

Fine
Woodworking

No table saw? No problem, p. 60

Tools & Shops

ANNUAL ISSUE



**Make the most
of a small shop**

Tools & Shops Winter 2026

SHOPS

**Pump up
your shop
lighting**

PROJECTS

**Make a sturdy
stand for your
lathe**

TOOLS

**Rehab a
vintage
backsaw**

Grizzly[®] Industrial

Purveyors of Fine Machinery[®]
Since 1983

WHY BUY FROM GRIZZLY?

- We buy direct from factories and sell direct to you
- High-quality, award-winning machines
- Two overseas quality control offices
- 98% of in-stock orders ship same-day
- Over five million parts in stock for instant after-service
- Family-owned and operated since inception



10" 3 HP Heavy-Duty Cabinet Table Saw

Handle the largest of wide panels

- Digital readout for bevel angle
- 52" Rip capacity
- Right and rear extension tables
- Cast-iron trunnions
- Lockable magnetic switch
- Footprint: 22 $\frac{3}{8}$ " x 21"
- Shipping weight: $\approx$ 685 lbs.



MADE IN AN ISO 9001 FACTORY

60651 // ONLY \$3200

\$399
FREIGHT

6" 1.7 HP Jointer

Achieve truly flat stock

- 30-Insert spiral cutterhead
- Parallelogram table adjustment
- Long infeed table and center-mounted fence
- Built-in mobile base
- User-friendly controls
- Footprint: 27" x 20 $\frac{1}{2}$ "
- Shipping weight: $\approx$ 473 lbs.



60604Z // ONLY \$2095

\$255
FREIGHT

6" x 48" Belt / 12" Disc Combination Sander

Efficient, precise sanding for pros

- Vertical, horizontal, or angled sanding
- Precision-ground cast-iron tables tilt 0–45°
- 0, 45°, and 90° Machined detents
- Heavy-duty miter gauge
- Steel cabinet base minimizes vibration
- Footprint: 19" x 21"
- Shipping weight: $\approx$ 327 lbs.



SB1093 // ONLY \$1775

\$255
FREIGHT

14" 1 $\frac{3}{4}$ HP Bandsaw

Take on resawing tasks with confidence

- 12" Resaw capacity
- 2-Position resaw fence and miter gauge
- Precision-ground cast-iron table
- Computer-balanced cast-iron wheels
- Quick-release blade tensioner
- Footprint: 16" x 18"
- Shipping weight: $\approx$ 334 lbs.



MADE IN AN ISO 9001 FACTORY

60555XH // ONLY \$1795

\$255
FREIGHT

21" Variable-Speed Scroll Saw

Master complex curves and fine details

- Saw tilts instead of table for greater functionality
- Oversized, stationary table supports larger workpieces
- 400–1550 SPM variable-speed control
- 2 $\frac{1}{2}$ " Dust collection port
- On/off foot pedal switch
- Footprint: 17" x 15"
- Shipping weight: $\approx$ 100 lbs.



MADE IN AN ISO 9001 FACTORY

60969 // ONLY \$755

\$49⁹⁵
SHIPPING

Saw/Stand Bundle
T33906 // ONLY \$815

\$49⁹⁵
SHIPPING

2 HP Two-Stage Quiet Series[®] Cyclone Dust Collector

Next-level dust collection

- 74 dB Noise rating
- Advanced MERV-17 HEPA filtration
- Two-stage cyclone separation
- 35-Gallon collection capacity
- Automatic filter cleaner
- Footprint: 48" x 23 $\frac{1}{2}$ "
- Shipping weight: $\approx$ 485 lbs.



60976 // ONLY \$3325

\$299
FREIGHT

18" x 47" Heavy-Duty Wood Lathe

Digital control at your fingertips

- Variable frequency drive (VFD) for high-torque variable speed
- 100–3200 RPM spindle speeds
- Spindle speed digital readout
- 10° Spindle indexing
- Lever-action cam-locks
- Footprint: 20" x 65 $\frac{1}{2}$ "
- Shipping weight: $\approx$ 503 lbs.



MADE IN AN ISO 9001 FACTORY

60733 // ONLY \$2825

\$349
FREIGHT

22" 2 HP Open-Ended Drum Sander

Smooth large surfaces for flawless finishes

- Sand workpieces up to 42 $\frac{1}{2}$ " wide
- 5" Computer-balanced aluminum sanding drum
- 0–10 FPM variable-speed feed
- Digital thickness readout
- Spring-loaded sanding belt tensioning
- Footprint: 23 $\frac{1}{2}$ " x 32 $\frac{1}{2}$ "
- Shipping weight: $\approx$ 341 lbs.



60920 // ONLY \$2350

\$255
FREIGHT

15" 2 HP Benchtop Planer

Professional results, benchtop convenience

- 32-Indexable-carbide insert spiral cutterhead
- 12 and 22 FPM feed speeds
- Thickness DRO
- $\frac{3}{16}$ " to 6" Material capacities
- Board return roller
- Footprint: 23 $\frac{1}{2}$ " x 19"
- Shipping weight: $\approx$ 157 lbs.



60999 // ONLY \$1450

\$199
FREIGHT

affirm[®]
Monthly Payments

clicklease[®]
Business to Business
Equipment Financing

FINANCING AVAILABLE

Please visit grizzly.com for up-to-date pricing.

Due to rapidly changing market conditions, our advertised prices may be changed at any time without prior notice.

⚠ WARNING! ⚠: Cancer & Reproductive Harm

Some products we sell can expose you to chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

grizzly.com
800-523-4777



features

38 Pump Up Your Shop Lighting

In the time it takes to replace your old fluorescent ballasts, you can upgrade the whole shop to LEDs

BY DOUG LEE

44 All About Sandpaper

A buyer's guide to abrasive sheets, disks, belts, and sleeves

BY ADAM GODET

52 Upgrade Any Lathe

Simple tips to elevate your lathe's performance

BY ANDREW FINNIGAN

60 No Table Saw? No Problem

With the right handheld power tools and other machines, you can do without this shop fixture

BY VIC TESOLIN

68 Rehab a Vintage Backsaw

These techniques will help you maintain your saw for peak performance

BY MARK HARRELL



Tablet editions free to subscribers

Magazine content, plus searchability and interactive extras. Download the app at FineWoodworking.com/apps. Access is free with your print subscription or FineWoodworking.com online membership.

in every issue

6 On the Web

8 Contributors

10 Letters

12 Workshop Tips

- Sliding brackets create front vise with unlimited width
- Hose manifold simplifies dust collection
- Easy stop system for miter saw

16 Tools & Materials

- Adjustable fence from SawStop
- Flush-trim router base is a winner
- Lighting the way

