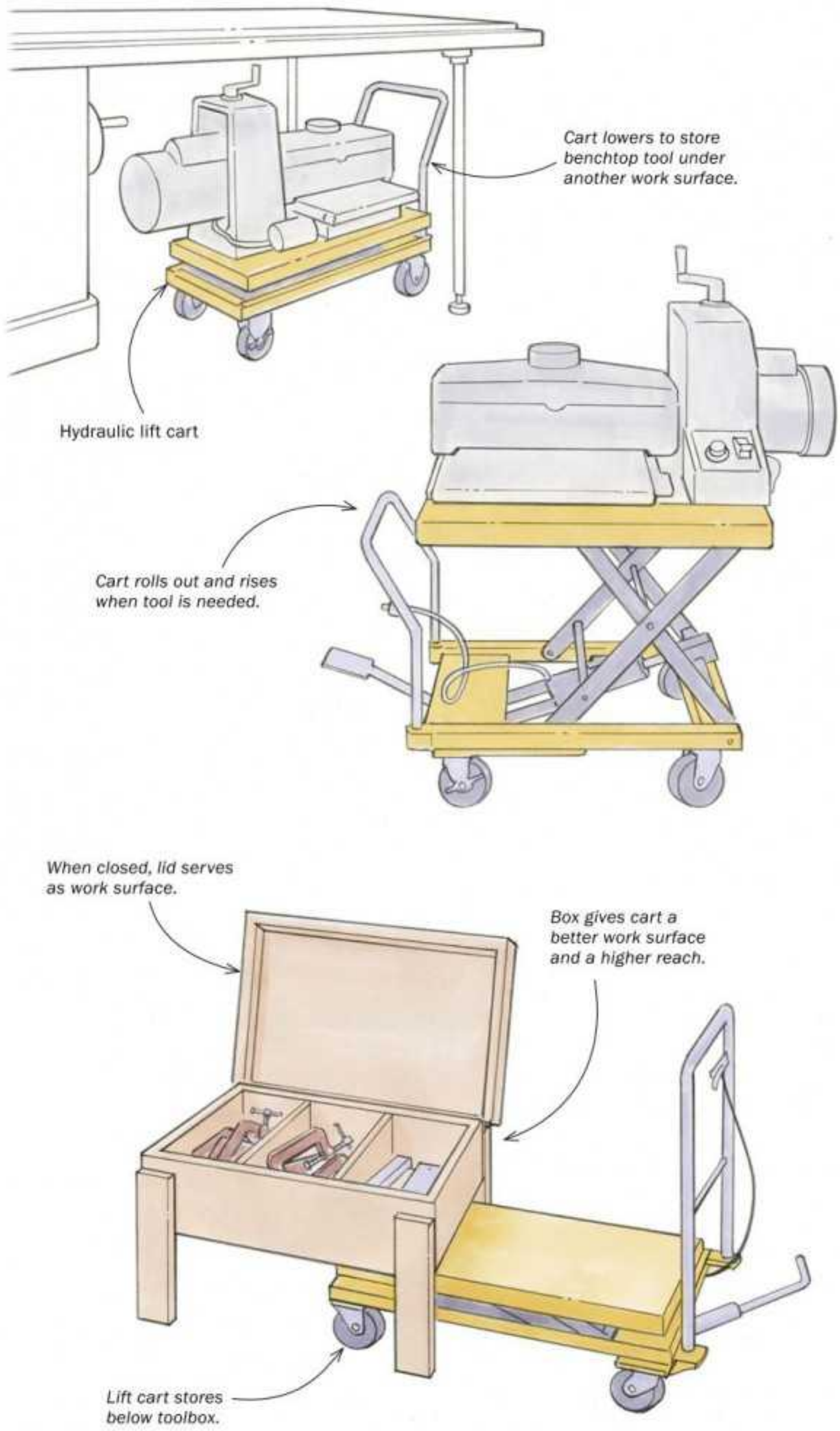
I realize there are endless solutions for storing sandpaper. Nonetheless, I think this one works best. Buy some letter-size hanging folders and a small box designed to hold them. You'll have more than enough room to store all the grits you might use, including the finest for sharpening, with tabs to help you find them quickly. And it's all in a handy box that you can tote over to where you are working.

–MARSH FENSTAD, North Oaks, Minn.

Readers make good use of hydraulic lift carts

I recently took a commission that required lots of panel glue-ups and decided it was time to purchase a drum sander. However, real estate is valuable in my shop, and I couldn't afford to give up floor space for the new machine. My solution was to mount the drum sander on a small hydraulic lift cart, which stores under the extension table of my tablesaw. When I need it I roll it out, raise the table, and go to work. A number of other portable power tools—such as a planer or spindle sander—could be mounted on a lift cart to be stored in out-of-the-way places, and a basic cart doesn't cost much more than a good mobile base.

—JOHN CHATBURN, Spokane, Wash.



Like many, I've discovered the benefits of a hydraulic lift cart. Mine has a 500-lb. capacity and cost less than $200 on sale. I use it to move big tools around the shop, including a full-size lathe and a scrollsaw, to carry my big crosscut sled to the tablesaw, and as a tablesaw outfeed table and additional work surface. I've also arranged my shop so that items I don't want to lift are stored at a height that can be accommodated by the cart. To improve the cart's work surface and give it a higher reach, I built a toolbox designed to sit on top of the cart, with tall legs that let me lower the box and roll the cart away to be used on its own. I store C-clamps in this simple toolbox, but it could be built to any degree of finish for hand tools or hardware.

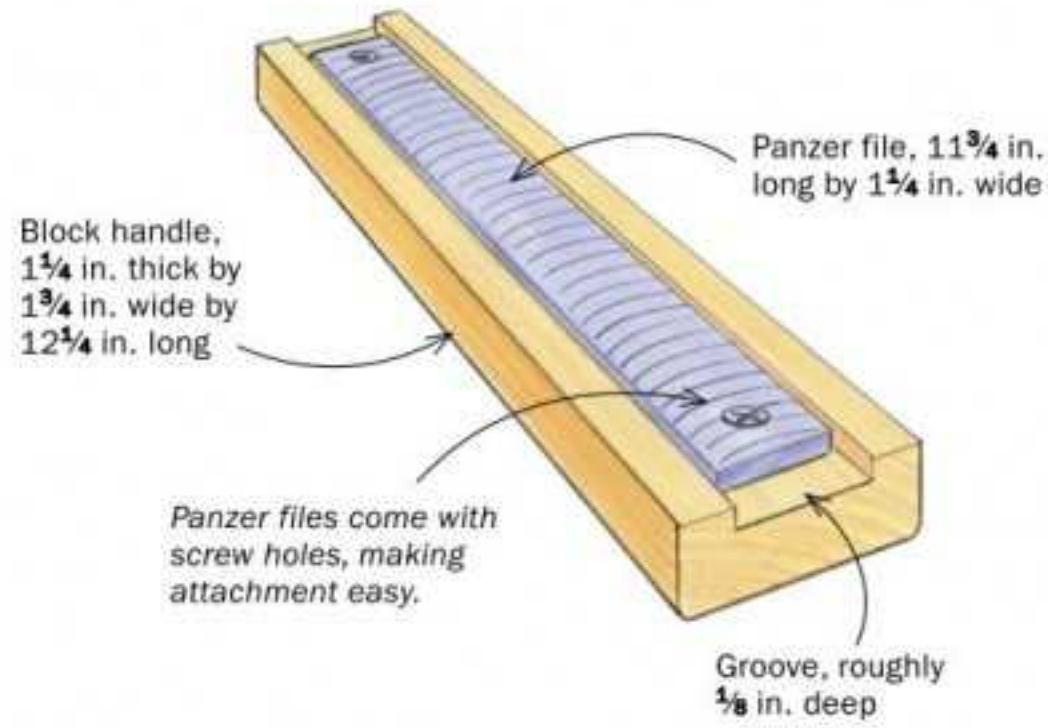
—HAROLD HORCHOVER, Trabuco Canyon, Calif.

Ski/snowboard file is best tool for leveling epoxy

I use a lot of epoxy in my woodworking, for everything from gluing up panels to filling holes and cracks. Being a one-man shop, I appreciate the extended open time this adhesive offers. Also, epoxy does not introduce water into the wood, its gluelines disappear, and unlike most other glues, it can fill gaps with full strength. The main drawback is dealing with the tough, hard squeeze-out. A Plasti-Cut file works OK for knocking down these lumps of epoxy, but it clogs quickly and works slowly. My favorite tool by far is a 12-in. radial file designed for tuning the plastic bases of skis and snowboards. It's called a Panzer file and is sold under a few brand names for as little as $20. It has two identical sides, extending the life of the tool.

The problem with the Panzer file is that it comes without a handle. It's also very sharp, so it will cut your hands and eat up gloves quickly. To make it safe and easy to use, I inset the file in a block of wood cut ½ in. wider and longer than the file. I run a groove down the middle just deep enough to accept the file and leave the teeth protruding. Then I round over the top edges to make them comfortable. Be sure to buy the type of Panzer file with screw holes at the ends, making it simple to attach to the block. This tool will destroy a mound of dried epoxy in seconds with little to no effort, and no damage to the surrounding wood. It's amazing.

—MATT SCHREIBER, Victor, Idaho



tools & materials

POWER TOOLS

Unfettered pin nailing

RYOBI'S NEW CORDLESS 18-VOLT pin nailer is good enough to make you give away your compressor. The ONE+ Airstrike 23-ga. nailer is an extremely well-designed tool, and it's a big bonus that it is not tethered to a loud, bulky compressor.

At first, I didn't think being unplugged would make such a big difference. But because the nailer feels more like a cordless drill, I keep it out on a shelf in my shop instead of packed away in its case in a storage cabinet. It stands upright on its battery pack, and I reached for it over and over again whether I was working with softwoods, plywood, or hardwoods, including oak. The tool's added heft compared with corded models wasn't an issue, as it was weighted nicely and easy to hold and use. It's also very easy to load.

In use, the Airstrike left almost no mark on my work. And because of the double trigger, it won't bump-fire, which can happen with guns that require you to depress the nose as a safety feature. At first this double trigger feels slow and clunky, but it quickly becomes fast, smooth, and second nature. The company says the pictured 4 amp/hr battery ($59) takes 30 minutes to charge and will fire 3,500 pin nails before it's drained.

—Anissa Kapsales is an associate editor.

ONE+ Airstrike pin nailer by Ryobi

$130 without battery

HAND TOOLS

Balanced skew chisels cut cleanly

IBC'S SKEW CHISELS are available in left- and right-hand pairs in three sizes (⅜ in., ½ in., and ⅝ in.). Like IBC's line of bench chisels, the skews have screw-on handles. I tested a set with the standard 3½-in.-long handle, although 7-in. handles are also available. Both lengths are available in walnut or maple. The tools performed nicely and were well balanced and comfortable.

The blades come with well-ground backs and bevels, so the initial setup for each took me under 20 minutes. In a variety of paring tasks in several woods, the high vanadium A-2 steel held up well. The skewed blades left a glassy surface on end grain. Similarly, they produced clean results in cross-grain work. Edge retention was excellent, too, holding up nicely when I chiseled the hard-to-reach corners in half-blind dovetails. Additionally, for those who already own IBC chisels, the skew blades can be purchased without handles and then used with the handles you already own.

If you are in the market for skew chisels, the IBCs are certainly worth considering.

—Bill Pavlak is the supervisor at the Anthony Hay Cabinet Shop at Colonial Williamsburg in Virginia.

Skew chisels by IBC

$132 single chisel;
$395 set of three;
$92 blade only

Photos: Barry NM Dima

IWF 2018 ROUNDUP

The International Woodworking Fair (IWF) this past August in Atlanta was enormous, chockful of equipment bigger than some shops. Amid all the industrial-scale machinery, though, a handful of new tools stood out as worthwhile for shops of any size. Here's a sampling of some that caught our eye.

Bessey GearKlamp $16–$25

This is a smooth-acting F-style clamp with an important change: The handle is in line with the bar, making it easier to tighten while clamping in tight spaces. The clamps come in lengths of 6 in. to 24 in.

Rikon DVR Control Box $630

Easily control the speed of your Rikon bandsaw blade using this digital interface and 1.75-hp motor. Designed in partnership with Striatech, this duo will allow you to nail the best speed for an individual cut, a boon when cutting different materials. They will retrofit onto Rikon models 10-320, 321, 324, 325, and 326.

Veritas Shooting Board Fence $109

Usable right- or left-handed, this attachment has eight detents, letting you shoot miters for frames with three, four, five, six, seven, eight, or nine sides. You can also slide the fence to any angle in between the detents. There's a microadjust to dial in the setup.

Festool CT Cyclone $375

While aftermarket cyclone filters that you can attach to your shop vacuum aren't new, we're looking forward to Festool's take on the tool. Compatible with the company's CT 26/36/48 dust extractors, this cyclone, like others, separates out large particulates—shavings and coarse dust—before they get to the collector itself, leaving the vacuum's main filter to handle only the fine stuff.

Online Extra

For highlights of our coverage of IWF 2108, watch the videos at **FineWoodworking.com/272.**

Photos: courtesy of the manufacturers

■ MACHINES

Dust collector with self-adjusting suction

I RUN A CUSTOM FURNITURE SHOP outfitted with just about every piece of machinery that needs dust collection. However, it doesn't have a centralized dust-collection system. Instead, we use a handful of units throughout the shop, each with multiple machines hooked up to it. This setup works very well with Oneida Air Systems' 3-hp, 35-gal. Dust Gorilla Pro, even if there are dust ports of varying sizes. That's because this system has what Oneida Air calls Smart Boost technology, which automatically adjusts the machine's suction to the task at hand rather than maintaining a steady draw.

To test the machine, I attached it to two tablesaws and a 5-ft. by 10-ft. CNC machine. Our CNC in particular can prove challenging for dust collectors, as its head is constantly moving in multiple directions and changing locations, which can reduce suction. The Smart Boost proved particularly helpful when multiple machines were hooked up and blast gates were used; opening up a gate for one of the tablesaws did not rob the CNC of suction. Other dust collectors do not respond like this, potentially compromising airflow and dust collection.

There are a handful of other great features. For one, assembling the dust collector is about as easy as it gets, and disconnecting the dust bin from the unit is a piece of cake. There are also gaskets that keep the connections sealed on the large HEPA filter. The filter is removable for cleaning, although I'd ask for a hand when removing it because the dust caught in there can make it quite heavy.

The Dust Gorilla Pro is a great dust collector for someone who wants to hook up multiple machines. It also comes in 5-hp and 55-gal. models.

—Greg Pilotti runs a furniture shop in Pennsylvania.

Boost with a brain. *The Smart Boost automatically regulates the fan speed to compensate for reduced suction.*

Dust Gorilla Pro by Oneida Air Systems

$2,994–$3,377

Photo: courtesy of Oneida Air Systems

Seventeen tools I can't do without

A LIST BUILT ON 40 YEARS AT THE BENCH

BY CHARLES DURFEE

My **workbench** is the absolute heart of my shop. I use it for joinery, shaping and surfacing, checking for flat, assembly, and of course for leaning on. Based on traditional German cabinetmaking benches, it's solid and heavy but can be moved in a pinch. I use it from both sides. Because I'm left-handed, I built it with the face vise on the right and tail vise on the left.

When we hang out with fellow woodworkers—whether online, in print, or in person—shop talk usually gravitates toward new twists on machinery, tools and techniques, and what we're making at the moment. It's all useful information, of course, and fun to talk about. But in the past few years, I've been having an internal discussion, noting the items in my shop that, over decades of use, I've really come to rely on and to appreciate, even if they may fly under the radar of shop-talk circles. Running the gamut from tweezers to my old workbench, these items range from the humble, perhaps hiding on a shelf and only occasionally used, to the more prominent and frequently used. But they all make my private pantheon.

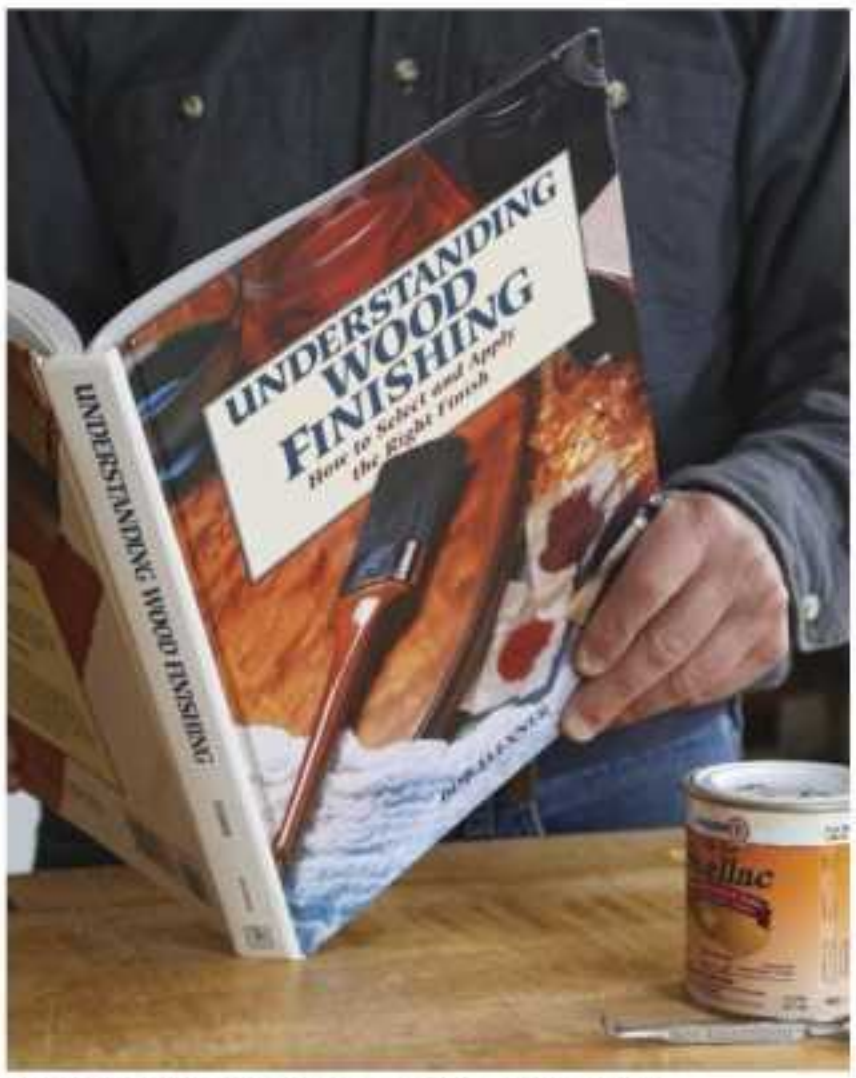
Charles Durfee works wood in Woolwich, Maine.

Photos: Jonathan Binzen

The **card scraper** is probably the most cost-effective tool in my entire shop. With this simple piece of quality steel (mine is Sandvik), I can clean off a surface, leaving it only in need of light sanding. It's also great for getting at particular spots that need attention, without affecting the surrounding surface. Saves a lot of sanding! I found using the Stanley #80 **cabinet scraper** frustrating at first. But after it's properly tuned up and sharpened this is a great tool for taking off wood, and it's especially useful when the board has a lot of figure. It's more aggressive than the card scraper, and the two work well in tandem.