24 Fundamentals

Essential non-woodworking tools

32 Shop Design

My snug shop

76 Handwork

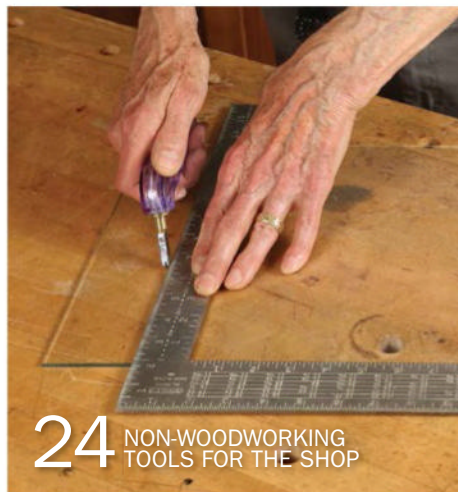
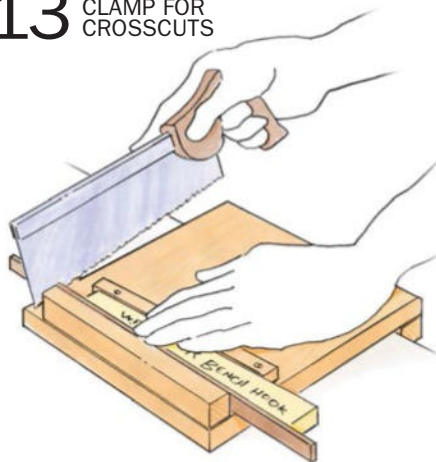
Planing bevel up

82 From the Bench

Closing up shop



13 CLAMP FOR CROSSCUTS



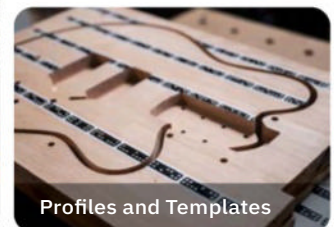
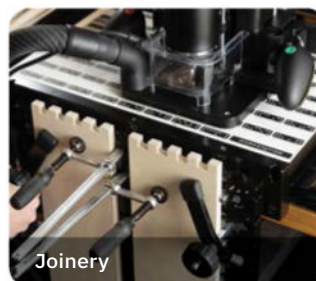
Learn more
shapertools.com/benchpilot



GO HANDS FREE, STAY HANDS ON

Clip Origin into BenchPilot
when you need to focus on
other tasks at hand.

BenchPilot is like autopilot for Origin: clip Origin into BenchPilot to turn it into a hands-free milling machine, capable of vertical or horizontal cutting. It's great at cutting joinery, inlays, intricate engravings, profiles, and more.



PRECISION CUTTING SIMPLIFIED

Fine Woodworking[®]

UNLIMITED

Our Unlimited membership provides exclusive access to a dynamic menu of woodworking talent, techniques, and projects—combining our print subscription with our online membership—all for \$99 a year. For details on all the benefits, go to finewoodworking.com/members.

Online extras

Visit finewoodworking.com/320

VIDEO

Evolution of a tool chest

Mike Pekovich gives a tour of his traveling tool chest, which has some smart modifications that make it easier to transport.



VIDEO

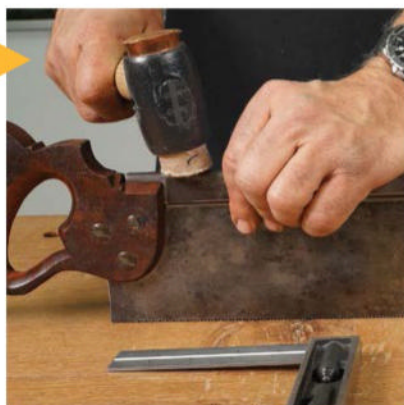
Tough grain? Try a bevel-up plane

Bob Van Dyke tackles woods prone to tearout using a low-angle jack plane with a 45° microbevel.

VIDEO

Align the spine

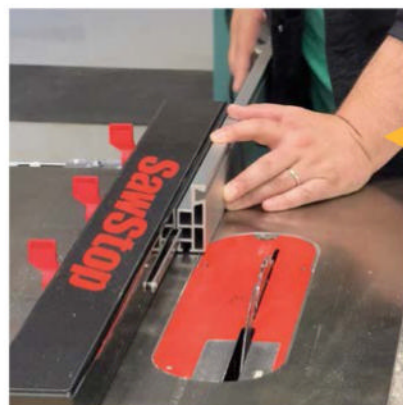
Mark Harrell demystifies the technique behind re-tensioning a handsaw.



VIDEO

Bright ideas

Mike Pekovich improves his shop lighting by switching from fluorescents to LEDs.



VIDEO

Fresh fence

Ben Strano shows off SawStop's T-Glide Advance Fence with its smart new features.

VIDEO WORKSHOP

The not-so-big workbench

For woodworkers with limited shop space, this workbench video series offers a compact design that doubles as a tool storage center. Learn how to build this bench from start to finish, with tips on:

- Traditional pinned mortise-and-tenon joinery
- Quick-to-build box-joint drawers
- Best practices for mounting a vise



Additional perks of Unlimited



FREE PLANS

As a member, you can search our entire digital plan library to find just the project you're looking for.

ONLINE ARCHIVES

Get on-demand access to the complete *Fine Woodworking* magazine archive. That's more than 1,900 in-depth articles!



BUILT BETTER — TO — BUILT BETTER™

FESTOOL®

Festool is built better
for woodworking
excellence. Transform
your work with
maximum precision,
power, and durability.



SCAN FOR
MORE INFO

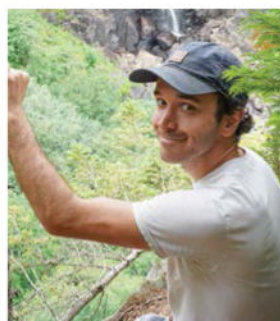


contributors

Alan McIvor (Shop Design) spent his career in the forest industry, first as a design engineer in a paper mill and then as a paper-machine consultant, and he has always enjoyed developing ways to make machines work more efficiently. For many years he owned some basic woodworking tools, but it was coming across one of *Fine Woodworking's Tools & Shops* issues that inspired him to set up his own shop. Upon retirement he converted his one-car garage to a workshop and has been busy ever since building furniture for family and friends.



Andrew Finnigan ("Upgrade Any Lathe") is a studio furniture maker in New York's Hudson Valley with a background and specialty in wood turning. In 2015, after years of working under and subcontracting for local woodworkers, artists, and makers, he set out to launch his own line of furniture and turned work. His work draws from classical designs and shapes that inspire his own interpretations, resulting in work that is both classic and subtly unique. Andy's time out of his shop is generally spent traveling and exploring the outdoors with his wife, Ashley.



Upon retiring from the Army after a 28-year career that included extensive service in Special Forces, **Mark Harrell** ("Rehab a Vintage Backsaw") started a saw-sharpening business with his late wife, Yvonne. That led to the founding of Bad Axe Tool Works, a manufacturer of high-quality traditional backsaws, which have earned multiple awards in this magazine. Mark sold the company to its employees in 2022 and now teaches saw maintenance and sharpening at schools around the country, including his own, in Superior, Wis. Go to SawSharp.com for info.

Doug Lee ("Pump Up Your Shop Lighting") has retired from a career as a college professor and executive biostatistician in the pharmaceutical industry. Home design and construction, and building furniture and cabinetry have been his hobbies for the past 35 years. He currently assists with classes at the Connecticut Valley School of Woodworking and rebuilds homes as a volunteer with the Anglican Relief and Development Fund and the Fuller Center for Housing's Disaster ReBuilders.



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

Fine Woodworking

EDITOR AND CREATIVE DIRECTOR	Michael Pekovich
DEPUTY EDITOR	Jonathan Binzen
DEPUTY ART DIRECTOR	John Tetreault
SENIOR EDITOR	Anissa Kapsales
ASSISTANT EDITOR	Owen Madden
COPY/PRODUCTION EDITOR	Don Burgard
ADMINISTRATIVE ASSISTANT	Betsy Engel
EDITOR, FINEWOODWORKING.COM	Ben Strano
ASSOCIATE EDITOR, FINEWOODWORKING.COM	Amanda Russell
VIDEO PRODUCER	Jeff Roos
DIGITAL PRODUCTION SPECIALIST	Zara Hanif

CONTRIBUTING EDITORS: Christian Becksvoort, Garrett Hack, Roland Johnson, Steve Latta, Michael Fortune, Chris Gochmour, Bob Van Dyke

ASSOCIATE PUBLISHER, ADVERTISING & MARKETING DIRECTOR **Alex Robertson**
203-304-3590
arobertson@aimmedia.com



SENIOR VICE PRESIDENT, CONTENT Rob Yagid



CHAIRMAN & CEO Andrew W. Clurman
CHAIRMAN EMERITUS Eferm Zimbalist III
CHIEF OPERATING OFFICER Brian Van Heuverswyn
CHIEF FINANCIAL OFFICER Adam Smith
SENIOR VICE PRESIDENT, MARKETING Erica Moynihan
SENIOR VICE PRESIDENT, SALES Mike Burns
VICE PRESIDENT, SALES OPERATIONS Christine Nilsen
VICE PRESIDENT, CIRCULATION Paige Nordmeyer
VICE PRESIDENT, DIGITAL PRODUCT DEVELOPMENT Ashley MacDonald
VICE PRESIDENT, STRATEGY & RESEARCH Kristina Swindell
DIRECTOR, HUMAN RESOURCES Scott Roeder
DIRECTOR, PRODUCTION Phil Graham
DIRECTOR, RETAIL SALES Susan A. Rose
DIRECTOR, INFORMATION TECHNOLOGY Andrew Shattuck
DIRECTOR, CLIENT MARKETING & PAID CHANNELS Taylor D'Argonne
DIRECTOR, AUDIENCE, AUTOMATION & DATA Matt Boyles
DIRECTOR, CUSTOMER ACQUISITION Sara Decanali

Fine Woodworking (ISSN: 0361-3453) is published bimonthly, with issues in Feb., Apr., June, Sep., Oct. and Dec., by the Home Group of Active Interest Media HoldCo, Inc. Subscription rate: \$34.95 per year. Single copy price: \$12.99 U.S., \$14.99 Canada. The known office of publication is located at 2143 Grand Ave., Des Moines, IA 50312. Periodicals postage paid at Des Moines, IA, and additional mailing offices.

Postmaster: Send all UAA to CFS. (See DMM 707.4.12.5); NON-POSTAL AND MILITARY FACILITIES: Send address corrections to Fine Woodworking, PO Box 1477, Lincolnshire, IL 60069-9829

Canada Post: Return undeliverable Canadian addresses to Fine Woodworking, c/o Worldwide Mailers, Inc., 2835 Kew Drive, Windsor, ON N8T 3B7.

PRIVACY STATEMENT: Active Interest Media HoldCo, Inc. is committed to protecting your privacy. For a full copy of your privacy statement, go to aimmedia.com/privacy-policy. COPYRIGHT: 2025 by Active Interest Media HoldCo, Inc., Des Moines, IA. This publication may not be reproduced, either in whole or part, in any form without written permission from the publisher.

MANAGE YOUR SUBSCRIPTION:

www.FineWoodworking.com/CustomerService
FineWoodworking@omeda.com
866-452-5141

SUPERCCELL[®]

*I'd give it 6 stars if
I had the option!*

The Supercell exceeded my expectations!
Every aspect of this machine is well designed.
From the very high pressure, to high CFM, to
the ease of chip disposal and filter cleaning.
An exceptional value.

Adam D.



Models Starting at
60" Tall and 20" Wide

Touchless
Filter Cleaning

Remote
included

*Named **Best Dust Collector** by
Popular Mechanics!*



Made in the USA • 800-732-4065 • oneida-air.com

From the Editor

Tools & Shops



Setting up for better work

A big challenge in woodworking is that there are so many critical aspects to consider before we can actually get to work. Our annual *Tools & Shops* issue offers an opportunity to take a step back from building things and look at the state of our tools and the places we call our shops. From there we can chart a course toward doing better work and finding more enjoyment in the time we spend in those shops.

While most of us would like to have a bigger space to work in, our ability to adapt the space we have can make a bigger impact on our enjoyment and productivity than increasing the square footage. On pp. 32–37, Alan McIvor shares his ingenious strategies for getting the most from his single-car garage shop, with tips from layout to storage solutions that make the most of the space he has to work with. Regardless of the size of your shop, I'm confident there will be many ideas that you can put to use as well.

When our results don't match our intentions, we tend to blame our lack of skill or experience, but the reason for our troubles can often be attributed to the condition of our tools or machines. Following his review of mid-size lathes in *FWW* #307, Andrew Finnigan suggests in this issue some lathe upgrades that can help turn a solid tool into a top-rate performer (pp. 52–59). And on the subject of tuning-up tools, Mark Harrell presents a

valuable primer on getting a vintage backsaw up and running on pp. 68–75.



Setting up a shop can involve a big financial investment, and gathering all the machines on our shopping lists can take a long time. This doesn't mean that we need to wait until we have everything in place, or limit what we make. On pp. 60–67, Vic Tesolin illustrates how to get by just fine without that shop cornerstone, the table saw. Not only can you do good work without one, but you may find you can skip that purchase altogether.

While often overlooked, sandpaper is a staple in just about every shop, and it often plays a leading role in finishing a project. On pp. 44–51, Adam Godet dives into the world of coated abrasives and offers insights into the factors involved in choosing the right product for the job. Whether you're sanding by hand or machine, the right grit, coating, and backing can make faster work of the task and offer better results.

From sandpaper to backsaws, machine upgrades to shop layout strategies, I'm confident that this issue will help you to get set up in your shop, have more fun when you're there, and achieve the results you want.