I have quite a collection of different files and rasps, but my go-to pair are the Nicholson **#50 rasp,** and the Glardon Vallorbe **detail file**. The former is a veteran of the patternmaking trade. It takes wood off in a hurry, but it doesn't leave grooved scratches. The detail file has round and flat surfaces, both coarse and fine, so it offers lots of choices in one tool. These two also work really well in tandem.

This Lie-Nielsen **block plane** is just as sweet a small plane as you will see. It has a heavy cast-iron body and it took a bit of time getting used to the weight, but now I wouldn't have it any other way. It's a pleasure to adjust and to work with.



Finishing can seem like voodoo science, but **Understanding Wood Finishing** by Bob Flexner goes a long way toward demystifying it. It's been my bible in the times when finishing tries my soul, which occur not infrequently.

I have pipe clamps and steel I-beam bar clamps, but they gather dust in the corner. I was exposed to these Bessey **bar clamps** while teaching at the Center for Furniture Craftsmanship more than 20 years ago and became a convert, gradually building up my own set. They are light, don't mar the work, sit upright on the bench, and their heads stay parallel and square so panels won't buckle. The newer ones have a nice rubber handle.

This **pneumatic drum sander** chucks in the lathe and can be inflated to soft or firm. It's perfect for sanding curves of all sorts, and you can sand flat stock on it as well.

Splinter pullers are as humble as can be, but when I need them—and invariably I do—I'm delighted to have them. Mine have little micro points that curl slightly inward at the tip and are very effective. I got this pair, called Splinter Picker, from my local hardware store many moons ago. Lee Valley sells similar ones. Anyone who works with roughsawn wood will know why they're so valuable!

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WGBH

APT

¼-in.-thick MDF is about as humble as one can get in the woodshop, but I find it invaluable for making patterns. It is easy to cut and shape, and holds up through multiple uses.

Using **tenon cutters** is vastly easier and more accurate than sizing tenons on the lathe with turning tools and calipers or an open-ended wrench. You can use a tenon cutter on the lathe or chuck it in the drill press. With the latter, I use a clamping jig to hold the workpiece.

My favorite **flush-trimming router bits** are the type with both top and bottom bearings. They're great for pattern shaping. Add some double-sided tape to hold the workpiece to the pattern, and they remove all the anxiety over situations where you would need to cut against the grain.

This **shopmade router table** doesn't have much in the way of snazzy micro adjusters, but it works well with plenty of accuracy. It has a nice large work surface, dust collection, and a hefty 3¼-hp Porter-Cable router to drive the cutters.

I've made a few pairs of these **squaring sticks** in different sizes. The two sticks mate—and slide—with a tongue-and-groove along their length; a wingnut locks in the measurement. Used for taking inside diagonal measurements to check for square during the assembly process, they're more accurate and mistake-free than a tape measure.

A **power cord reel** is very handy. I don't like stuff underfoot, especially power cords. If you plug a cord into a wall socket and then are working on something in the middle of the shop ... well, you know what I mean.

In almost any shop, versatility in the use of space is important. My main machines are fixed in place, but the remaining open floor space is used for lots of things. I often take advantage of it with my pair of **folding horses**. I pull them out for sorting rough stock or gluing up large panels. If I add a sheet of ¾-in. MDF I've got an assembly or finishing table. Put them away when you need the space for something else. Super useful in a small shop!

Photos: Jonathan Binzen

shop design

Building a barn shop in Vermont

BY ERIC BAUER

My old shop, located in the cellar of our 1830s farmhouse in Fayston, Vt., came complete with gravel floor, 6-ft. clearance below the hemlock floor joists, and my very own springs percolating up from the ground. Sheet goods had to be broken down outdoors before I could get them downstairs. Still, it was my shop, and many decent pieces came out of it. Then, on Christmas Day in 2014, the outflow pipe got plugged up and the basement flooded. Forty-degree water steadily crept up the sides of my new tablesaw, finally rising over 20 in. Dampness had been a problem before, but this went beyond the merely inconvenient. I needed a new shop.

My criteria were these: It should be a stand-alone structure whose architecture was in keeping with the rural character of the area, it should button up tight against the winter chill, it should have plenty of natural light, and it should be built on a modest budget. Oh, and one more thing—there should be no rivers running through it.

After much back-road driving to photograph farm buildings, and after delving into the great book *An Age of Barns* by Eric Sloane (originally published 1966, Funk & Wagnalls), I drew up elevations for a barnlike building with a 24-by-18-ft. main structure and an attached 24-by-10-ft. lean-to. This gave me a shop roughly 23 ft. by 27 ft., completely open save for a single post supporting the lean-to's joist.

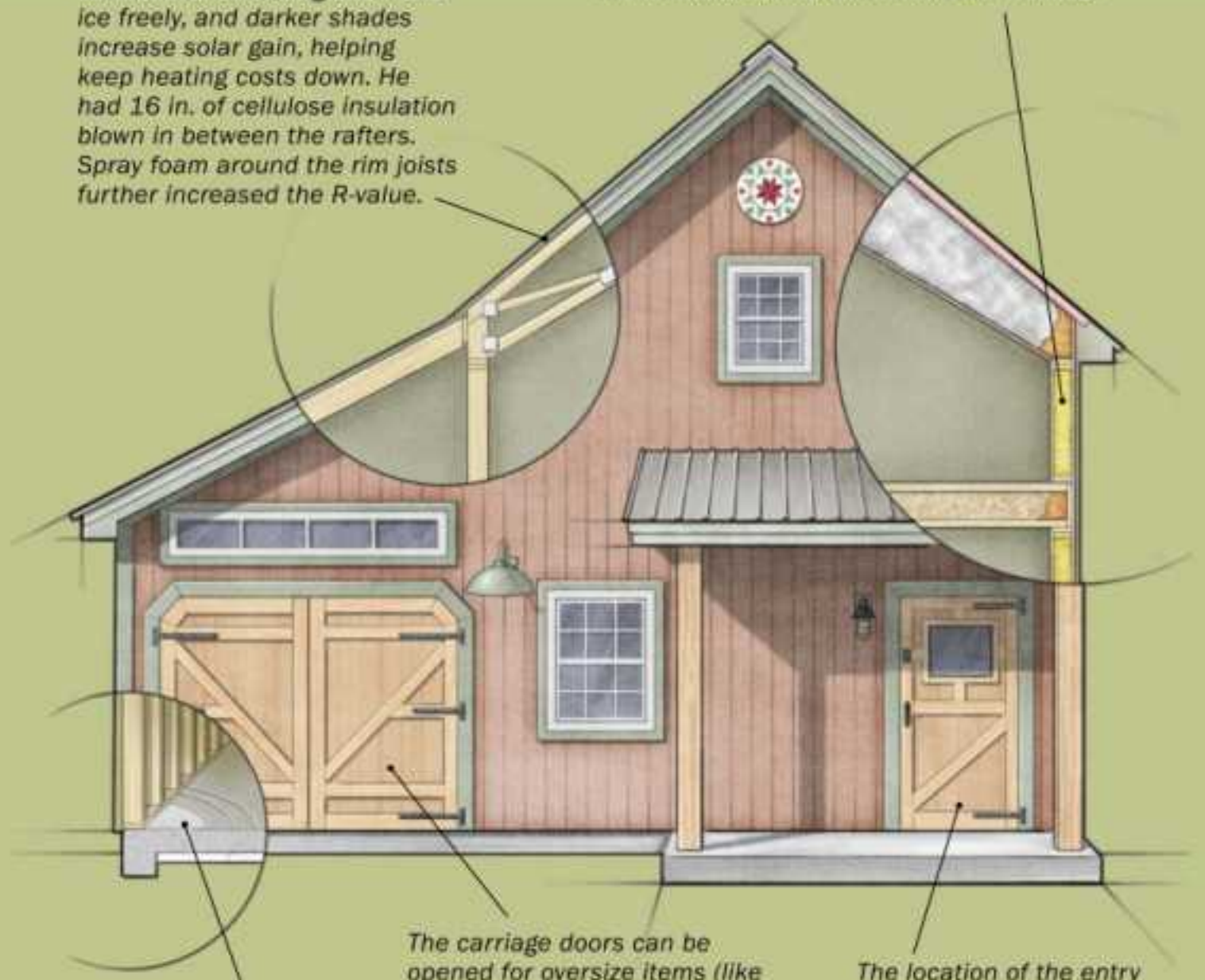
Take the high road. *A hillside site afforded the opportunity to create access to the storage loft by way of a ramp, or "high road," saving the shop space that an interior stairway would have required.*

A TWO-PART STRUCTURE

The shop's overall design can be viewed as two separate buildings joined together. The primary structure utilizes standard truss design while the second, the lean-to, has a conventional rafter design. To keep the work area as open as possible, the two sides were tied together with an 18-in. LVL joist, supported in the center with a 6x6 post. While post-and-beam construction would have been in keeping with history, Bauer opted for 2x6 studding, with cost being the deciding factor.

Bauer chose slate-gray channel-drain metal roofing to cap the shop. Metal roofing is popular in Vermont for shedding snow and ice freely, and darker shades increase solar gain, helping keep heating costs down. He had 16 in. of cellulose insulation blown in between the rafters. Spray foam around the rim joists further increased the R-value.

The shop walls are sheathed with OSB inside and out, with Tyvek vapor barrier wrapping the exterior and R-21 fiberglass insulation sealed within. Inside, the OSB was left exposed; outside, local shiplap knotty pine clads the building.



Bauer rolled three coats of water-based, industrial concrete sealer on the concrete slab floor. It facilitates sweeping, and most spills are easily wiped up, leaving no stain.

The carriage doors can be opened for oversize items (like a forklift dropping off a planer), and would allow a future owner to convert the space from a shop to a garage. Here and for the entry door Bauer used the same sandwich construction: ½-in. exterior plywood faced on both sides with ¾-in. shiplapped knotty pine. The strapping is ¾-in. cedar.

The location of the entry door creates a straight run from truck to lumber rack. Bauer built it oversize (42 in. by 82 in.) to provide passage for most machinery and finished projects. The window is a custom, insulated, low-e argon glass insert.

Versatile (and very big). *The 50-in. by 90-in. MDF-topped assembly table is well positioned for stacking lumber and workpieces while milling. Outfitted with a vise and dog holes, it also serves as an auxiliary planing bench.*

Saw at the center. *Located right at the heart of the shop, Bauer's tablesaw is equally convenient to his milling machines, workbench, and assembly table.*

The site

Siting the barn required balancing several factors. There was the slope of the land, the numerous springs nearby, the proximity of power lines, the need to maximize southeast exposure to capture more sunshine, and the desire to make the building be as good to look at—and as good to look out from—as possible. Working with these thoughts in mind, I situated the shop on the hill behind our house at a 45° angle to the house, a siting that gave the shop architectural interest, the proper exposure, and direct access to power. It also afforded great views of the surroundings, including the families of deer, turkey, and bear that frequent our field.

Building into a hillside did present some problems, but it also made for one fun and creative solution. To keep the floor plan open, I had decided to install a drop-down ladder to the loft instead of interior stairs, even though it would restrict the size and weight of what I could store up there. My son-in-law, Kirk Strassberger, who was the general contractor for the shop, suggested we take advantage of the sloping site and build an exterior ramp as the main access to the loft. There was ample historic precedent for this—many old barns had a "high road" that was used to access the hay mow. The ramp preserved the open floor plan while providing full access to the loft.

The structure

All the framing, sheathing, and roofing were handled by Kirk. I did offer my services, but my habit of measuring in 32nds and 64ths was deemed detrimental to the momentum of the build. So I channeled my energy into fabricating the doors. Well-proportioned doors are an architectural focal point on many a barn, and designing the doors for mine was a very enjoyable aspect of the project.

Drawings: John Hartman

Knife-making. *In this corner Bauer's son Karl makes the blades for Japanese-style kitchen knives, and Eric makes their handles and wooden sheaths.*

Hub of handwork. *Bauer's workbench is supplemented with built-in benches on two adjacent walls.*

Miters and mortises. *One run of counter accommodates Bauer's chopsaw and his hollow-chisel mortiser, which can be pulled forward for use.*

The layout

My work can vary from the micro (laminated knife handles) to the macro (up to 18 linear ft. of cabinets). It was therefore imperative that the shop layout accommodate the small and large, the simple and complex equally well.

So where to start? Grizzly Industrial has a Workshop Planner app (grizzly.com/workshopplanner) that's very handy for the initial phase. The first thing you notice when using it is that you probably should have built a bigger shop! The planner is set up for Grizzly machines, but small differences in dimensions are not important; this step is to see in broad strokes what will fit where and to establish a flow pattern. I developed a plan so lumber flows from the wood rack to the jointer, planer, and tablesaw, while being cycled off a large (50 in. by 90 in.) assembly table. And I made sure the primary machines could handle a run of 10 ft., fore and aft.

I designed a dust-collection system with dedicated ports at all major machines, overhead 4-in. PVC pipe, and a 30-gal. cyclone separator and 2-hp dust collector. I put the cyclone and collector in the loft, freeing up floor space in the main shop and dampening the noise. Wood chips are taken out the "high road" for storage outside until I use them as mulch for our gardens. Incidentally, I put offcuts in a bin at the end of my driveway marked "free kindling." My neighbors love it!

Wrap-around benches tied into two walls of the shop provide general workspace and support my chopsaw and mortising machine; they also provide ample storage below. All my shopmade benches and the assembly table have sacrificial tops of either MDF or ¾-in. plywood. In keeping with the cost-conscious construction, virtually all the built-ins and trim were fabricated from lumber left over from the initial build.

Three years on, I'm very happy with how the shop worked out. It's warm in the winter and cool in the summer, and with minor tweaks the layout has proved efficient for a wide range of projects. Perhaps the most satisfying feature of my shop is the corner dedicated to my collaboration with my son Karl, a chef who makes Japanese-style kitchen knives. Karl does the forging, grinding, and finishing of the blades, and I make the handles and wooden sheaths. □

Eric Bauer works wood in Fayston, Vt.

Hanging Panels Keep Tools

Close at Hand

BY JASON STEPHENS

Clever holders blend security with easy access

I joined the Army in 1994 as a drummer in the band program. One day on the Army base in Wiesbaden, Germany, I noticed my friend Dave coming up the stairs carrying a newly made wall cabinet with beautiful exposed joinery. He told me he'd made it at the woodshop right across the parking lot from our barracks. I was floored.

For the next eight years, I spent practically every waking moment in that shop, which I realized later was a world-class facility. I began accumulating hand tools during those years, and it didn't take long before the shop workbench began doubling as my storage shelf, with tools eating up all of its usable real estate.

My tool-storage solution

When I returned to the United States and finally had the opportunity to set up my own shop, I consulted Jim Tolpin's *The Toolbox Book* (The Taunton Press, 1998). I loved his idea of French-fitted trays, which protect tools and show at a glance where they belong. As for the many cabinets featured in the book, they were magnificent, but I don't like opening doors or drawers to retrieve bench tools. I want to be able to grab them right away with one hand.

My hanging-panel-based tool storage solution marries custom holders for each tool with easy one-handed access. I use it for both hand tools and machine accessories, placing panels full of tools within arm's reach of my working position.

I mounted my tool holders on 2-ft. by 4-ft. pieces of ½-in. plywood (as opposed to directly on the wall) for a few reasons. First, the plywood saves your wall from becoming Swiss cheese when you rearrange the layout, add tools, and delete others from daily use. Also, plywood lets you attach and relocate holders with simple screws, as opposed to the fussier fasteners required for drywall or concrete. And if you need to relocate a group of tools—or the whole shop—you can take the panels and holders off the wall in one piece, and mount them easily in your next location.

Jason Stephens, who recently retired after 24 years in the U.S. Army, lives in Dunn, N.C.

Two ways to attach panels

1. SCREW THEM IN PLACE

2x4s are simple and effective. *Mounting strips screwed to the wall make it easy to attach the plywood panels. You can ignore the studs if you like and use self-drilling plastic drywall anchors (left), rated to support 50 lb. each. That lets you space the strips 24 in. apart, at the edges of the panels. The panels then screw on easily and securely.*

I've attached the plywood tool panels to the wall in a couple of ways. If you are pretty sure that they will be staying put, the simplest, strongest method is attaching 2x4s solidly to the wall and then screwing the plywood to those. A more versatile option, the French cleat, allows you to move panels with ease.

A French cleat consists of two pieces of wood beveled at 45°, one on the wall and one on the back of the tool panel. It lets you drop the panel into place securely with the mating bevels pulling it firmly against the wall. When it's time to move a panel, mount another cleat in the new location and you can lift the panel off the first one and drop it onto the new one. When I moved my bandsaw, I relocated the panel holding all its accessories in minutes.

An additional benefit is how the French cleat (and a spacer strip that keeps the panel from tilting inward at the bottom) keeps the panel off the wall. The plywood is only ½ in. thick, and that air space at the back lets me drive screws all the way through, for maximum grip when attaching holders.

As for beveling the French cleats, you can bevel two at once by making a 45° ripcut along a single piece of hardwood or plywood, or bevel individual pieces of solid lumber on the jointer. Because the cleats are ¾ in. thick and the plywood is only ½ in., I screw the plywood to the cleat, not vice-versa.

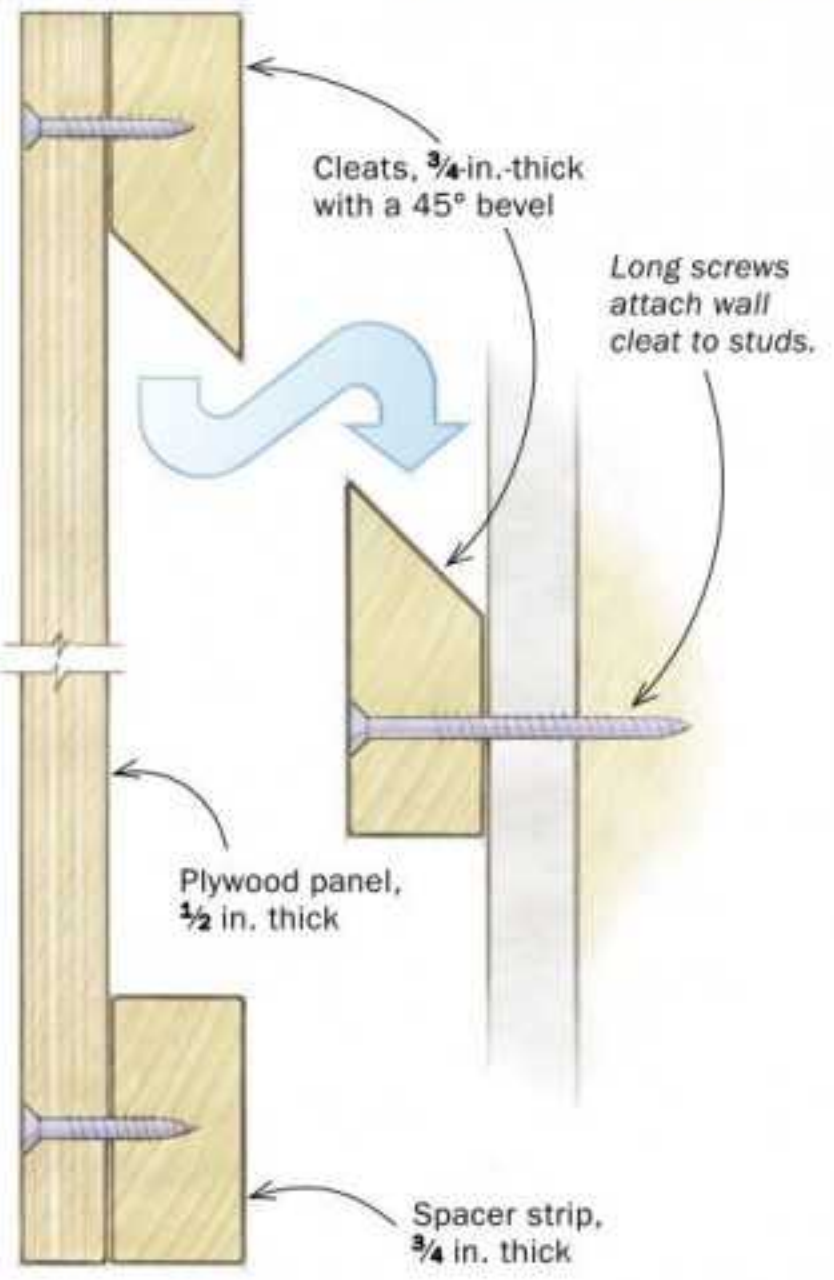
To attach 2x4s or French cleats to the walls, my method depends on what the walls are made of. For drywall, I hang French cleats by locating the wall studs and screwing into those. For the 2x4s approach, I use a number of self-drilling plastic drywall anchors—rated to support 50 lb. each.

Faced with concrete walls in a past shop, I used a .22-caliber powder-actuated tool to essentially blast nails through a 2x4 frame, securing it to the cinder blocks. Use washers with the nails, and plan carefully. Once these nails are driven into concrete, the 2x4s or cleats are not coming off without the use of demolition equipment.

Photos: Asa Christiana; drawings: Dan Thornton

2. USE A FRENCH CLEAT

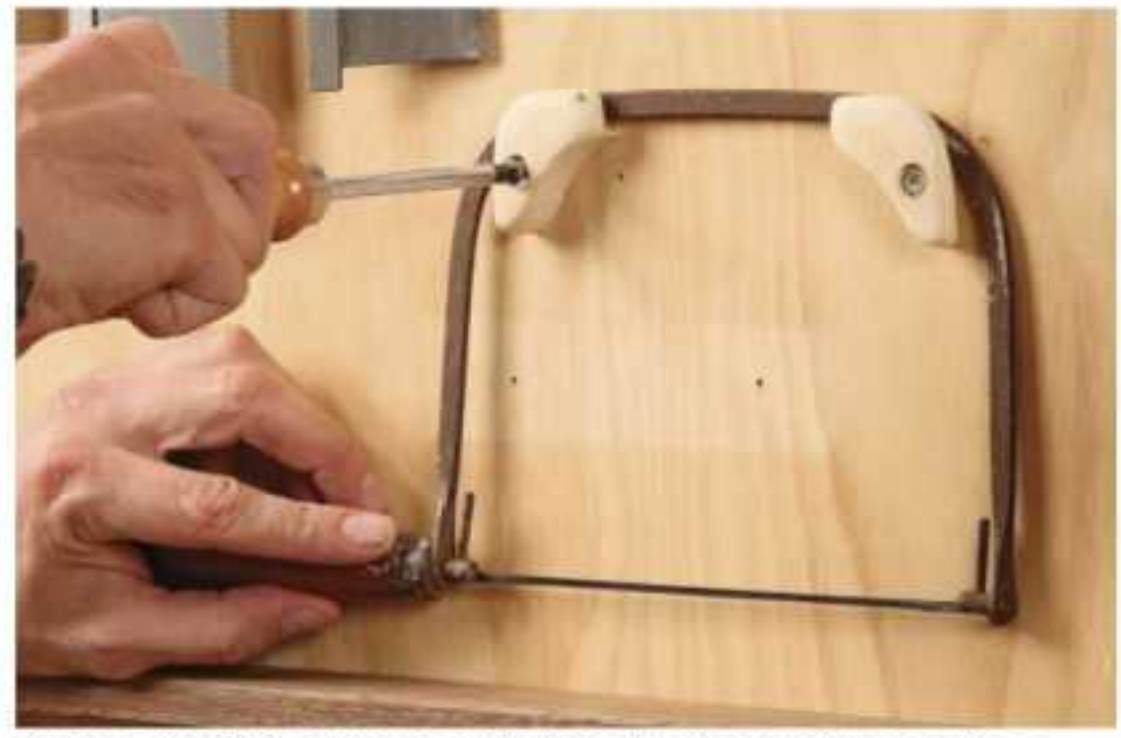
Cleats make panels portable. *Find the studs behind the drywall, and screw a ¾-in.-thick beveled cleat to them (above). Then screw the panel to a matching cleat, and hang the panel on the wall with the cleats interlocking securely. A spacer strip at the bottom of the panel keeps the plywood plumb.*



Holders that stay put

Solutions don't need to be fancy. *To hang Japanese saws, Stephens screws eye hooks into the ends of their handles, and hangs them from simple deck screws.*

Spinners secure handsaws. *Stephens designs holders so that valuable tools won't fall, but he can free them easily with one hand. A twist of the spinning catch allows easy access to his backsaws.*



Custom hanging solutions. *Odd-shaped tools sometimes require a creative approach. A coping saw gets a pair of curved and coved hooks.*

The hand tools on the wall behind my bench are the ones I use in my everyday workflow. I even position them near the parts of the bench where they're used most, for example, dovetail saws near the main vise. Not only do I like my tools within arm's reach, but I also want to be able to release them with one hand and put them back just as easily. At the same time, I don't want tools hurtling to their demise on the concrete floor.

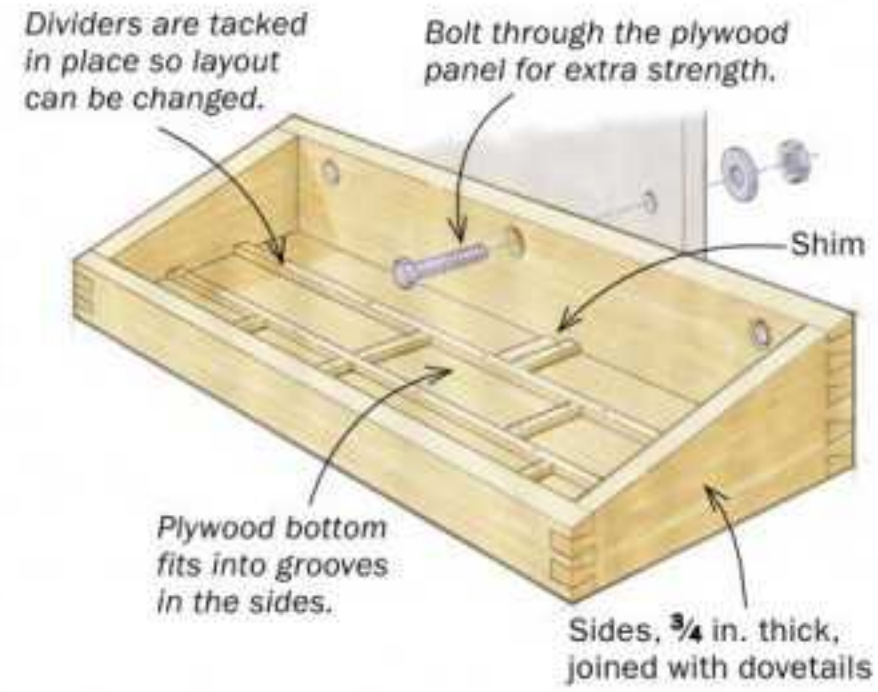
To create that balance of security and accessibility, each tool holder is a custom job. I find making these holders to be a rewarding problem-solving exercise. One of my first was a hanger for my mallet. I was never quite happy with it, because the top-heavy mallet was forever flopping over to the left. One day, when placing the mallet back in its mount, I accidentally put it back upside down, hanging it by the handle's knobby end. Perfect. I learned an important lesson that day: Sometimes you need to study a given problem, carefully formulate your best solution, and then do the opposite.

Here's a look at some of the holders I designed.

Handsaws—The two panel saws to the left of my bench belonged to my great-grandfather. They don't look like much, but hidden beneath the patina of 70-plus years of sweat and use I discovered the mark of Henry Disston. These are fine working saws, worthy of a place near the bench. I mounted the saws by cutting a form-fitting piece that fits inside the handle, with a T-shaped spinner that can be rotated to lock the saw in place. I did the same with my tenon and dovetail saws.

Bench planes—I store the most-used ones in a trough, hung at waist level for easy retrieval and located near the end of the

When subpanels make sense. *For sets of tools he wants to keep together, like these vintage saws, Stephens creates subpanels (above), so he can relocate the set as a unit in the future. A twist of a T-shaped spinner (right) locks the handles in place.*



The plane trough. *For his collection of standard bench planes, Stephens built this trough, which lets him access each one in seconds. Dividers separate the planes and show where each one goes, and a small shim inside each pocket raises the plane's toe to keep the blade from touching down.*

bench where I do most planing. I assembled the shallow box with dovetails because of the weight it would have to support—about 45 lb. If you use fewer handplanes, you can make a smaller trough.

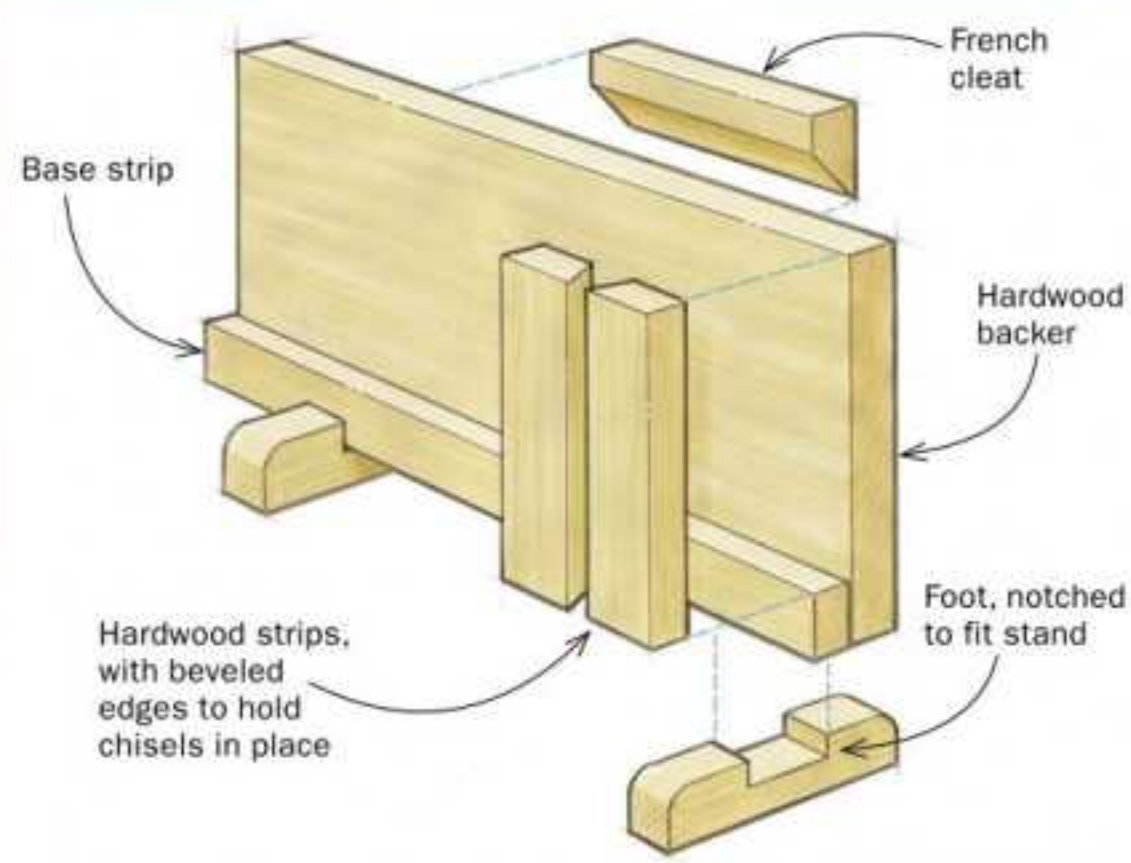
In keeping with my allergy against using more than one motion to retrieve a tool, I chose not to cover the trough. The result is extremely efficient, and I have to admit that years later I still sometimes smile when retrieving or replacing a plane.

Specialty planes—Some of my planes have a non-rectangular footprint, so I chose not to include these in the trough. Instead I made French-fitted trays for those, tracing around the sole with a pencil to achieve the desired result. A few of the planes—such as the rabbet and dovetail planes—are not flat on the bottom, so their holders required extra fitting. I accomplished this with a combination of drilling, chiseling, and some coping-saw work.

Special planes get special pockets. *For planes with curved soles or unusual shapes, Stephens makes custom holders like this one, designed to hug the sole and protect the blade.*

Holders that travel

Chisel stand. *Stephens makes holders like these for various types of chisels, letting him bring a whole set to the bench and keep them from rolling around when they get there. They attach to the wall with a French cleat. A hinged wood flap pivots over the top (right) to add security.*



A few of my wall-mounted holders double as detachable tool stands, which I take down as a unit and bring wherever they're needed. I find this especially helpful for chisels and drill bits. If you do a lot of carving, this is an extremely useful concept. I'm pretty sure I shamelessly stole this idea from someone—it's been long enough now that I can't remember.

Chisels—When I'm mortising or chopping dovetails, I like all my chisels in front of me so I'm not forever turning around and reaching for a different one. I also don't want them rolling around on the bench or over the edge. So I made separate free-standing holders for each of type of chisel I own (bench, mortise, dovetail).

I use a French cleat to mount each chisel holder to the wall, so I can easily take it off or put it back on. The cleats are pretty secure, but there is still the possibility of knocking the holder off the wall. So I installed a little hinged piece of wood on the wall mounts, which swings forward over the holder to lock it in place.

Drill bits—This holder lets me transport all my drill bits at once to my workbench or assembly table, with the bits standing upright for easy access. Obviously this can be done with a standard metal drill-bit case, but I wanted something with a little more soul. I also wanted the individual bits to be visible when wall-mounted, so it made sense to use a holder similar to the one for my chisels.

Drill-bit stand. *Stephens made another holder for drill bits, letting him bring his whole collection to the drill press or assembly table.*

TOOL TEST

Random-Orbit Sanders

We test 5-in. models for speed, handling, and efficiency

BY BARRY NM DIMA

The 5-in. random-orbit sander is a staple in most shops, and for good reason. Its size makes it easy to handle, and its random-orbit action cuts quickly and yields a smooth surface without obvious scratch marks. Still, sanding can be a particularly vexing chore, so you want a sander that works as quickly and comfortably as possible, and leaves the least amount of dust floating in the air. I took a look at 11 sanders to find out which ones excelled and which disappointed in terms of ability to smooth, speed of stock removal, dust collection (both with and without a shop vacuum attached), handling and ergonomics, decibel level, and how quickly they stopped vibrating after being turned off.

To see how well each sander smoothed a solid-wood surface, I sanded cherry test boards up through the grits, ending at 220. Then I quickly hand-sanded the boards at 220, wet them with denatured alcohol, and viewed their surfaces in raking light. It turned

Photos: Michael Pekovich

TESTING THE SANDERS

Using poplar boards, I tested each model three times for five minutes with a vacuum attached and then with on-board dust collection if available. I used 100-grit Norton ProSand Multi-Air sandpaper. It has a large number of small holes instead of the traditional cluster of larger ones, allowing it to fit any sander's hole pattern. Variable-speed models were set to high. The chart (pp. 46–47) shows the averages of these tests.

STOCK REMOVAL AND DUST COLLECTION

Comparing the weights of the test board and on-board dust bag before and after sanding showed how much wood was removed and how much dust was collected.

SHOP VACUUM PERFORMANCE

Replacing on-board dust collection with a shop vacuum, Dima weighed the test board and the vacuum's bag before and after sanding. He found that every sander worked significantly better when connected to the vacuum.

SURFACE QUALITY

After power-sanding a cherry board to 220 grit, quickly sanding by hand, and rubbing on paint thinner, Dima found that all the models left a flawless surface.

HANDLING

Room for two hands is crucial, especially when hooked up to a shop vacuum, which can drag down the back of a sander.

While Dima struggled with using a paddle power switch, many professional finishers favor sanders with this mechanism.

out it wasn't the surface quality that separated the sanders. From the $30 Black and Decker to the $610 Mirka, they all produced a finished surface free of blemishes. But there were big differences elsewhere, including in how much stock they removed, and how well they collected dust. My findings are in the chart on pp. 46–47.

Almost all of the sanders come with a removable container for on-board dust collection, and I tested their effectiveness. They also can be fitted to a shop vacuum, which made for substantially more efficient dust collection and more aggressive stock removal. All these sanders performed much better when used with a shop vacuum. But having a hose attached does make sanding somewhat more cumbersome, as it can make the back end tippy and, if you rotate the sander much, you have the ribbed hose to contend with. Maybe I'm slow on the uptake, but each time a rib caught on the edge of a board, I was just as surprised and annoyed.

If you always sand with a vacuum attached, the exact noise level of a sander might not be a vital concern, since the vacuum will add its own racket. But if you ever sand without a vacuum, the decibel levels of these sanders, which ranged substantially, could be a factor in choosing between them. There's also the amount of time a sander takes to completely shut down after hitting the power button. This didn't make or break a sander for me, but I noticed and appreciated the luxury of a fast-stopping sander.

A number of the sanders have variable speed control, although the value of this feature is questionable. Professional finisher Teri Masaschi suggests there's no advantage to sanding at slower speeds with an electric sander. Furniture maker Chris Gochnour agrees. In any case, I tested the variable-speed sanders at their highest setting.

Other factors to consider are ergonomics and handling. A tool that's hard to use and control could skitter over the board or dig into it—not exactly what you want when you're so close to the finish line. In the same vein, all but one were nice to hold from above. People who like to hold a sander around its waist, though, may find some models more spacious there than others.

Barry NM Dima is an associate editor.

Top performers

These two sanders, at opposite ends of the price-range spectrum, both performed excellently, so the size of your wallet shouldn't keep you from buying a fine sander.

FESTOOL RO 125 FEQ PLUS ROTEX

The Festool Rotex is a top-of-the-line choice. On its coarse setting, it removed stock nearly twice as quickly as the second-fastest model. But that speed doesn't mean you'll have to wrestle with it. It's no huge task to control it with two hands, and its long body gives you plenty of room to find a sweet spot while holding it.

CRAFTSMAN AT SEARS 320.39592

While this sander is among the least expensive models in the test, its performance ranks among the best. The stock removal was excellent, and dust collection was solid when used with a vacuum. It handles really smoothly, too, and has a tall body that fit my hand nicely whether I was holding it from above or around the waist.