—Michael Pekovich



YOUR SHOP'S NEXT SOLUTION STARTS WITH SCM



FULL COMBINATION MACHINES



cu 410es



lab 300p

JOINTER / PLANER



nova f 410



class s 630



fs 52es

BAND SAW



s 45n

COPY LATHE



t 124

COMPACT CNC



startech cn k

SCM North America
Tel: 770.813.8818 - scmwood.com
SHOP NOW at shop.scmgroup.com



workshop tips

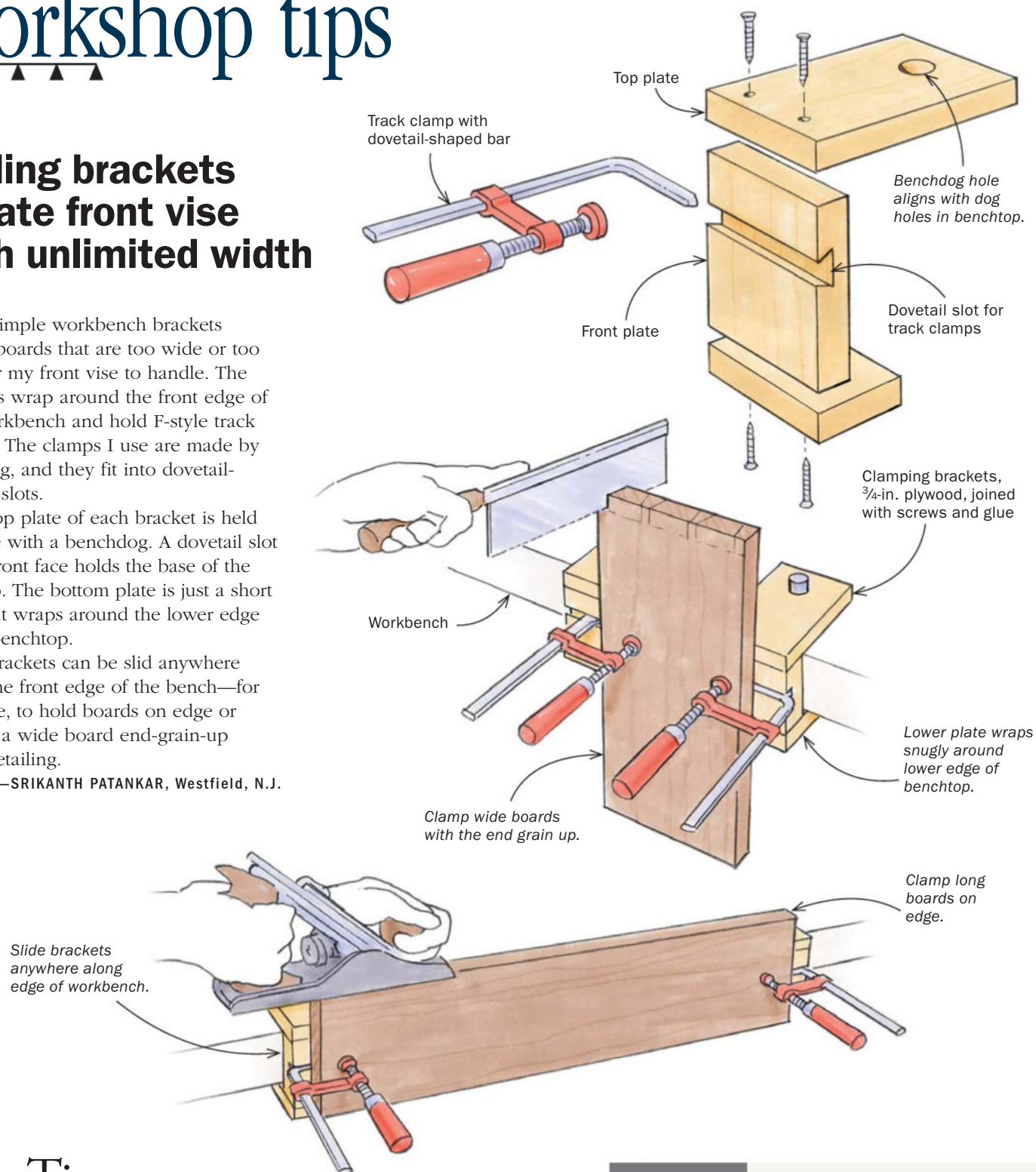
Sliding brackets create front vise with unlimited width

These simple workbench brackets secure boards that are too wide or too long for my front vise to handle. The brackets wrap around the front edge of any workbench and hold F-style track clamps. The clamps I use are made by Micro-Jig, and they fit into dovetail-shaped slots.

The top plate of each bracket is held in place with a benchdog. A dovetail slot in the front face holds the base of the F-clamp. The bottom plate is just a short stub that wraps around the lower edge of the benchtop.

The brackets can be slid anywhere along the front edge of the bench—for example, to hold boards on edge or to hold a wide board end-grain-up for dovetailing.

—SRIKANTH PATANKAR, Westfield, N.J.



Best Tip

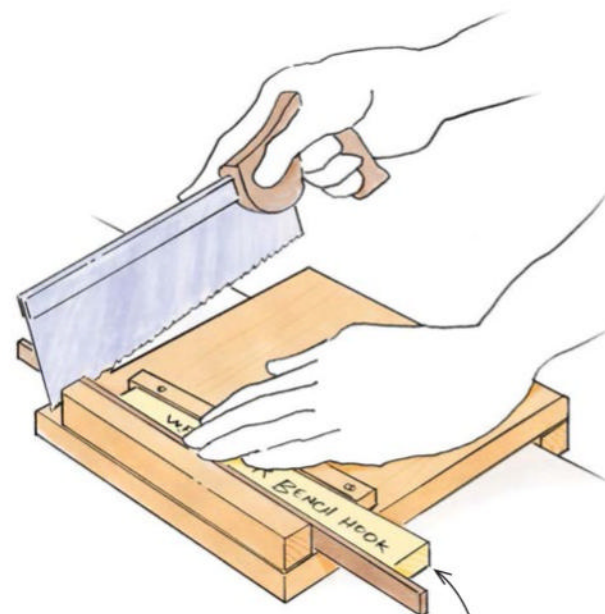
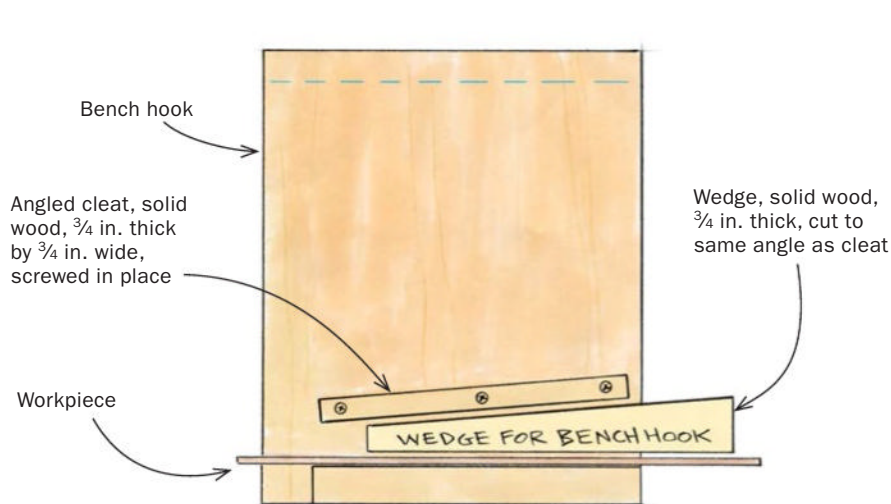


Srikanth Patankar is a pediatric anesthesiologist. After 33 years in practice and 30 years as a woodworker, he is nearing retirement and spending more time in the shop. When he immigrated to the United States 40 years ago, he knew nothing about woodworking. His first projects were planters, potting tables, Adirondack chairs, and trellises. When his wife brought home some issues of FWW from the library, Srikanth was inspired to take his new hobby to the next level.