5-in. random-orbit sanders

Black & Decker
BDER0600

Bosch
ROS10

DeWalt
DWE6423

Festool ETS
EC 125/3 EQ-Plus

Festool ETS
125 REQ

MODEL	PRICE	VARIABLE SPEED	BUILT-IN DUST COLLECTION		SHOP VACUUM	
			Stock removal (grams)	% of dust collected	Stock removal (grams)	% of dust collected
Black & Decker BDER0600	$30	Yes	8	62.5	9	88.9
Bosch ROS10	$50	No	9.7	79.3	13	94.9
BEST VALUE Craftsman at Sears 320.39592	$55	No	11	33.4	16.3	93.9
DeWalt DWE6423	$80	Yes	7	52.4	8.7	96.1
Festool ETS EC 125/3 EQ-Plus	$400	Yes	N/A	N/A	15.3	95.7
Festool ETS-125 REQ	$200	Yes	6.3	68.4	10.7	96.8
BEST OVERALL Festool RO 125 FEQ Plus Rotex (coarse/ fine)	$510	Yes	N/A	N/A	38.7/ 13.7	90.6/ 87.8
Mirka DEROS 550XCV	$610	Yes	N/A	N/A	20.3	96.8
Porter-Cable 382	$43	No	7.3	59.1	15	97.8
Ridgid R26011	$60	Yes	8	70.8	12	100
Ryobi RS290G	$40	No	7.67	73.9	11.3	88.3

Mirka
DEROS 550XCV

Porter-Cable
382

Ridgid
R26011

Ryobi
RS290G

LOUDNESS (db.)	STOPPING TIME (sec.)	HANDLING	COMMENTS
88	4.95	Good	Fair stock removal and dust collection without a vacuum. Fair stock removal and poor dust collection with a vacuum. Sander has a regular pulse in use. Paddle switch was awkward, but the on/off lock was handy. Comfortable, but cramped waist made holding there often uncomfortable. Slow to stop.
85	2.48	Very good	Good stock removal and dust collection without a vacuum. Average for both with a vacuum. Handling was very good, but a little less so with a vacuum attached. Easy to grip around the waist.
91	3.75	Very good	Excellent stock removal both with and without a vacuum. Good dust collection with a vacuum but very poor without one. Comfortable to grip around the waist.
90	2.76	Very good	Stock removal was poor. Dust collection was near the bottom without a vacuum, but very solid with one. Roomy waist leaves plenty of options for gripping.
79	0.51	Good	Good stock removal and dust collection. Must be used with a vacuum. Low profile makes for awkward one-handed sanding. Sander sometimes jumpy with stock irregularities. Shuts off almost instantly. Brushless motor makes it more powerful than the ETS REQ.
81	1.33	Very good	Without a vacuum, stock removal was poor and dust collection fair. With a vacuum, dust collection was excellent, stock removal fair to poor. Roomy waist, but square body isn't very comfortable. Very quick to stop.
92	1.91	Fair/ Good	Two sanding modes make this the most versatile sander in the field. By a mile the best stock removal of sanders tested. Must be used with a vacuum. Dust collection was comparatively poor. Handling is good in fine mode, but requires two hands in coarse mode. Grip is comfortable both from the top and the front.
82	1.11	Very good	Excellent dust collection and stock removal. Must be used with a vacuum. The paddle switch was awkward to use, but the shape of the head made handling comfortable with one hand or two. Stops very quickly.
86	5.01	Poor	Without a vacuum, toward the bottom of the pack in stock removal and dust collection. With a vacuum, stock removal was good and dust collection was excellent. Slowest to stop. Not much to grip when held on top.
88	4.22	Fair	Without a vacuum, average stock removal, very good dust collection. With a vacuum, fair stock removal, excellent dust collection. Dust port's location allows a good grip.
89	4.32	Very good	Fair stock removal and dust collection. Handles smoothly. Thanks to a scoop in the dust port, there's plenty of room to grip around the waist, even when attached to a shop vacuum.

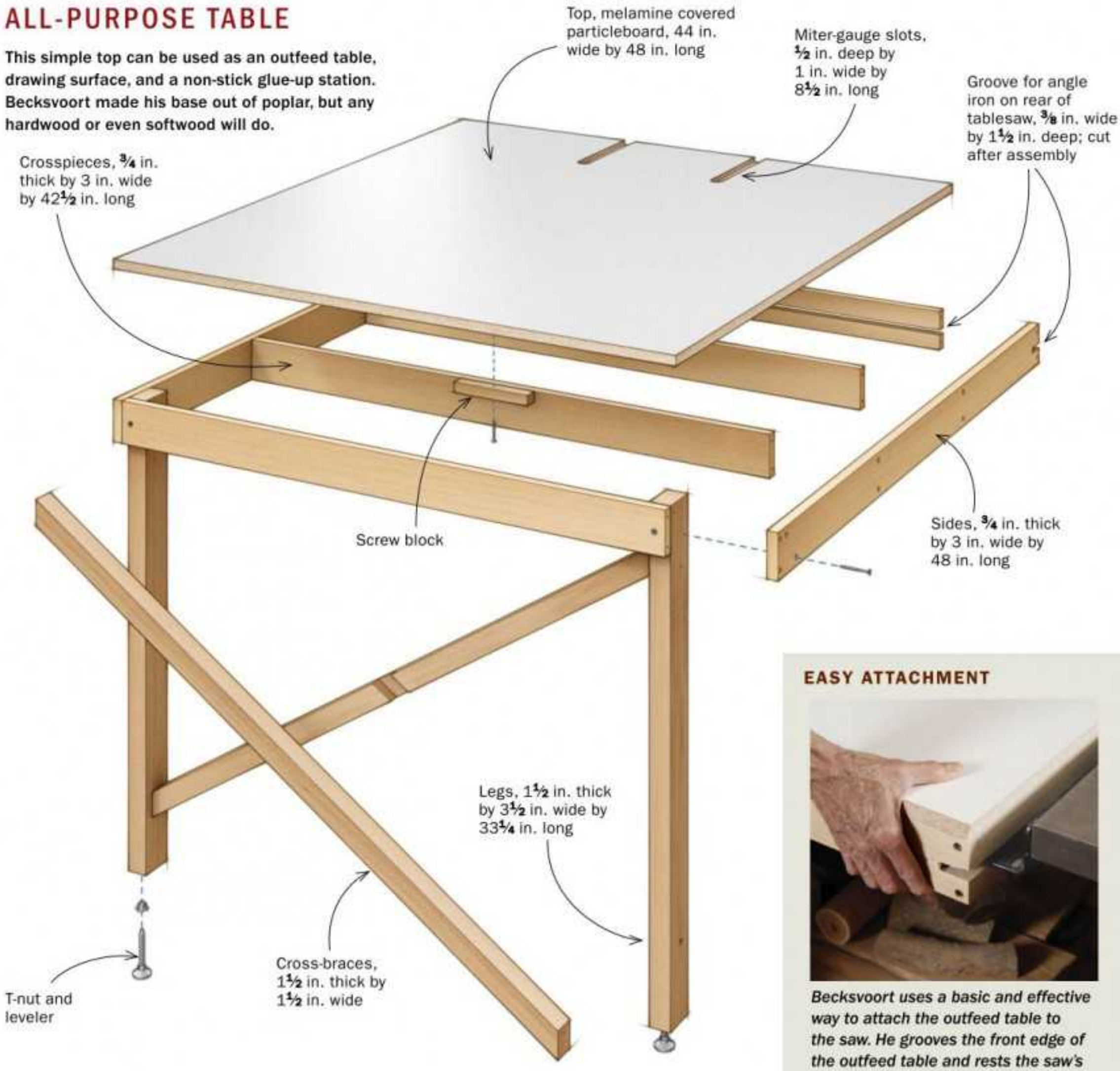
Basic Outfeed Table

Durable, versatile, and easy to build

BY CHRISTIAN BECKSVOORT

ALL-PURPOSE TABLE

This simple top can be used as an outfeed table, drawing surface, and a non-stick glue-up station. Becksvoort made his base out of poplar, but any hardwood or even softwood will do.



EASY ATTACHMENT

Becksvoort uses a basic and effective way to attach the outfeed table to the saw. He grooves the front edge of the outfeed table and rests the saw's angle iron in the groove.

If you own a tablesaw and make anything bigger than miniatures, you really need an outfeed table. There are plenty of articles on making outfeed tables equipped with a variety of cubbyholes, doors, and drawers. That's a great idea, especially if you're in need of additional storage space and have the extra time to devote. However, if you just want a quick, dependable, and versatile alternative, I have one. The simplest outfeed table is nothing more than a flat surface and two legs. It shouldn't take more than a few hours to build and will serve you for decades.

Your choice of materials for the top adds to the versatility of this outfeed table. My first two choices are ¾-in. plywood covered with Formica, or melamine-faced particleboard. I often use mine for assembly, and dried glue pops right off these surfaces. I'd go with white, off white, or light gray because I also use my outfeed table as a whiteboard to lay out angles or draw full-size details. Pencil wipes off easily.

Size your table to fit your needs

You don't have to build your outfeed table to the same dimensions as mine. Decide on the width and length of the tabletop based on your saw, what kind of work you do, and how much room you have in your shop. The cast-iron top of my tablesaw

Photos, this page and opposite: Michael Pekovich; drawings: Christopher Mills

Start at the top

A simple frame. *Once the outer frame is screwed together, add two internal supports. A wooden hand-screw clamp keeps the parts aligned for pre-drilling and screwing.*

is 44 in. wide, so that's the width I chose to make my outfeed table. If you have room to the right of the saw and work with lots of sheet goods, feel free to make the table wider. For me, 48 in. is a convenient length. Added to the 30 in. of the saw table itself, that gives me more than 6 ft. of flat surface to work on.

Build the frame first, then add the top

Start by making a frame out of ¾-in.-thick by 3-in.-wide hardwood. The corners can be nailed, rabbeted, screwed, glued, or even dovetailed. I use screws. For my size table, once the frame is together I add two internal crosspieces, roughly 15 in. apart, for added strength. These can be screwed in place from the outside of the frame. Sight across the top of the frame to be sure that the entire top is in the same plane.

If you are using plywood or MDF for the top, cut the piece to size and glue, nail, or screw it to the frame. Now glue on the Formica surface. If you are working with sheet material with a factory-applied melamine surface, just glue and clamp the panel to the frame.

The outfeed table can be attached to the saw in one of two ways. If your saw has an angle-iron fence system front and back, cut a groove along the leading edge of the outfeed table's frame. I cut it on the tablesaw with the tabletop standing on end, using a dado blade, a featherboard, and a high fence. If the saw table has no angle iron, you can bolt the outfeed table to the flange of the saw table. Next, cut two slots into the top aligned with your saw's miter-gauge slots.

Attach the top. *The top gets glued and clamped to the frame. If you are using a sheet with melamine on both sides, make sure to scuff-sand where the glue will be applied. Because there's no way to apply clamp pressure at the center of the tabletop, Becksvoort glues a cleat to the supports, and then predrills and screws through the cleats into the underside of the top.*

Photos, except where noted: Anissa Kapsales

Cut a groove for mounting

Locate and rip. *Use an adjustable square to measure the distance from the surface of the tablesaw to the top of the angle iron. Because you want the outfeed table to lie a bit below the saw table, retract the square's blade 1/16 in. to mark for the groove. With a tall auxiliary fence and a featherboard to support the top, Becksvoort uses a dado blade to cut a groove in the frame's front edge for the angle iron to rest in. Avoid the screws in the corners.*

Measure from the edge of the tablesaw to locate the slots. Cutting the slots with a 1-in. router bit gives me a bit of leeway when aligning them to the tablesaw's ¾-in. miter slots.

Move on to the leg assembly

Once the top is made and the slots are cut, add the two legs. They are easy to make from 1½ in. thick by 3½ in. wide stock, cut about 1 in. shorter than the distance from the underside of the top to the floor. Undersizing them gives you space to add T-nuts and levelers. Drill the appropriate size hole into the bottom of each leg, insert the T-nut, and then thread in the levelers. I get mine from Rockler (nos. 49869 and 24315).

The legs are attached into the far corners of the table, clamped and then screwed through the frame from the outside. The 1½-in. edge goes to the end, with the 3½-in. face parallel to the sides. If your frame parts were cut square, the legs should stand plumb. Two 1½-in.-thick by 1½-in wide pieces are used diagonally as cross-braces between the legs. With the table upside down, I locate the top end of the cross-braces to rest just above the underside of the frame. I use a half-lap

Continue the tablesaw's miter slots. *Locate the slots by taking measurements off the tablesaw and drawing them on the outfeed table. Using a 1-in. router bit builds in some forgiveness when aligning to the saw's ¾-in. miter slots.*

Attach the legs

Make legs and add cross-braces. *Before you screw the leg in place, drill and tap in a T-nut and add a leveler to the bottom of each leg. These will help you level the outfeed table to the saw table. Mark the first cross-brace in place (bottom right), cut it to length, and screw it to the legs.*

joint at the intersection for stability, and screw the cross-braces between the legs.

Attach the outfeed table to the saw

If your tablesaw has angle iron, turn the outfeed table right side up, and slide the groove at the front edge onto the angle iron at the rear of the saw. I leave the table loose, so I can slide it along the angle iron if I need to get around the table for a glue-up. But most of the time it just rests in place with its miter-gauge slots aligned with the miter slots on the tablesaw.

If your saw has no angle iron, drill two holes through the wood frame, put the outfeed table in place, clamp or shim it to align the miter-gauge slots, and transfer the holes in the wood frame to the flange of the tablesaw. Drill two $\frac{5}{16}$-in.-dia. holes through the flange. The cast iron drills pretty easily. Use $\frac{1}{4}$-in. bolts and nuts to attach the outfeed table to the saw.

Finally, use a long straightedge to be sure that the outfeed table is a smidge below the saw table, and raise or lower the support legs to align the two surfaces. This ensures that whatever you're cutting won't catch as it passes from saw table to outfeed table. □

Contributing editor Christian Becksvoort is a professional furniture maker in New Gloucester, Maine.

The second brace gets a half-lap. *After marking the cross-braces to each other, use a handsaw and chisel to remove half the thickness of the second cross-brace (below). Attach that brace to the legs and the first cross-brace.*

Level it up

Sight and set. *Use a long straightedge to sight along the length of the tablesaw top and the outfeed tabletop. The front edge of the outfeed table should sit just below the tablesaw top. Set the levelers accordingly. The levelers have a square or hex head just above the pad. Use a crescent wrench to adjust them up or down as needed.*

Custom Moldings with Paired Planes

Make your own moldings, from simple to complex, with hollow and round planes

BY MATTHEW BICKFORD

It's a common quandary: You get 95% of the way through building a piece of furniture, having safely navigated wood selection, milling, joinery, and assembly, only to get stuck at the end on the molding. Despite having a seemingly limitless collection of router bits and shaper knives, you don't have the means to produce the exact molding you have in mind. So you compromise and make a molding that's roughly similar to what you really want. But compromising on molding profiles is unnecessary if you

Matching moldings. *When Matthew Bickford mentioned that he could produce any molding with hollow and round planes, we presented him with a range of profiles and asked him to show us how he does it.*