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 Lie-Nielsen No. 102 Low Angle Block Plane.



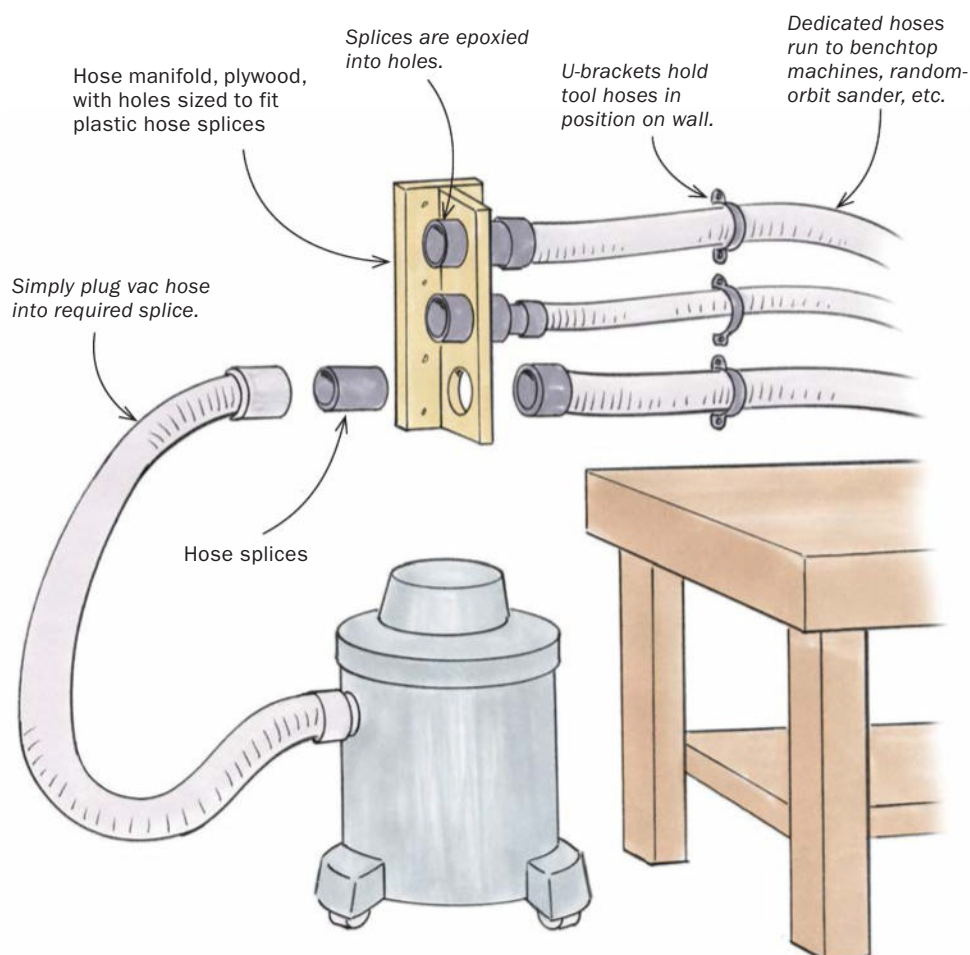


Wedge holds parts in place for secure sawing.

Add a wedge clamp to your bench hook

If you add an angled cleat to your bench hook and cut a wedge to the same angle, the two mating components will hold parts securely when you're sawing. That's especially helpful when those parts are thin and/or short. Make the angle relatively shallow, and the wedge will stay solidly in place. My only issue has been remembering not to use the wedge for something else—hence the note in large letters. By the way, I added this setup to the top of my wood toolbox as well, and it works great there too.