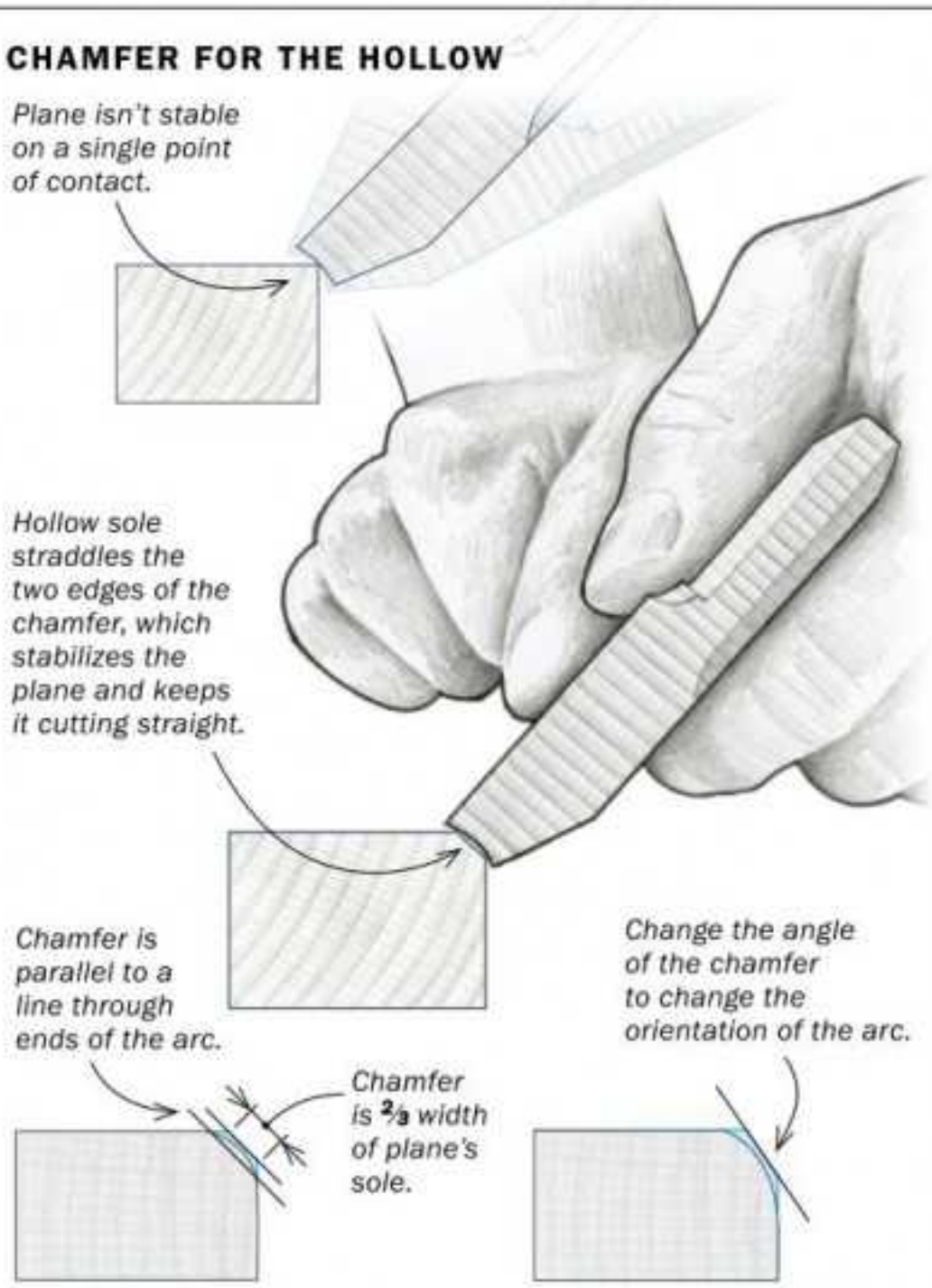
Photos, except where noted: Matt Kenney

Molding planes in mating sets

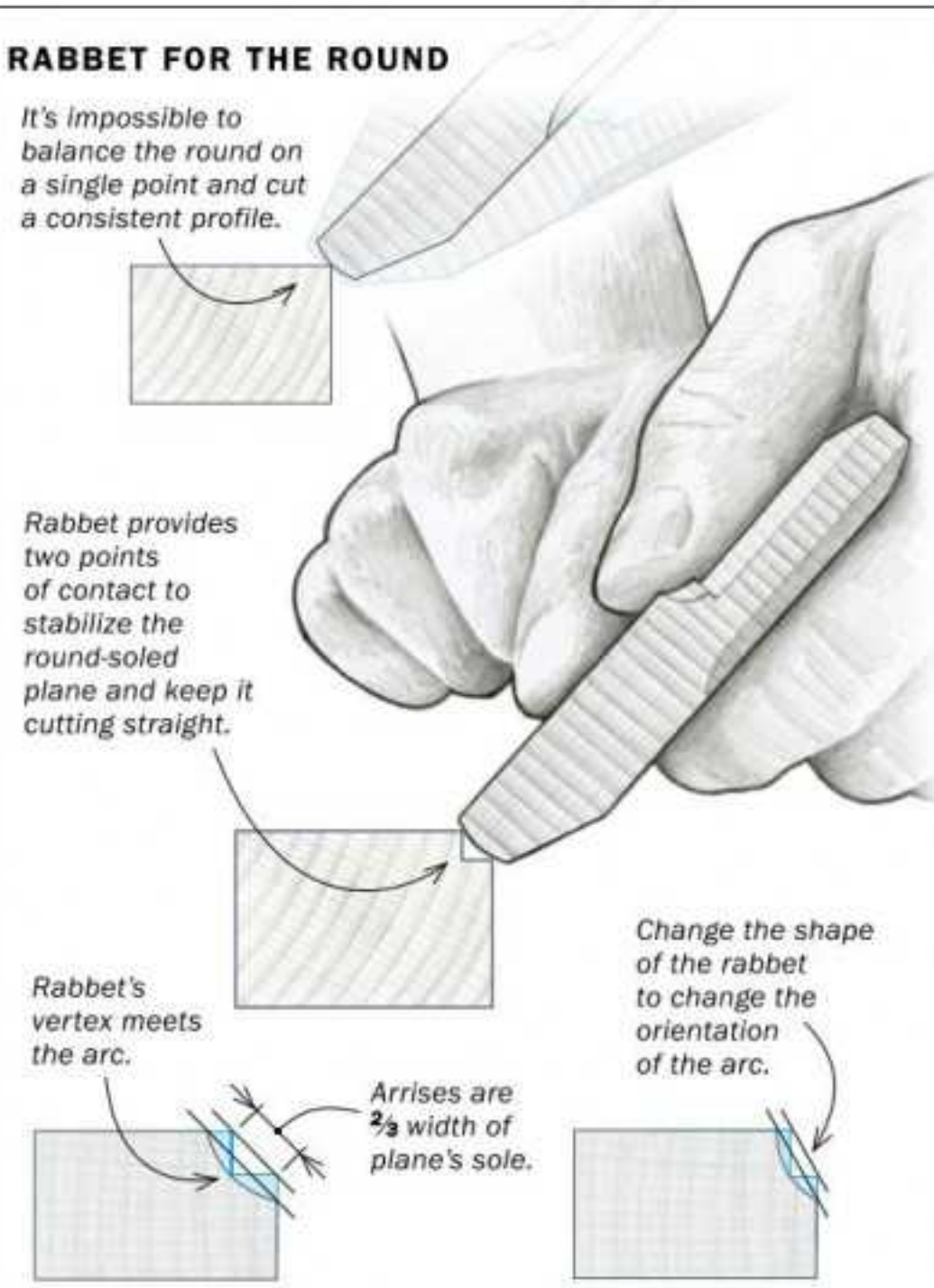
Hollow and round planes, which come in an array of widths, are named for the shape of their soles. A hollow has a concave sole and cuts a convex profile. A round has a convex sole and cuts a concave profile. You can make a lot of profiles with just two planes. Start with a mid-range pair—between ¾ in. and ⅝ in. wide, say—and add more as needed.

CHAMFERS AND RABBETS GUIDE THE PLANES

CHAMFER FOR THE HOLLOW

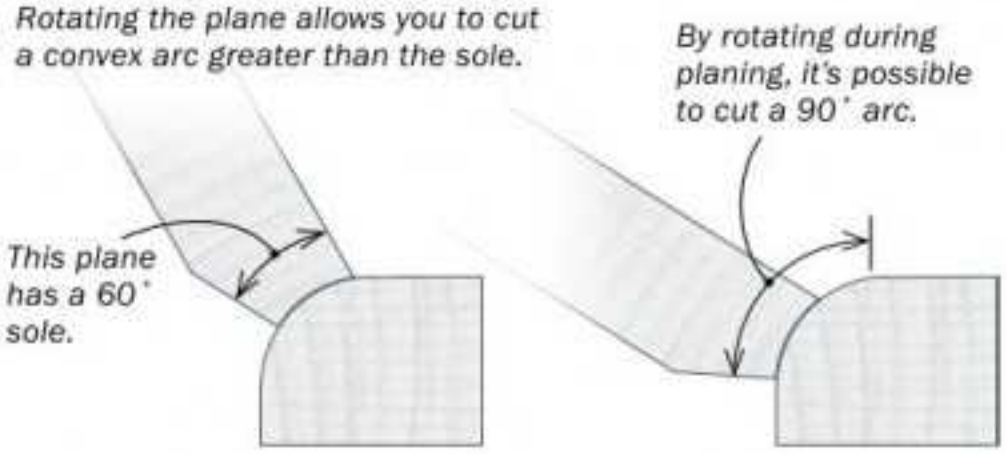


RABBET FOR THE ROUND



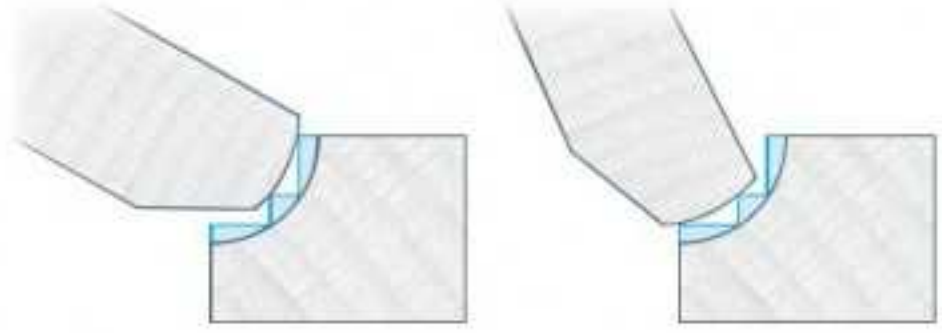
ANGLE PLANE FOR GREATER ARC

Rotating the plane allows you to cut a convex arc greater than the sole.



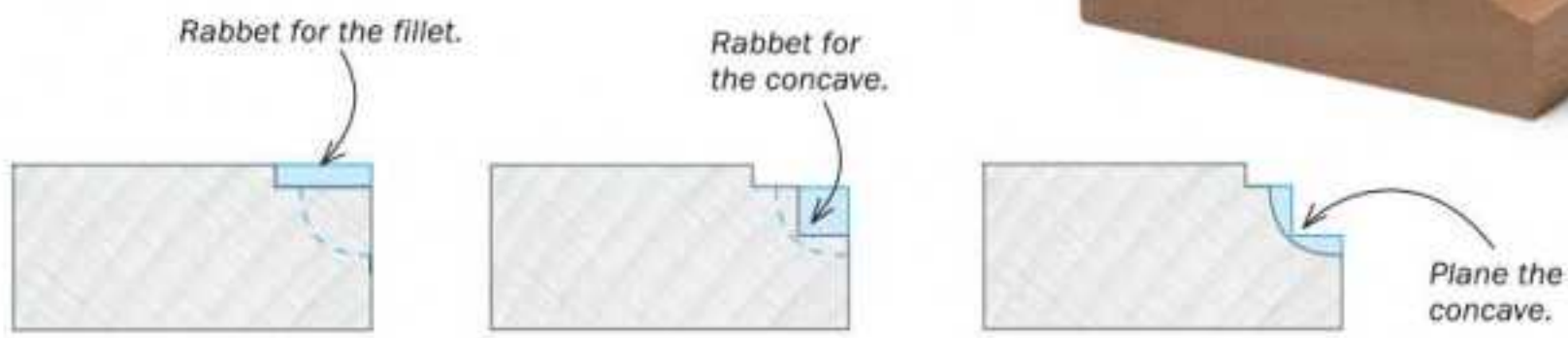
EXTRA RABBET FOR GREATER ARC

A second rabbet removes more waste and provides further guidance when cutting an arc wider than the sole.



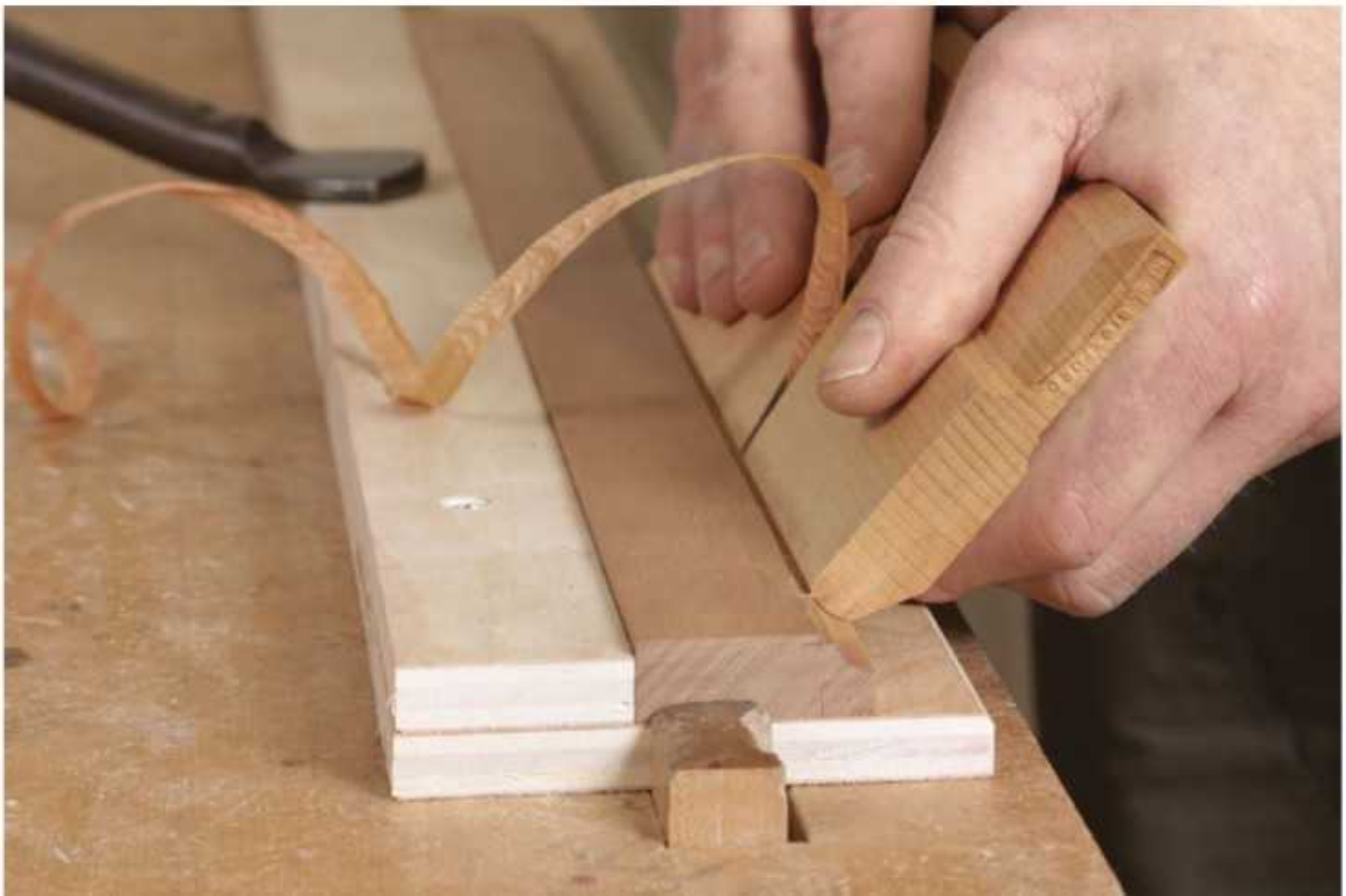
Making a concave cut

The concave arc is one of two profiles used to make all moldings. When cutting a concave arc, first cut a rabbet to remove waste and guide the plane.



Ride the rabbet. *There is no fence to guide the cut, but the arrises of a rabbet are just as effective, serving as two points of registration so the plane rides straight through the cut.*

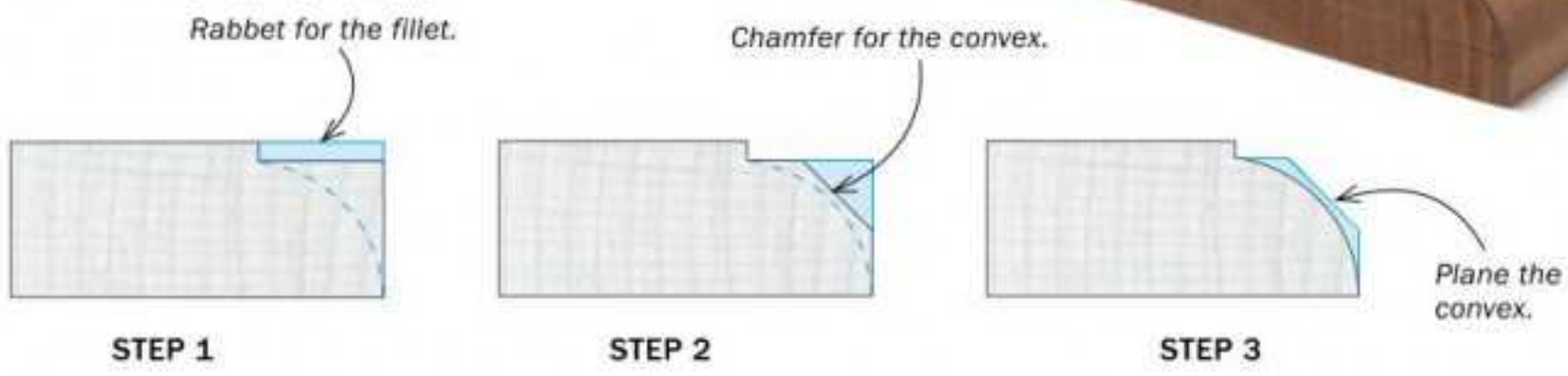
A pair of shavings. *When you start to cut the concave, the blade contacts just the arrises, so you get two thin shavings. These become wider with each pass of the plane.*



Use the shaving as a depth gauge. *The concave is finished, or ideally so, when the plane takes a full-width shaving and the rabbet is gone. A shopmade plywood sticking board keeps the molding stock from flexing or shifting during the cut, and the benchdog acts as a stop.*

Making a convex cut

The convex arc is the second element common to all molding profiles. Cut with a hollow-soled plane, it begins life as a chamfer. The hollow rides the chamfer's two corners, or arrises.



Straddle the chamfer. *There's no fence to guide the plane, but a hollow's sole fits nicely over a chamfer, picking up two registration points and following them for a straight cut.*

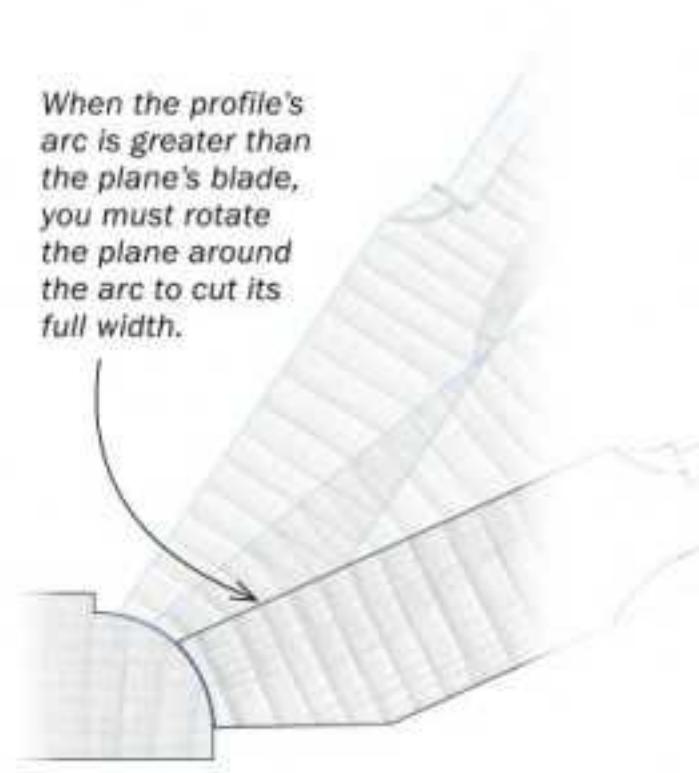
Keep the shavings consistent in width. *This tells you that the plane is cutting the molding to a uniform depth as you progress. Workpieces that won't flex under lateral pressure can be clamped between benchdogs.*

have the ideal tools: hollow and round planes.

All molding, even the most complex, is only a series of convex, concave, and flat sections. A single pair of hollow and round planes affords the opportunity to make dozens of these shapes. Add a second pair of planes and the number of possible molding profiles rises into the hundreds. With a larger collection of hollows and rounds, you can make any profile you want.

Once you've learned how to cut simple concave and convex sections, you'll have what you need to move on to more complex moldings.

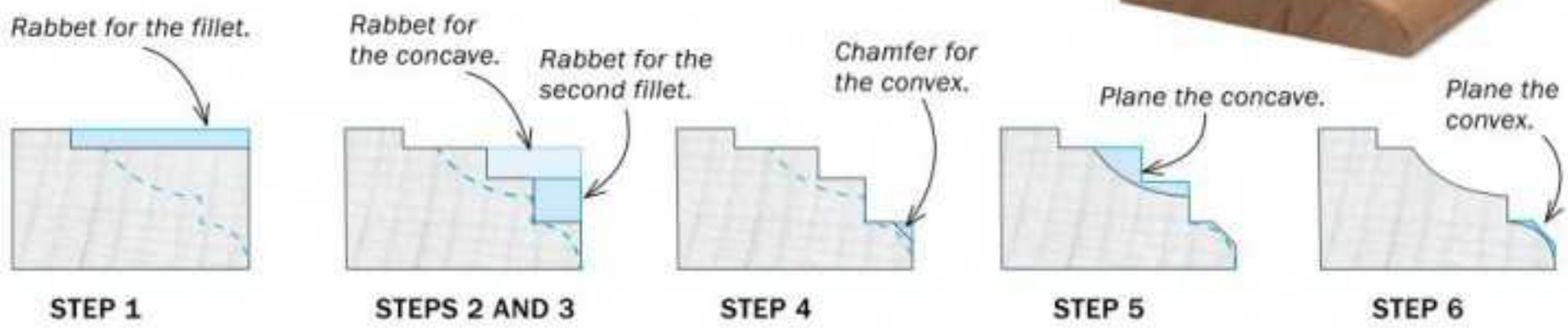
Full-width shaving often means you're done. *Because you're working a chamfer, the plane won't take a full shaving until you've neared final depth, having removed the chamfer and cut with the blade's full arc.*



Drawings, and photos of individual moldings: John Tetreault

Combining concave and convex profiles

This molding pairs a concave section with a convex one. A fillet separates the two. Bickford cut the shapes with a mixed pair of planes—a wide round and a narrower hollow.