—CARADOC WINSTON, Gloucester, England



Hose manifold simplifies dust collection

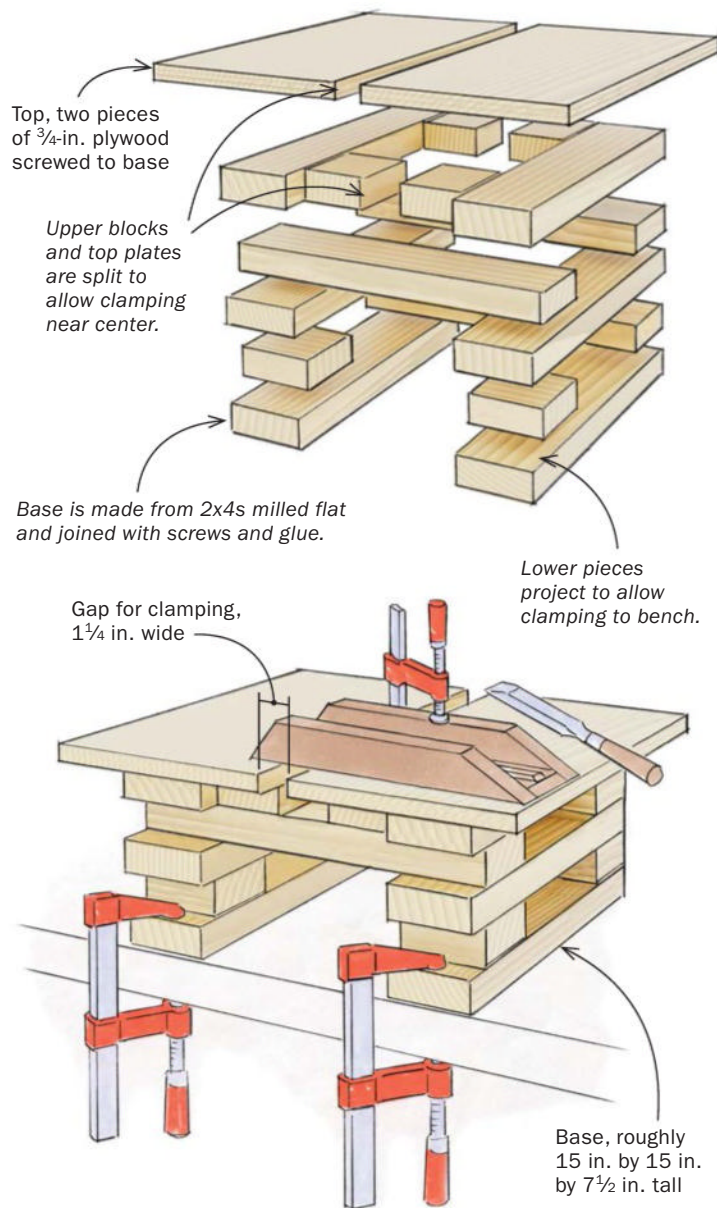
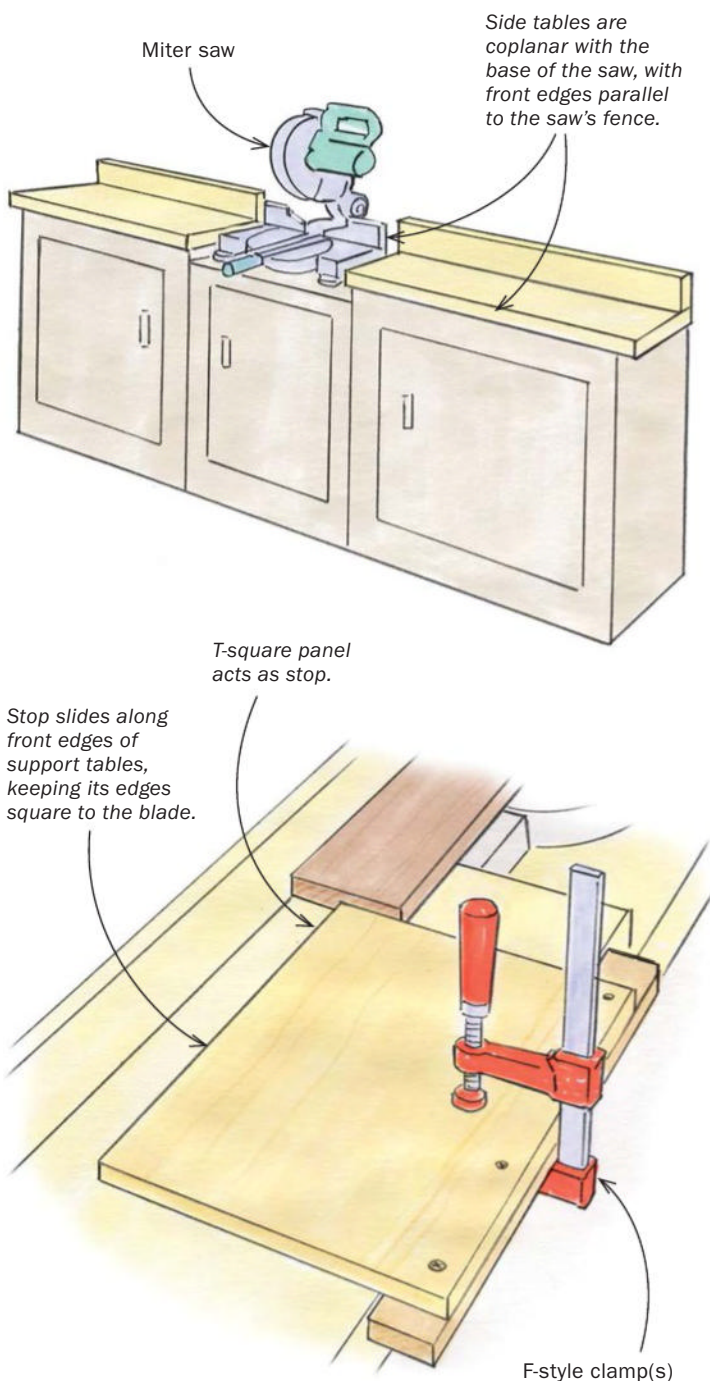
I borrowed this simple idea for a hose manifold from a tip by Chuck Lambert in *FWW* #229, updating it with dust-hose “splices” from Lee Valley, as opposed to simply drilling holes in plywood. These hose connectors are available for both 2½-in.-dia. and 4-in.-dia. hoses, so the manifold idea will work for both shop vacuums and full-size dust collectors. Unlike Lambert, I mounted my manifold vertically, on the wall. The hose splices are epoxied into holes in the plywood. The splices are tapered, so hoses go on and off easily but also fit tightly, with no suction loss. I mounted the plywood on the wall with simple angle brackets, and I hold the dedicated hoses in position with another handy product from Lee Valley: U-brackets that screw to the wall. The dedicated hoses can run to a variety of benchtop tools, including a handheld sander. When I want to use the vac for shop cleanup, I just unplug its hose from the manifold.

—JOHN CORDUKES, Cobourg, Ont., Canada

Easy stop system for miter saw

My first piece of advice is to incorporate your miter saw into a cabinet system that provides level support tables on both sides, coplanar with the base of the saw. My setup also includes rear fences that align with the saw. Once you have a setup like that, your work stops can be as simple as the T-square panels shown here. They slide anywhere along the support tables, keeping their edges square to the sawblade for accuracy.

—ERIC RIMEL, Spring Green, Wis.



Benchtop mini-bench is very easy to build

As demonstrated in this magazine and others, a small auxiliary workbench placed atop a standard one raises certain types of work to a much more convenient height. Handheld routers are easier to use at that height, for example, and detailed handwork is easier to see and perform. All you really need is some sort of solid work surface that allows convenient clamping. This simple stack of 2x4s, with a plywood top added, works great for me. I milled the 2x4s flat so they screw together solidly and sit flat on the bench, and I broke the top into two pieces, creating a center slot for clamping. My mini-bench clamps easily to my workbench and sits quietly in the corner when I don't need it. The top is easily replaceable, so I don't hesitate to cut into it or nail small parts to it. As I dive deeper into kumiko work and my eyes continue to age, I appreciate this bench more and more.

—EDWARD CHRISTIANSEN, Auburndale, Mass.



THE ULTIMATE MATERIAL SUPPORT SOLUTION



**TOOLESS
WING
REMOVAL**

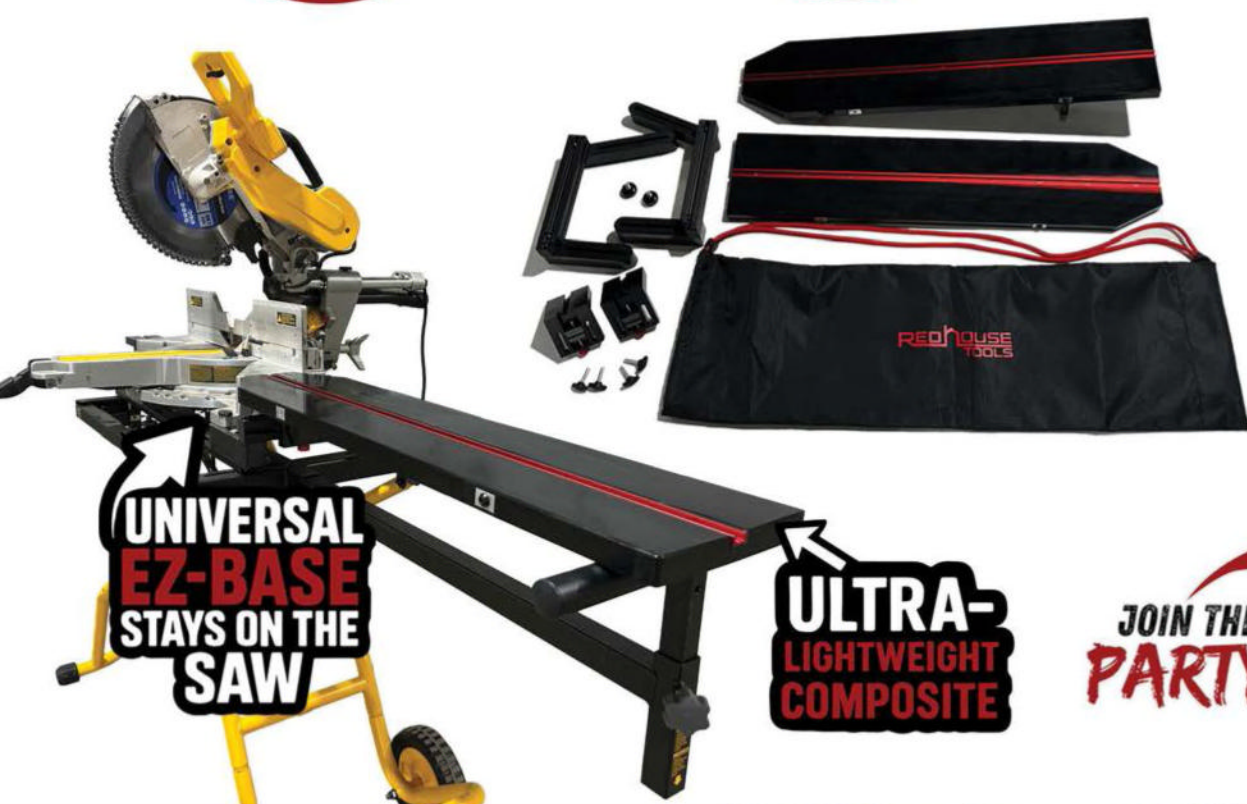


**BACK
FENCE
COMPATIBLE**



**MICRO
ADJUSTMENT
FOLD DOWN
FEET**

**ANY
SAW
STAND
OR
WORKBENCH**



**UNIVERSAL
EZ-BASE
STAYS ON THE
SAW**

**ULTRA-
LIGHTWEIGHT
COMPOSITE**

**JOIN THE
PARTY!**



DON'T BE THAT GUY!

**MAKE SAFETY &
SUPPORT A PRIORITY**



www.REDHOUSETOOLS.com

■ ACCESSORIES

Adjustable fence from SawStop

YEARS AGO, I FELL IN LOVE WITH THE FUNCTIONALITY OF THE UNIFENCE on my old Delta Unisaw. Sadly, the Unifence stayed with the saw when I sold it. I've missed having the Unifence with its sliding aluminum face that can be positioned in various ways for different functions. My favorite configuration for this type of fence involves sliding its face toward the rear of the saw and using it as a stop for crosscutting. In many parts of the world, fences with this functionality are mandatory.

So I was understandably excited when SawStop announced its T-Glide Advance Rip Fence. Installing it on the SawStop PCS in *Fine Woodworking's* shop was a breeze. The new fence dropped right onto the stock fence rails, and it only took a couple of minutes to adjust the fence parallel to the blade and square to the table.

The extruded fence face was straight, and it has a dovetailed slot that accepts two included inserts that enable you to attach featherboards, jigs, and sacrificial fences to the face. The right side of the fence tube features three quarter-turn cam locks that loosen and tighten the fence face with ease. Another great feature that is easily overlooked but very welcome is the inclusion of rollers on the far end of the fence. These make the T-Glide Advance Rip Fence move over the table like a dream.

However, there are two things that prospective users should be aware of. If you have any fence attachments that straddle your old fence, the cam locks on the right side of the fence tube will interfere with them. Also, if you're apt to use your

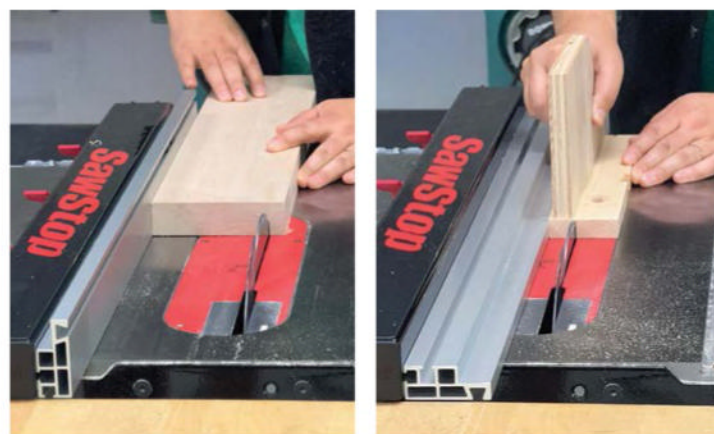


T-Glide Advance Rip Fence (ATGP-FA)
\$349 (for the Professional Cabinet Saw or Contractor Saw)
\$399 (for the Industrial Cabinet Saw)
sawstop.com

fence on the left side of the blade, you should know that while you can swap the face to the other side, doing so is tedious; however, this shouldn't be a problem for the vast majority of woodworkers.

At the *Fine Woodworking* shop, we will likely rotate between the stock fence and the T-Glide.

—Ben Strano, *Tools and Materials* editor



Ups and downs. The fence face is easily switched between its high and low orientations. There are dual scale indicators, one for the high position and one for the low. The face can also be used as an L-fence.



Smart stop block. The face is adjusted with three cam locks on the right side of the fence tube. Loosen the locks and pull the fence back clear of the blade, and you can use it as a stop block when crosscutting with your miter gauge. The rip fence's scale indicator will give you the correct reading for the crosscut.



■ JIGS

Flush-trim router base is a winner



Flush Trim Base for Compact and Mid-Size Routers
\$110
woodpeck.com



WOODPECKERS' NEW FLUSH-TRIM ROUTER BASE

is fantastic. Designed for flush-trimming solid-wood strips glued to plywood edges, it's just as good for flush-trimming joinery and inlay, from dovetails and through-tenons to bowtie keys. If you like to leave your joinery protruding a bit, this base will help you trim those elements

consistently too, leaving the ends of your dovetails and tenons up to 1/8 in. above the surface.

If that's not enough, the jig also lets you rout perfect rabbets, thanks to its excellent fence, which adjusts easily and precisely. The fence is also very helpful when you're trimming edge-banding, keeping the bit squarely over the edge as you move the router along.