Work the wide concave. *For this profile it's the easiest place to start, and after it's formed the convex section below is easier to get at.*

Cut a consistent profile. *When you're nearly finished, look for spots where the shaving splits into two. Work these areas, because they haven't been cut as deeply as where the plane is taking a full-width shaving.*

Shape the convex. *To finish the profile, cut the convex section with a hollow.*

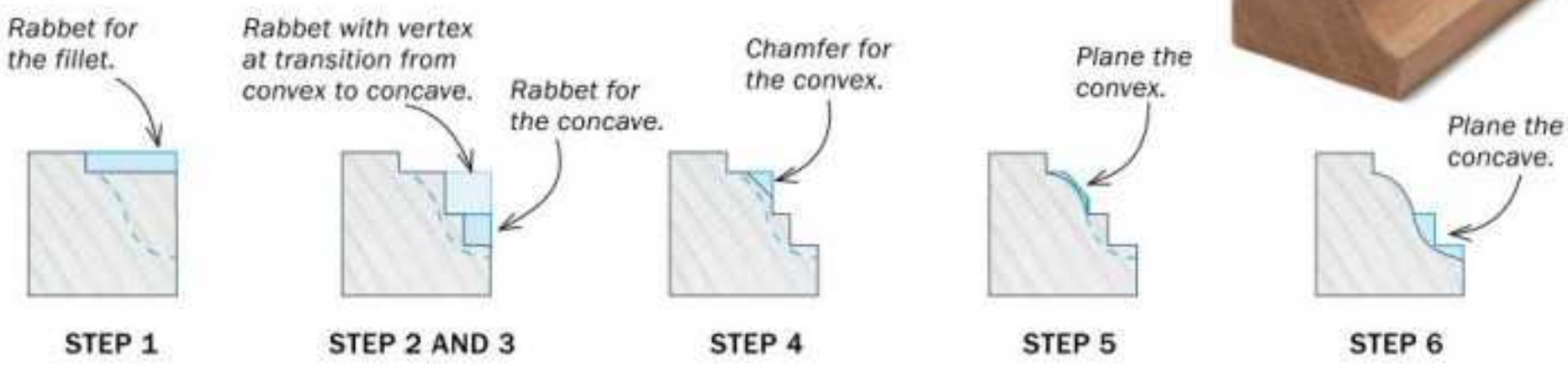
Guiding hollows and rounds

Hollow and round planes have no fence and no depth stop. This would seem to make them difficult to steer. And it's true the likelihood of balancing a hollow or round on the corner of a board and producing an acceptable molding profile is, conservatively, 0%. To cope with this, you create guides that serve as both fence and depth gauge.

To guide a round, cut a rabbet into the edge of the workpiece. The plane will sit in the rabbet, resting on its two corners, or arrises. As long as the plane is fully engaged with both points of contact throughout the cut, the profile it cuts

Creating the classic ogee

To make an ogee, cut adjacent concave and convex sections with a smooth transition. Ogees can be cut with matching or mixed hollow and round planes.



This time, start with the hollow. *Ride the chamfer and look for the full-width shaving to know when you're nearly done.*

will be predictable. The rabbet also acts as a depth gauge. When the rabbet disappears, the profile is complete (assuming the rabbet was sized properly). To change the orientation of the arc, change the dimensions of the rabbet.

The hollow is guided in a similar fashion, except that instead of riding in a rabbet, it straddles a chamfer. The two edges of the chamfer guide the hollow through the cut. And just as the rabbet serves as a depth gauge for the round, so does the chamfer for the hollow. When the chamfer has been planed away, the full profile is finished (provided the chamfer was correctly placed).

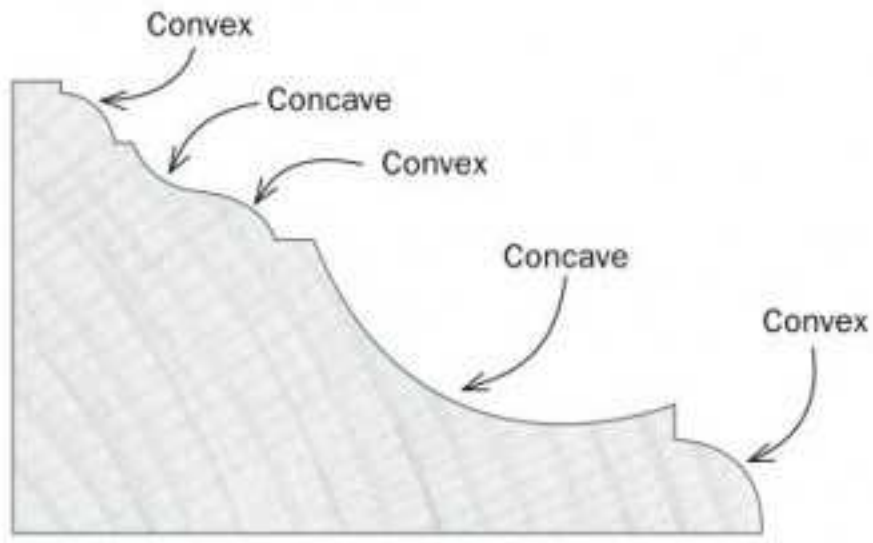
For both rabbets and chamfers the two points that the plane rides on should be about two-thirds the width of the plane's sole. Making them too close together defeats their purpose, and making them too far apart prevents the plane from registering properly. I cut the rabbets and chamfers at the tablesaw whenever it's reasonable; otherwise I cut them with a rabbet plane.

The lack of a fence and depth stop is actually advantageous. Each hollow or round only creates a specific arc. But rotating the plane with subsequent passes—which is possible because there's no fence or depth stop—allows you to cut a

Round follows hollow. *Progress as with a simple concave section, cutting until the guiding rabbet is gone.*

Complex moldings from simple profiles

By combining hollow and round planes of different widths you increase the possible molding variations exponentially.



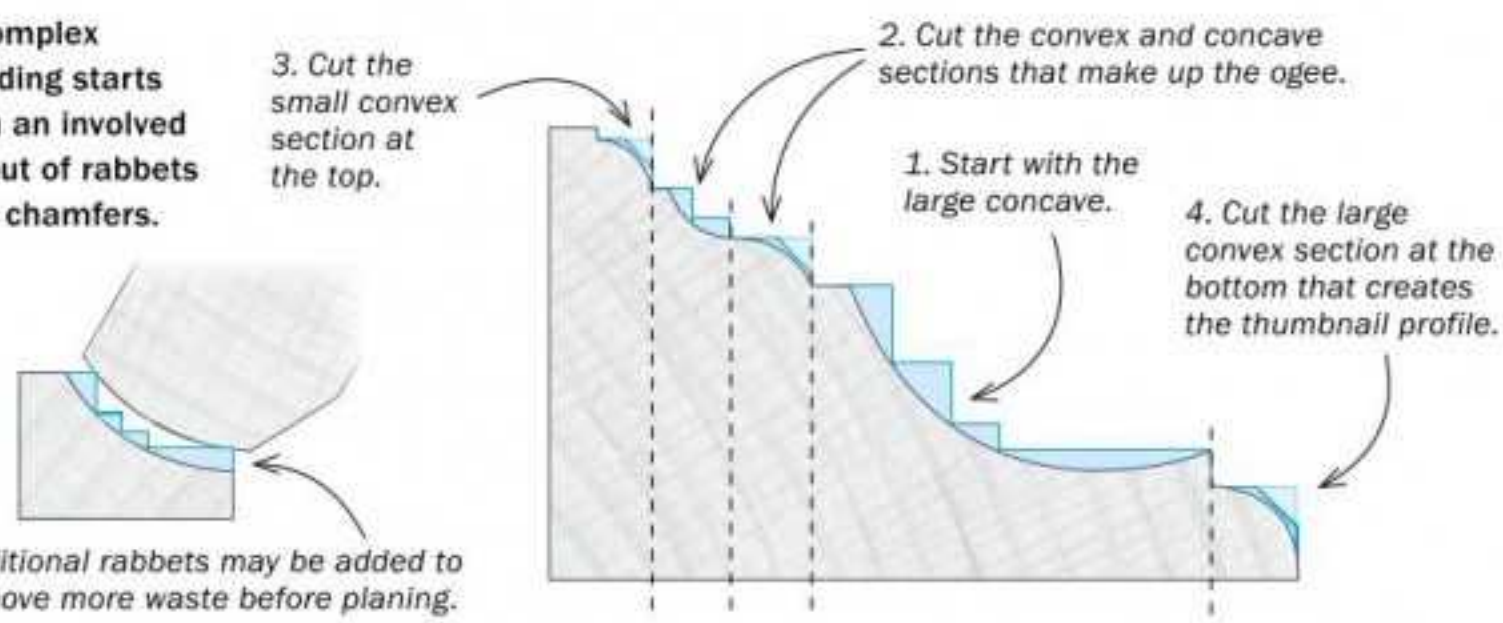
greater proportion of the same arc, and so create many more profiles. All sizes of hollows and rounds are guided and used with the same methods, simply scaled larger or smaller.

Cut complicated moldings curve by curve

The highest hurdle to overcome with complex profiles is viewing them simply. Lay out a complex profile in its simplest form: a series of individual concavities and convexities. Break each portion of a profile apart by placing the vertex of a rabbet at every transition

TACKLE THE SHAPE ONE CURVE AT A TIME

A complex molding starts with an involved layout of rabbets and chamfers.



Waste better. *After beveling the molding stock to remove most of the waste, cut the rabbets on the tablesaw with the blade tilted.*

Start with the hardest plane to push. *It's the one that cuts the largest profile, but it works just like its smaller brothers. Because this concave is a greater arc than the plane can cut in a single pass, you'll need to lay the plane over to complete the work (right).*

point. Then add the rabbets and chamfers to guide your rounds and hollows, same as before.

Complex profiles often demand more than a single pair of hollows and rounds. Most profiles do. Introduce additional pairs of hollows and rounds into your shop and exponentially increase your options. Not only will you be able to mix and match the hollow of one size with the round of another, but you will also be able to combine multiple hollows or multiple rounds to make elliptical shapes. But that's a subject for another article. □

Matt Bickford is author of Mouldings in Practice, *(2012, Lost Art Press). See more at msbickford.com.*

On to the ogee. *Cut the convex section of the ogee next. A sticking board with a high fence resists lateral pressure on the molding stock, which is gripped by benchdogs at both ends.*

Cut the small concave. *Then switch to a round and cut the small concave that finishes the ogee.*

Back to the hollow. *There's a small convex section framed by fillets at the top of the molding. Cut it next with the hollow (above). Then drop down to the bottom edge and cut the convex there to complete the molding (right).*

At Home in the Shop

Built for living as well as working, a woodshop in Maine evolves with its maker

BY CHARLES DURFEE

Yes, it looks like a house! That's for several reasons, but primarily because it was one. When I built it 32 years ago, my shop served as an all-in-one building for my life: woodworking on the first floor, storage in the attached shed, and living space upstairs for me and my girlfriend (long since my wife), Jennifer. Another reason was aesthetics. I wanted something that would be pleasing to my Yankee eye, and that fit into the New England landscape. That called for a pitched, gabled roof and wood-shingled walls, dormers, divided-light windows, and classic red-painted trim. It all added up to a sensibility that felt at home here in Maine.

I made some modifications to accommodate specific needs. The first-floor ceiling is 9 ft. high, way higher than pre-19th-century country dwellings but great for a woodshop. And the roof has a steep pitch, which provided extra living space upstairs.

Looking out, I would see fields and trees, changing with the seasons.

It always looked too tall to me, but with years passed, the surrounding trees have grown enough to soften that.

Aesthetics counted in the location, as well. We built on a five-acre lot on a dead-end country lane, so my noise and racket wouldn't bother the neighbors. From the inside looking out, I would see fields and trees, changing with the seasons, which is refreshing and recharging as well.

My shop isn't really "done up" as some are (although I do admire and have learned from some that are). Mine is plain, simple, practical, efficient, and straightforward. I've had regrets about some decisions I made, some possibilities not realized, but I am generally at peace with what I have.

When our daughter was 3, and a son was about to be born, we realized we had outgrown the upstairs thing. It was rustic (rudimentary plumbing, cramped space, reliant on an outhouse), and after six years we built a "grown-up" house a few hundred feet up the hill behind the shop.

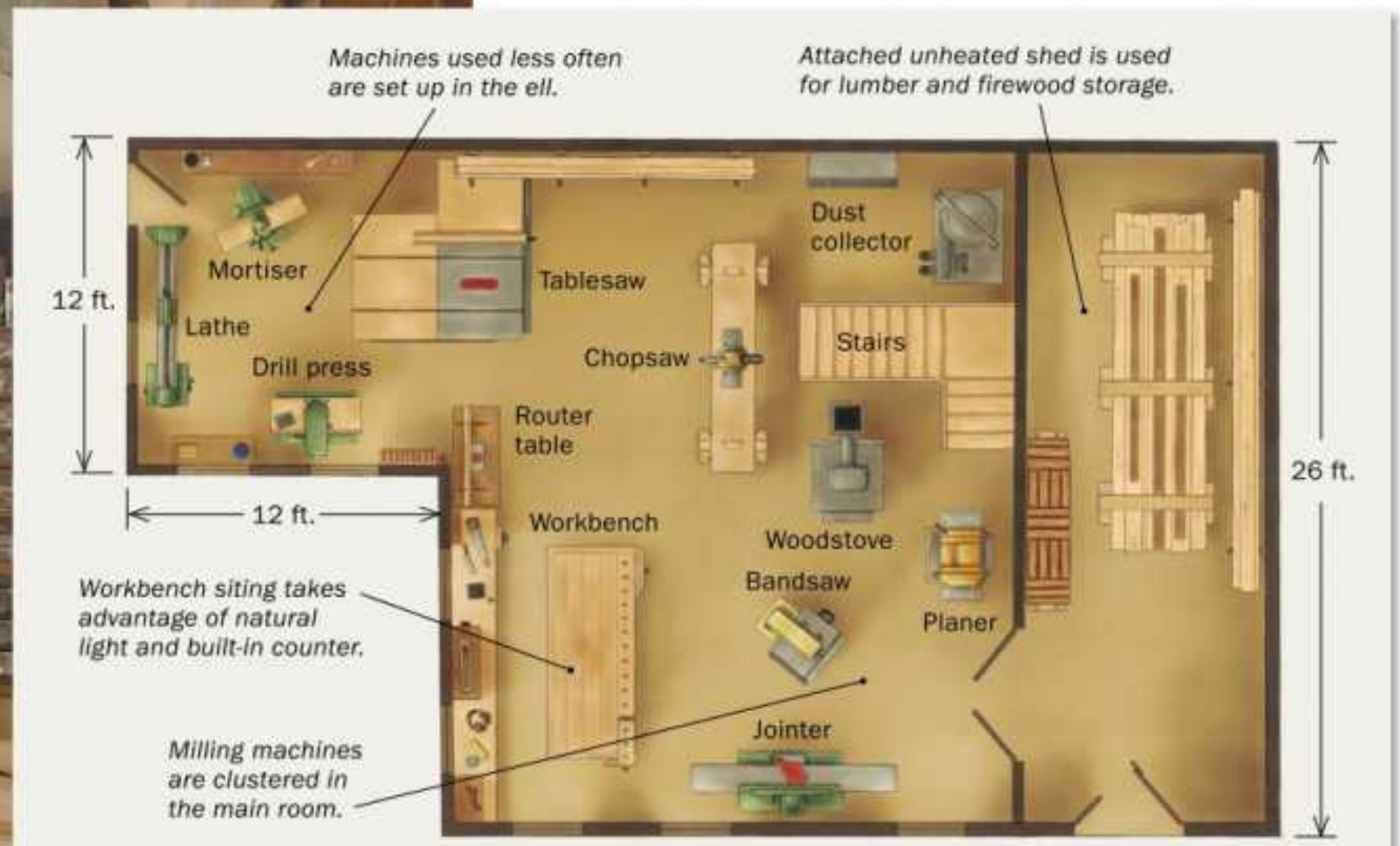
Guided by daylight. *Originally intended as a machine room only, this space, with its high ceiling and plentiful natural light, soon became home to Durfee's workbench. The counter behind the bench affords quick access to hand tools and serves to keep the benchtop clear. The space also houses his bandsaw and other often-used machines.*

What spurred me to build

Getting to the point of building the shop was a long evolution of its own. I got started in woodworking building wooden boats, large and small, but within the first 10 years my work morphed into dry-land stuff. I've built just about anything to do with houses: kitchens, stairs, built-ins, corner cupboards, fireplace surrounds, frame-and-panel doors. These jobs have been a big help in keeping the bills paid. In addition, there have been more than 150 pieces of furniture in the mix, and I'm doing furniture exclusively now.

During that first decade I worked in six different shops, some well-established but others quite makeshift. How about working in barn shops (in Maine, remember) without insulation? Or in my brother's living room? Or building a 16-ft. boat in a 17-ft. garage? After a few of these experiences, the idea of having my own place to live and work was a constant driver, and getting it at last was a dream come true.

Photos, except where noted: Jonathan Binzen; drawings: Derek Lavoie



SHOP LAYOUT

A layout designed over time

Once we had built the building and moved in, the shop's layout evolved in a very organic way. For example, I originally intended to devote the whole main space to machines; the ell would be my bench room. That didn't last long. With big windows on two walls, the main room called out for my bench. I soon moved it, and to this day I happily spend the vast bulk of my time right there.

The bench shares the main room with my bandsaw, tablesaw, jointer, planer, chopsaw station, and router table, and there's a space where I set up sawhorses with a piece of MDF on top when I need an assembly or finishing table. The ell now houses the outfeed for the tablesaw along with some smaller machines I use less frequently: drill press, lathe, mortiser, and sharpening bench. It also provides space for a thicket of hanging patterns, jigs, and templates. All my machines have moved multiple times over the years, but the current configuration seems to do most of what I

I never try to impress with my machinery—it's all pretty basic, small-shop stuff. But it is versatile and for the most part does good work.

Changes in the ell. *When Durfee moved his bench out of the ell, his drill press, mortiser, and lathe moved in. This part of the shop also provides outfeed space for the tablesaw and quick-access storage for clamps, patterns, and templates.*

Online Extra

For a video tour of Charles Durfee's shop, go to **FineWoodworking.com/272.**

need, and is quite efficient. Not to say it won't change again!

The identities of the machines themselves (my "apprentices") have gone through many changes, though the roster now seems fairly well settled. Having started in boats, I bought a bandsaw as my first machine. It was a 12-in. Rockwell, which was replaced with a 14-in. Delta, which was then replaced with a 20-in. Italian machine, an Agazzani. My tablesaw is a 10-in. General, a good friend that I've had since the shop was just built, when it replaced a contractor's saw. I've had a couple of jointers (currently an 8-in. Jet) and planers (now a 15-in. Bridgewood). I never try to impress with my machinery—it's all pretty basic, small-shop stuff. But it is versatile and for the most part does good work.

I built several of the fixtures myself, including my router table, chopsaw stand, and workbench. I did lust after the Hancock Shaker bench, but I realized it would be quite stationary, with all those drawers filled with tools. The bench I built has an open trestle base so that it can be moved if necessary. I built a second work surface along the wall behind where I stand at the bench; this countertop catches all the debris that would usually be on the main workbench, so that's been very handy. I like not having a tool well on my workbench; that makes the bench equally good to work at from either side.

Storage is important in this trade. Lumber, which I try to buy in bulk as much as I can, is on racks in the attached shed, and on racks on one wall inside the shop. Upstairs, where we used to live, is a showroom (which is sometimes presentable) for finished work, and there is storage space for larger jigs, boxes of parts, and fixtures from past projects.

Also mundane, but important, are lighting and heat. At first I had several rows of incandescent lights, as I disliked fluorescents. But these had to be changed often. Eventually I went with color-corrected fluorescents, and I'm glad I did. They are expensive, but worth it. For heat, I've relied on a trusty woodstove. That was all I used until about 10 years ago, when I added a propane wall furnace to keep the shop at 50° when I'm not in it. □

Charles Durfee's shop is in Woolwich, Maine (cdurfee.com).

From family to furniture. *The upstairs of Durfee's shop, where he and his family lived for several years, became a showroom for his furniture when he built a new house up the hill.*

A rural commute. *Durfee's shop is just a short walk down through the woods from his house.*

Photo, top right: Michael Pekovich

Is a Sliding Tablesaw Right for You?

These premium machines are loaded with features that add precision and versatility

BY DANIEL CHAFFIN

Sliding tablesaws have long been a fixture in production cabinet shops, where they're invaluable because they handle sheet goods so exceedingly well. But sliders aren't just for sheet goods; they handle solid wood excellently too. On a slider, the workpiece rests on the sliding table and cutting the stock is simply a matter of pushing the sliding table through the cut. There's no wrestling with the workpiece during the cut regardless of its size or the condition of its edges, and accuracy is not influenced by technique; rather, accuracy is a product of the precision built into the saw. You can also lock the sliding table in place and push boards by hand, if you prefer.

In spite of their versatility, efficiency, precision, and safety, sliding tablesaws have often been considered out of the question for smaller shops because of their high price and large footprint. But with more manufacturers offering them, there are now several entry-level models that can be had for around the cost of a high-end cabinet saw, and sliders are increasingly finding their way into smaller pro shops and some home shops as well.

For years, a sliding tablesaw was the heart of my pro shop, and I got pretty familiar with the advantages and disadvantages of this machine. So while I can't decide if a slider's right for you, I'll try to make your choice a little clearer.

Photos: Barry NM Dima

Handle plywood easily

Sliders—even small ones—handle sheet goods much more efficiently than cabinet saws. The sliding table bears the entire weight of the workpiece, so pushing it through the cut is as easy as pushing the table. With the crosscut fence in the front position, Chaffin quickly cleans up a board's long edge (opposite) before squaring an end (below). He can also use the crosscut fence and rip fence together in a cut called a Euro Rip (bottom), in which the rip fence serves as a width stop.

Most are beautifully built

Although there are exceptions, sliders are typically built to very high standards. They are large, heavy machines, and for their sliding components to work properly, the design and manufacture must be spot on. As a result, these machines tend to deliver incredible precision, smooth action, and dependable repeatability. Heavy, durable fences and stops ensure that settings and adjustments do not drift over time.

There's also a staggering list of options available with some sliding saws, allowing you to customize the machine to your space and intended use. One example is a scoring blade, a tiny blade spinning ahead of the main blade to lightly score the underside of the panel, helping eliminate tearout, particularly on plywood. Some manufacturers offer the option of combining multiple machines— jointer, planer, shaper, saw—into one cabinet, somewhat offsetting the slider's enormous footprint.

Other options include digital scales, alternate locations for on/off switches, motorized adjustments, crosscut fence length, sliding table length, motor size, and even the size of the arbor. You'll pay for these, but they can customize the tool to a specific shop and user.

Solid stock, too

Sliding tablesaws aren't one-trick ponies stuck breaking down sheet goods. The fences and sliding table are just as effective for handling solid wood.

Straight-line rips. *Pushing against a removable wedge, called a shoe, at the leading end of the slider, Chaffin rips the edge of rough stock straight, reducing his time at the jointer.*

Upper-class undercut. *An otherwise unwieldy and dangerous task, beveling the bottom of a tabletop, is quick and clean on a sliding tablesaw. Just angle the blade and push.*

edges as it does for plywood, greatly speeding up milling. How many passes—not to mention how much effort—does it take to straighten the edge of an 8-ft. board on your jointer? With a slider, your only limit is the length of the sliding table's stroke.

On the fences—A slider has two fences, a rip fence and a crosscut fence. The rip fence is the same as on a cabinet saw, but with a couple of perks that you may not find on that machine. For one, on many sliding tablesaws you can slide the rip fence toward you, ahead of the blade, and use it as a crosscut stop. The fence can also be flipped facedown, making its top edge the bearing edge. This is helpful because the top is much narrower than the face, allowing you to use a push stick close to the fence when ripping thin stock without jamming your knuckles.

Because the crosscut fence attaches to the sliding table, it benefits from that mechanism's accuracy and smoothness, making crosscuts a snap on pieces large and small, whether the fence is set to make a 90° crosscut or a mitered one.

Design contributes to safer use

In terms of safety, sliding tablesaws have a number of advantages over ordinary tablesaws. For rips using the sliding table, the risk of kickback is smaller compared with just pushing the board by hand. And whenever the sliding table is being used for a cut, the saw's design encourages the user to be in a safe position well to the left of the sawblade.

Additionally, I've been thankful for the automatic blade brake on sliders a number of times. The brake ensures that when the machine is switched off, the blade quickly stops. This significantly reduces the chance of the user coming in contact with a spinning blade when reaching for a freshly cut workpiece.

Sliding tablesaws also come equipped with riving knives (which are also standard issue on the newer cabinet saws), an important safety feature that helps eliminate dangerous kickback.

Efficiency and ease of use

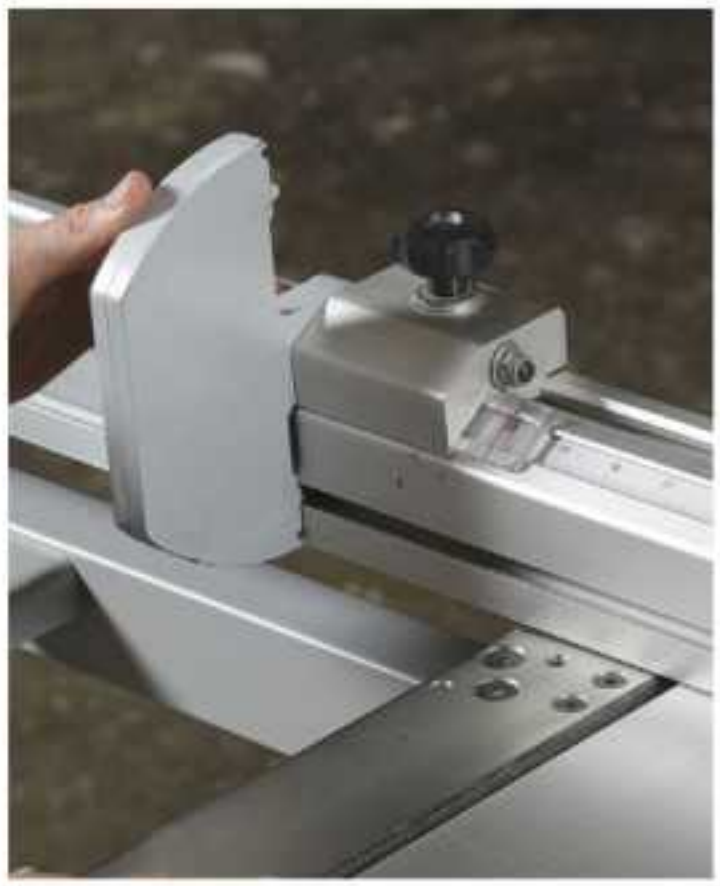
This high quality of machining directly translates to a machine that's efficient and, for many tasks, a breeze to use.

Big boards a small concern—Take, for instance, sheet goods, which can be a handful on a cabinet saw. Imagine cutting a 4x8 sheet down to 4x7 on a cabinet saw; it would be difficult if not dangerous. With sliders, all you do is put the sheet in place and push. The sliding table guides the work past the blade in a perfectly straight path. The slider is also great for cleaning up unreliable factory edges, even the long ones, before breaking down the rest of a sheet.

Cutting a long edge straight with the sliding table is called a straight-line rip, and it works just as well for lumber with waney

Versatile crosscuts

The slider's crosscut fence works like a crosscut sled on steroids.



Flip stop and a reliable scale. *With its built-in flip stop, the crosscut fence operates like a smooth-sliding sled on a cabinet saw when cutting boards to length. Chaffin also finds the included scale very reliable, using it instead of a tape measure.*

Stack 'em high. *The slider's smooth and easy action lets you gang-cut pieces effortlessly. Here, Chaffin has the crosscut fence in the front position and is using the flip stop to register his pieces.*

Big miters. *The crosscut fence pivots, letting you make safe angled cuts on wide workpieces. For this cut Chaffin adjusted the fence to support the full length of the workpiece and again used the flip stop.*

Some caveats before you buy

Buying such a high-tech saw is a big investment, not just in money but in space, too. While entry-level models are a little over $3,000, comparable in price to high-end cabinet saws, that gulf can quickly widen with higher-end sliders, some of which cost north of $20,000.

Space is a consideration, too. Sliding saws have an enormous footprint. Including the stroke of the sliding table, they can take up about four times more space than a cabinet saw with both a standard outfeed and side-feed support. Plus, if you get a slider with a long enough stroke to rip a full sheet of plywood, you will spend a fair amount of your shop time walking around the table to get to your perfectly dimensioned boards.

Although a slider's size, mass, and sliding capacity are ideal for big parts, some folks may find it a bit difficult to use for small parts. While a cabinet saw fitted with a shopmade crosscut sled will handle a stack of small pieces with grace and efficiency, the slider when faced with the same task is precise but not terribly nimble. A well-made sliding table can be quite heavy, and despite the ultrasmooth sliding action, there's a lot of inertia. And you have to pull the table back to you after each cut.

If you decide that a slider will fit in your shop and your budget, there are still a few other issues to consider. Moving such a saw is a major operation requiring a battle plan and special equipment. While cabinet saws are heavy, sliding saws are on a completely different scale. The one in this shop weighs over a ton and to move it in we had to use a combination of an engine hoist, ramps, and some extensive dismantling. Smaller models can come in around 700 lb. For a cabinet saw, if you want to move it often, you just invest in a mobile base—not always an option with a slider. Initial setup and calibration of a slider can also be quite involved. They're complex machines that need to be set up

Fancy features

Little perks, including some custom choices, add up to big benefits.

MOVABLE RIP FENCE

Unlike most tablesaw fences, this slider's rip fence can slide back and lock, allowing Chaffin to use it as a stop for crosscuts.

CLEANER CUTS

This saw has a scoring blade, which is a small blade ahead of the main blade that lightly scores the underside of the panel, eliminating tearout. The scoring blade spins in the opposite direction from the main blade.

OPEN ACCESS

Blade changes are easier and access to the inside of the cabinet is greater because the sliding table can be moved out of the way, revealing a large opening into the machine.

for precision. Also, the instructions for many sliders are translated into English and can sometimes be unclear. And last, while sliding tablesaws are very easy to use once you're familiar with them, there is a learning curve.

Does it fit your work?

So let's say you can afford a slider, get it into your shop, and still have room to move. It's also important to consider the type of work you do. If you work with large boards and sheet goods and often work with production in mind, a sliding tablesaw could very well improve your workflow. It did for me. When I was producing built-ins and other large, standalone pieces, my slider was integral to the way I worked wood. So if you ever mull over buying one, don't just consider whether it will fit into your budget or shop; also think about whether it will fit the way you work. □

Daniel Chaffin is a woodworker in Louisville, Ky.

DIGITAL POWER

Some sliders can be customized with digital gauges and motorized movements, including for blade height and angle. Here, the scale is measuring the distance from the rip fence to the blade.

Add a slider to your saw?

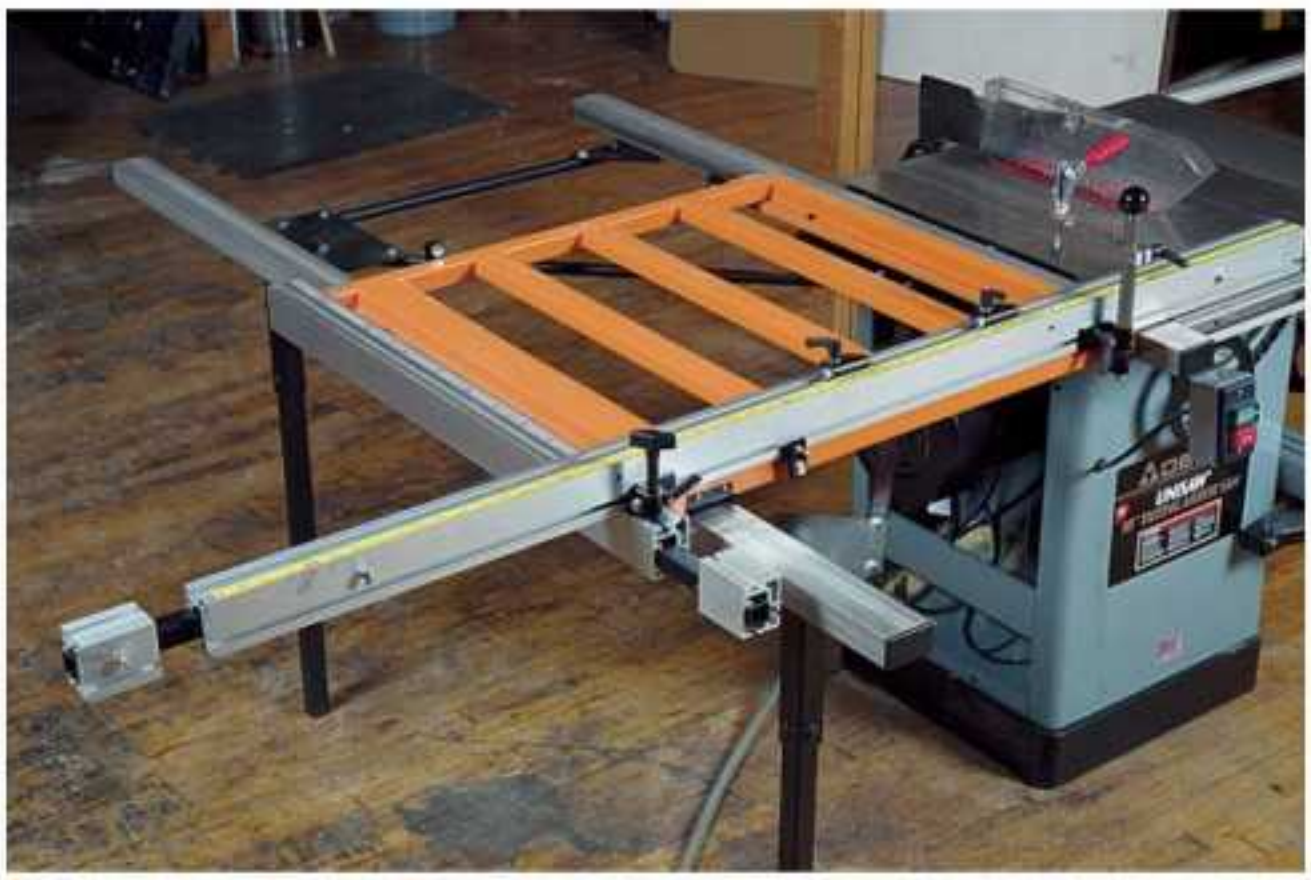
To get the benefits of a slider at a more modest cost in space and cash, you might consider adding an aftermarket sliding table to your current tablesaw. Add-on sliding-table attachments for cabinet saws are available from a number of manufacturers, including Exaktor, Grizzly, King Industrial, SawStop, and Shop Fox. Expect to spend about $700 to $1,500 for one.

These aftermarket units share a number of benefits found on traditional sliding saws. For one, there are two levels of safety. First, they keep you well to the left of the blade. Second, they help support long, heavy, and wide pieces, meaning you can focus more on the cut than on keeping a large board stable. Additionally, these accessories are capable of handling miters and crosscuts even on sizable stock—almost all can handle 4x8 sheets—aided by included stops. The add-on tables won't be able to handle ripping the 96-in. length of a sheet, however. And don't expect some of the bells and whistles that are available on true sliding tablesaws, like digital readouts. Still, if you get one of these aftermarket sliding tables your miter gauge and crosscut sled may end up collecting dust.

Aftermarket attachments all require meticulous installation and setup. For some you'll need to remove your saw's left extension wing before installing the sliding table. All involve bolting the slider to the saw. You'll almost certainly have to shorten the saw's rail, and possibly adjust the rip fence. Then there's alignment. To make these add-on sliding units perform as they should, you'll need to make sure they are level, coplanar, parallel, and square to your saw's table, blade, and fence.

Lastly, if you're in the market for one of these, consider your shop and the work you do. They all require more space than a traditional cabinet saw setup, so you need to account for that when buying one.

—Barry NM Dima



Suit it to your work. *Some aftermarket sliding tables are larger than others. If you mostly work with sheet goods, consider a large table for more workpiece support.*

Capable crosscutting. *Paired with a stop, an aftermarket slider can handle crosscuts at any angle, including on larger panels.*

Check compatibility. *While most add-ons say they'll work with the bulk of cabinet saws, SawStop's Sliding Crosscut Table is designed only for SawStop saws. (It fits their cabinet and contractor's saws.)*

Shopmade Cam Clamps

Handy, light-duty clamps are quick to make

BY NATHAN MURPHY

As a luthier, I always need a lot of clamps that apply light, firm pressure, and these little cam clamps are the perfect tool for the job. They come in handy with furniture, too, any time you need to hold a couple of small parts together.

The clamp's mechanism is simple. The lever applies pressure on the tongue, which tightens on the workpiece. The lever's pivot pin is off center, creating a cam action, so the lever exerts more pressure the farther you pull it. Two pins then lock against the metal bar to keep the sliding jaw from moving. The clamps don't apply huge pressure, but it's enough that you don't want to clamp your fingers in them (I know from experience). Cam clamps can cost close to $20 apiece; I make them myself for about a tenth of that.

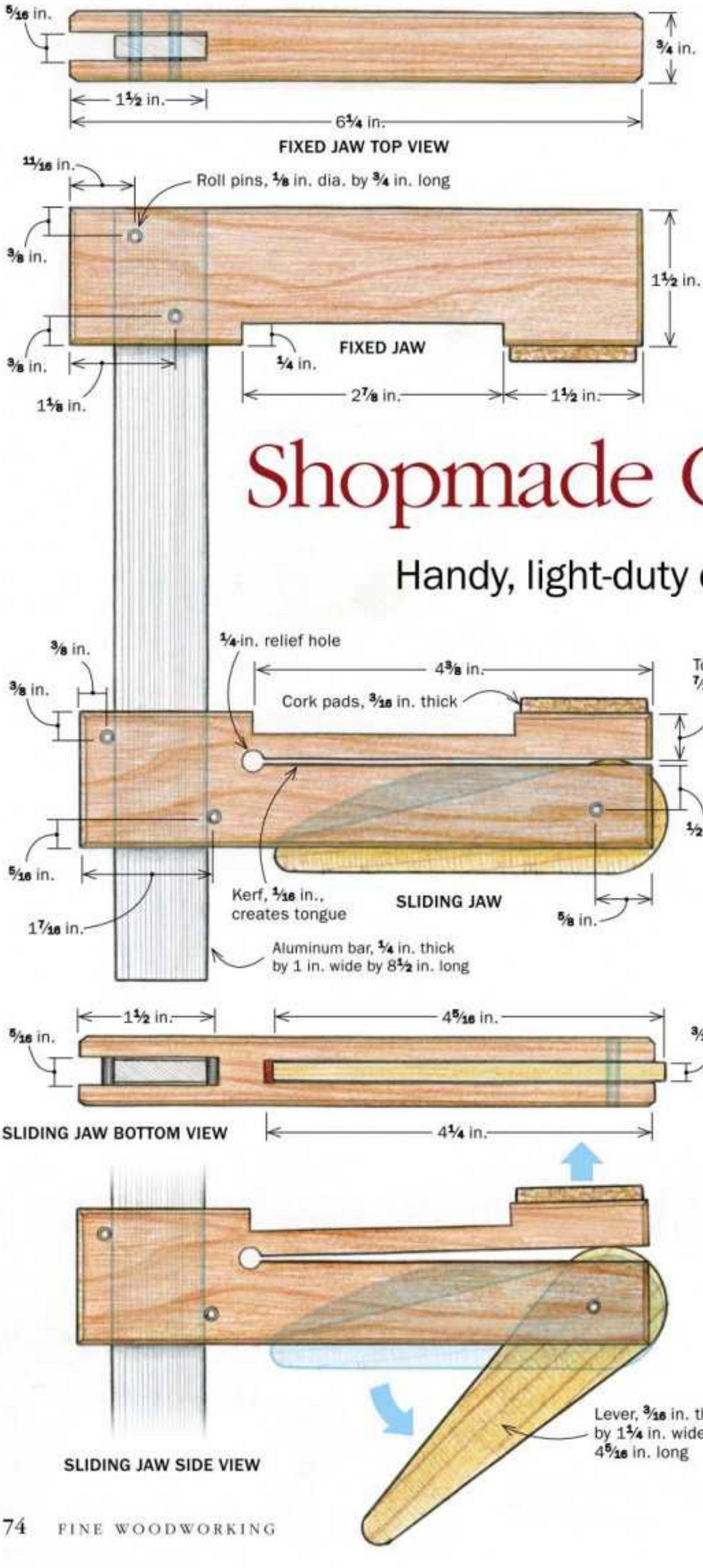
A stack of blanks

I begin crosscutting the jaw blanks to length at the chopsaw. The sliding and fixed jaws are the same length, so you have to measure only once. Cut the aluminum bar stock to length at the chopsaw now too. I get this stock from Online Metals (onlinemetals.com).

You can use almost any wood for these cam clamps. I've had success with oak and cherry. Whatever you use, try to look for straight-grained pieces and mill it so the grain runs vertically on the ends. Knots, grain runout, and horizontal grain can weaken the jaw. Grain direction is less critical for the lever.

I generally like to cut more blanks than I plan to use, because some of them will end up as test pieces for setting up to drill the pins.

Next, make the recess in the middle of the blanks to leave space for the jaws to



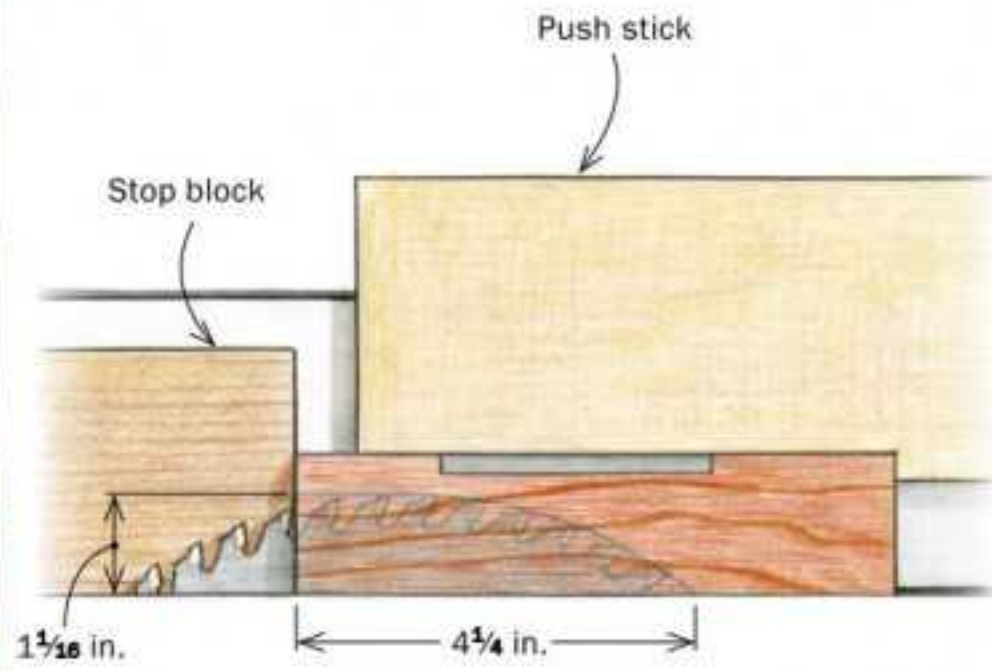
Drawings: John Tetreault

Time for recess. *Nibble out a recess on the tablesaw using a crosscut sled, sliding the workpiece back and forth between stop blocks.*

Slot for the bar. *Use a tenoning jig to cut the bar slot. Rotate the workpiece after the first cut and take a second pass to center the slot. Aim for a 1/32-in. gap.*

Photos, except where noted: Barry NM Dima; bottom right: Michael Pekovich

Cut a slot for the lever. *This is a stop cut with small parts, so work carefully. Use a featherboard, push stick, and zero-clearance insert, and shut off the saw after each cut before removing the workpiece.*



Create the tongue. *At the bandsaw, make a stopped cut, locating the kerf at the top of the lever slot (right). A ¼-in. relief hole drilled at the end of the kerf (far right) helps prevent splitting when you tighten the clamp.*

Drill for the pins. *Because this jaw will slide, drill these holes outside of where the bar will lie. For repeatability, Murphy uses a spacer block for one hole, then removes it and flips the jaw over to drill the second hole.*

grip while tightening. I nibble out the waste on a tablesaw with a crosscut sled.

When cutting the slots at the back end of the jaws for the aluminum bar, raise the tablesaw blade to 1½ in. Even though the bar is only 1 in. wide, the slot should be deeper to leave room for the roll pins you'll install later. Also, make the slot 1/32 in. wider than the thickness of the bar to let the movable jaw slide. Afterward, chamfer the edges of the jaw.

Separate the blanks into two piles, one for the fixed jaws and the other for the sliding ones. From now on you'll work on them separately.

Sliding jaws have bite

The sliding jaws require two more cuts: a slot for the lever and a bandsaw kerf that creates the flexible tongue. I first cut the slot for the lever. Using a ¼-in. dado blade, set up a stop block and featherboard to make the stopped cut. Then turn off the saw, wait for the blade to stop, and back the jaw out of the cut.

Photo, top left: Michael Pekovich

Cut and shape the levers. *Aim for a teardrop shape that's flat along its sides. Rough out the levers on the bandsaw (far left) before refining them on a belt sander. Avoid flat spots along the curve.*

Cut the kerf for the tongue at the bandsaw, aligning your entry with the top of the lever slot. Don't cut so far back you run into the bar slot, or the clamp will be prone to splitting. Drill a hole at the end of the kerf to relieve the tension on the jaw.

For the levers, I first make a master, aiming for a teardrop shape that's flat along its sides. Once done, this lever becomes the template for the others.

If you want to sand your clamps, now is the best time.

Add the pins

I get the ⅛-in.-dia. metal roll pins, sometimes called slotted spring pins, from Fastenal in ¾-in. lengths. These get hammered into each jaw. The sliding jaw gets three, two at the back and one through the lever. The rear two should be spaced so the jaw can slide

Pivot point. *A roll pin acts as the axle for the lever. Hold the lever in place while you drill these holes.*

Put a pin in it. *Hammer the roll pins in carefully, especially at the slot for the aluminum bar (far left). Have the lever in place when you pound in its pin (left).*

Cut the bar to length. *Murphy uses a standard miter saw and blade to cut the aluminum bar, but a hacksaw would handle the job as well. File the ends smooth afterward.*

along the aluminum bar but still lock at 90° to it when clamping. The third pin allows the lever to rotate, so drill for it with the lever blank in its slot.

The fixed jaw gets only two roll pins. These fix the jaw to the aluminum bar, so drill through the jaw and bar together.

Finishing touches

With the pins in, the clamps are functionally finished. Still, I add cork to the jaws to improve the grip and to help prevent marring a workpiece. Another option is to install a rivet at the end of the bar to keep the movable jaw from sliding off. I don't do this, however, because if I'm trying to clamp inside a hole or some other awkward spot, it helps to be able to take the clamp apart and put it back together. □

Nathan Murphy is a luthier in Madison, Ind.

Bore for the bar. *You want to lock the aluminum bar into the fixed jaw, so drill through both wood and bar simultaneously. Again, a fence and spacer help speed up the process (right). Pound the two pins into place (below) to keep the bar fixed to the jaw.*

Cork cushions. *Murphy glues small pieces of cork to the jaws to keep them from damaging his workpieces. To clamp the cork in place, simply close the jaws on themselves.*

shop maintenance

How to bust rust

GET RID OF THE RED SCOURGE AND KEEP IT AT BAY

BY ROLAND JOHNSON

Rust, another name for iron oxide, occurs when iron, or a metal alloyed with iron, is exposed to water. The problem is pervasive in wet climates, but even dry climates devoid of big temperature and humidity variations can still see problems with rust. It's inevitable. What's more, short of plating or painting the iron, there's no bulletproof or permanent solution.

So what can we do to get rid of the red scourge? I have a trio of products that I rely on. For these to be effective, you'll need to follow a few simple steps before, during, and after you use them. And once the rust is gone, I have some suggestions for prevention.

First remove the grime

For any rust remover to be effective, it has to reach below the existing surface rust and neutralize or eliminate freshly forming rust. If the tool is dirty, start by cleaning the surface with a solvent such as naphtha. Wearing gloves, apply the solvent and scrub any contamination and loose rust off the iron. I use a maroon Scotch-Brite abrasive pad where possible and a wire brush or stiff nylon brush for hard-to-reach places. Small parts I simply drop into a container of solvent for a couple minutes and then scrub clean with a small wire brush.

Attack the rust

With the grime gone, the rust is exposed and ready to be removed. While there are plenty of products and methods available, I have three favorites— camellia oil; Evapo-Rust, a proprietary rust remover; and phosphoric acid, found in cola— that I choose from depending on the task. I'll discuss some other products and methods, too, and explain why they fall short in my book.

Simple solution for light rust

Light rust on machines and hand tools may not even need pre-cleaning with a solvent, instead requiring only a quick scrub with light-duty oil and an abrasive. Johnson prefers camellia oil and maroon Scotch-Brite pads.

Spray and scour. *Spritz on some camellia oil, and use a Scotch-Brite pad to scrub the rust off the tool.*

For light spot rust, be it on a hand tool or a tabletop, the process is pretty straightforward, and pre-cleaning may not even be necessary. First, try camellia oil and scrubbing with a maroon Scotch-Brite. If the oil doesn't get all the rust, turn to Evapo-Rust. Evapo-Rust's active ingredient bonds with iron—and only iron—to remove iron oxide without removing iron from steel. It's capable of removing light rust and deeper pits fairly quickly. Additionally, the product is non-toxic, free of volatile organic compounds, and biodegradable—giving me some peace of mind.

Evapo-Rust is my go-to for bigger projects, and using it is easy: Apply it with a brush or via submersion, wait, scrub, apply, wait, scrub, and repeat until rust is gone. That's pretty much it. If the rust is really bad, soak a cotton cloth in Evapo-Rust and lay it on the rusted surface. Be sure to keep the cloth saturated. After a bit, scrub the tool with a Scotch-Brite to check your progress. When it seems like the product's gotten to the bottom of the rust, scrub it clean and dry it off.

The other product I use for rust-ridden jobs is phosphoric acid, which removes rust equally well. It is the basic active ingredient in many rust removers, including naval jelly. It is also a flavoring ingredient in cola sodas. I de-rust my crusty old handplanes, flea-market saws, and chisels by soaking them in a plastic tub full of cola. The process can take anywhere from a day to a couple of weeks depending on how much rust is present and how deep the pits are. What I like about using cola is that it doesn't remove the patination on the iron, won't remove excess metal, won't damage brass or wood, and won't hurt japanning, plating, or paint. It's also non-toxic and really inexpensive.

The drawback to using cola is that you have to keep the piece saturated for an extended period—not your ideal solution for vertical surfaces or large pieces, where you'll have to keep the surface wet with saturated cloths.

There are other, more concentrated forms of phosphoric acid. Naval jelly, which I used to use to derust tools, contains a much higher percentage of phosphoric acid than cola, so it's more

Wipe it down. *After cleaning off the rust, apply a light layer of camellia oil regularly to protect the tool from further oxidation.*

Photos, except where noted: Barry NM Dima; opposite page: Roland Johnson

Online Extra

To watch us derust a bandsaw table, go to **FineWoodworking.com/272.**

For heavy rust, let it soak

Rustier jobs require a heavier hand. Use a solvent like naphtha to clean affected surfaces before breaking out a derusting agent, such as Evapo-Rust.

Clean the surface. *Pre-cleaning with naphtha and a maroon Scotch-Brite pad will ensure there's no contamination or wax residue, which could prevent the rust remover from penetrating into scratches and rust pits, thereby allowing rust to reappear soon.*

Keep it wet. *To derust large, flat areas, Johnson saturates towels with Evapo-Rust and then lays them on the rusty surface.*

Scrub off the rust. *Periodically scour the machine to see how much rust has been loosened. If necessary, remoisten the rags. When you can, scrub down the whole area.*

aggressive at eliminating rust, and it's a gel, so it can adhere to vertical surfaces. The drawback is that it tends to darken iron and can leave an uneven patina. I don't like ugly tools. High-concentration phosphoric acid, typically sold as concrete rust stain remover, can be purchased at big box stores and is more aggressive than cola, making it better for bigger tools. It's also a lot more expensive.

What about other methods and products? I find many of them too aggressive, such as muriatic acid, sand-blasting, or using a powered wire brush or a disk sander—the last of which doesn't even get into pits. Vinegar and citric acid take too long and are less acidic than cola. Then there's tannic acid, which leaves iron black. As for electrolysis, messing around with chemicals and electricity is more fuss than I want.

Protect the fresh surface

Dealing with rust is both a leisurely and hurried process. Letting the cola or Evapo-Rust do its work will take some time, but once the rust is neutralized, the residue is cleaned

Protect with oil. *Camellia oil will repel ambient moisture, keeping tools rust-free if applied regularly. Plus, it doesn't harm finishes or woodworkers, and it doesn't attract dust.*

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A sweet technique for hand tools

Phosphoric acid is a potent rust remover, provided you start with a clean surface. Luckily, it's found in common colas, meaning you can get a safe, gentle, inexpensive rust remover anywhere that sells soda. Using it just requires a little time and elbow grease.

Clean into the nooks and crannies. *Make sure to work the solvent over every part of the tool. Soak small parts in a container, and use a bristle brush where necessary.*

Into the drink. *Cola doesn't remove excess metal, and it won't damage brass or wood. It also won't hurt japanning, plating, patination on the iron, or paint. Plus, it's nontoxic and really inexpensive. But it could require soaking for a couple of days or even weeks before you're able to brush off the rust.*

off, and the surface is dry, it's important to work quickly and immediately apply a preventive film to keep air away from the fresh surface. Most rust-removal products leave a very fresh layer of iron exposed, and it can flash-rust in minutes when exposed to air, especially humid air. You may not even necessarily see the flash rust, but it's there, and like a virus it will just keep propagating.

My top rust deterrent is camellia oil. If you prefer wax, though, it's important to use a good-quality wax, like carnauba, that is devoid of silicone, which can cause significant finishing problems if transferred to a workpiece.

Evapo-Rust and some other proprietary rust removers leave a water-resistant film, so it's not as important to immediately apply a film coat to a freshly de-rusted surface. However, the film is only temporary and needs to be reinforced with additional protection.

For a torture test of other rust barriers, see "The Best Rust Preventers" (*FWW* #227).

Light layer of oil. *The more regularly you oil, the less you'll have to deal with rust.*

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Keep the rust away

One key to preventing rust is protection, which means keeping the air from direct contact with your tools.

Short-term coverage. *For tabletops, Johnson uses a sheet of thin plywood cut a bit larger than the size of the table with blocks around the edge to locate it.*

An ounce of prevention

Prevention is the best cure for rust problems. Regardless of how well you remove rust, if the basic problem of oxidation isn't dealt with, the rust will eventually return.

The main strategy is to consider condensation the enemy. Warm air can hold a significant amount of water, one of the main reasons rust prevention is so difficult in hot, humid climates. When the warm air comes in contact with cool iron, the air molecules shrink, literally squeezing water onto the iron. Without a barrier to the condensation or a way to forestall it, rust will reappear and moisture will eventually penetrate nearly any oil, wax, or protective coating.

One way to interrupt the cycle is by conditioning the air. Heat your shop to above the ambient air temperature as necessary. Similarly, air conditioning, or at least a good dehumidifier, will go a long way toward keeping tools rust-free in wet climates. Also keep the shop doors closed as much as possible. Your wood, and you, will be happier.

Long-term protection. *If he's not going to use the tools for awhile, Johnson lays down a layer of plastic sheeting and puts a moving blanket on top to ensure that water stays away.*

Stow away. *To protect your hand tools, shield them from ambient air. Plane socks for handplanes work well. Tool cabinets and tool chests also do the job.*

Covering tools and machines with a thermal barrier to keep warm air from directly contacting cold metal can also keep rust at bay. If I want the protection to be easily removable, I use a thin sheet of plywood, for example on machine tabletops. This sometimes means cutting a kerf in the sheet, like when sliding one onto a bandsaw.

If a tool is going to be out of service for awhile, I cover it with plastic bags or tarps. Ask your local tool dealer to save some of the plastic bags that tools are shipped in. They'll be happy to give them away rather than toss them in the dumpster. I also use blankets, with a layer of plastic sheeting beneath to provide assurance that water will stay away. Canvas, plastic tarps—there are lots of inexpensive vapor barriers hanging around most shops. Use them. □

Roland Johnson is a contributing editor.

Photos, this page: (top three): Roland Johnson

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