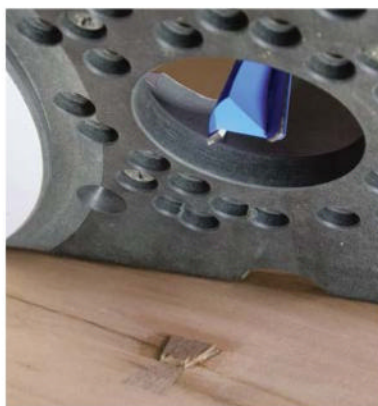
Another component that elevates this jig over a shopmade version is the stiff, slick phenolic plate, which prevents the router from sagging and slides easily over any surface. The plate also includes tall handles for safety and control. These features combine to give the jig a solid, positive feel, and they allow it to deliver very accurate results.

The plate includes a wide array of hole patterns for mounting a variety of popular routers. Check the product page at woodpeck.com for the full list.

—Mike Farrington, a professional woodworker in Aurora, Colo.



Trim edge-banding quickly and accurately. The stiff plate keeps the router level and slides easily over the surface.



Trim inlay and joinery too. The base trims inlay and joinery very close to the surrounding surface, leaving you very little cleanup to do.



VADConcepts Roller Guides

\$70 (single roller)

\$170 (as shown with a dual roller and spacer)
etsy.com

■ ACCESSORIES

A fine featherboard for resawing, etc.

WHEN RESAWING, MAINTAINING CONSISTENT PRESSURE against the fence can be a challenge. VADConcepts roller guides, 3D-printed in PCTG (a tough plastic) and with a clever built-in spring behind the roller, can help provide that pressure.

The guides have a bar underneath that mates with a T-shaped miter slot, and you lock them in place with a pair of knobs. You can use a single roller guide, or stack a pair of the rollers with the available spacer between them to apply pressure across a wider board without additional friction. I also elevated a single roller on a spacer while resawing 7-in.-high stock with great results. I found the roller guides to be effective on my table saw as well, though they don't have anti-kickback provisions.

I can see many uses for these guides, and I'm evaluating my router tables to use them there.

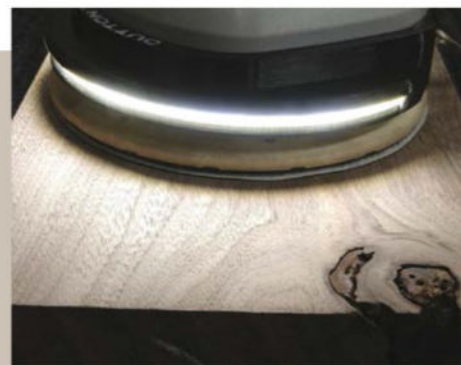
—Eric Rimel, a woodworker, set carpenter, and teacher in Driftless, Wis.



Spring assist. The spring-loaded wheel helps immensely with cuts where a variance in pressure against the fence or the table could make the workpiece unusable.



Easy to attach. Mount the Dutton light by simply sliding it into place.



Light it up. The light comes with a 16-ft. cord, and zip ties are included for cord management.

Dutton Tools Individualized Sander Light
\$50
duttontools.com



■ POWER TOOLS

Lighting the way

SURFACE IMPERFECTIONS CAN SLIP PAST EVEN THE MOST SKILLED WOODWORKERS. One way to improve your odds of catching them is with proper lighting. Fortunately, toolmakers are on the case, and I had the opportunity recently to try two new options for enhanced lighting during sanding.

First up was the Individualized Sander Light from Dutton Tools. I used the one for the Festool ETS 150, but the company offers models for many Festool and Mirka sanders, as well as some DeWalt, Bosch, and 3M sanders. The light is a 3D-printed plastic clip with an embedded LED strip. The light mounts onto the sander by simply sliding it into place—no tools required. In use, the light did not vibrate or come loose. It provides strong light, illuminating several inches near the sanding disk—

right where your eyes are already focused. The light comes with a 16-ft. cord, which is plenty long enough for any shop, and the included small zip ties make it simple to manage the cord. The light clips on and off easily, but in my shop it is likely to remain attached most of the time. Dutton is developing a battery-powered option as well.

The other tool I tested is the Festool ETSC 2 150. This battery-operated sander has a light built into the machine. Unlike the Dutton light, it has high and low settings with default brightnesses built in. Given the collection power of the bag and strong light, I can see this tool getting a lot of use in any shop, particularly in tight spaces like the inside of a cabinet.

Either of these lights will work great for helping you find imperfections in your surface preparation and avoiding postfinish surprises.

—Adam Godet,
a woodworker in
Washington, D.C.



More light or less. The Festool's built-in light has high and low settings. It's a bit brighter and casts a wider halo than the Dutton.

Festool ETSC 2 150 Cordless Random-Orbit Sander (tool only)
\$530
festoolusa.com

▲ Online Extra

To see how to make a 3D-printed device that converts a standard flashlight into a raking-light inspection thingee, go to FineWoodworking.com/320.



INFINITY CUTTING TOOLS Shop 1000's of Innovative Tools!

New
DRILL PRESS PACKAGE
w/ Pro Fence!

Aluminum Extruded
Fence w/ Integrated
Dust & Chip Collection

Now with Integrated
Dust Collection!

New Video Online
Item # DPT-200

INFINITYTOOLS.COM • 877-USA-BITS

HIGHLAND
Woodworking
Fine Tools since 1978
800-241-6748

Wood Slicer®
resaw blade

- Cuts smoother
- Makes veneers
- Rated #1 by FWW Magazine

In Canada,
available at
Lee Valley

All of the great comments
about this blade are true!
It cut quickly, cleanly & straight
... my only regret is that I didn't
purchase this blade earlier.
— Lewis K.

Scan the QR code to see a short video demo.

www.highlandwoodworking.com

BE A BETTER CRAFTSMAN WITH GREX®

CORDLESS or **AIR**-powered; be a better craftsman with proven precision built GREX tools. When you choose a GREX, you're investing in a better built, longer lasting, more powerful tool with the best considered set of features and ergonomics. It's the same award-winning robust build quality users have trusted in GREX tools for 30 years. Every new GREX adds innovations that enable you to do more, easier and faster. The difference is in the details. Learn how GREX precision crafted tools just work better and longer for you.

FIND YOUR DEALER

🇺🇸 888-447-3926 🇨🇦 866-633-7788

www.grextools.com

30 YEARS
GREX
1995-2025 USA®



Celebrating with
a new sale
every month.
Scan for details.



On the Horizon

A selection of some of the best new tools on the market.

Go Hands-Free, Stay Hands-On

The world's first handheld CNC router now has a hands-free mode. Like autopilot for Shaper Origin, simply clip Origin into BenchPilot to turn it into a hands-free milling machine, capable of vertical or horizontal cutting. Let BenchPilot drive Origin so you can focus on other tasks at hand. Then simply unclip Origin to take it where you need it and cut at virtually any scale. There's no computer programming required and no complicated software to learn.



Startech CN K

SCM introduces the Startech CN K, a new 3-axis machining center designed for artisans, schools, and prototyping departments. It's the only machine in its class with a protective enclosure featuring internal lighting and dust extraction—ensuring operator safety and a cleaner working environment.



Knew Concepts Marquetry Saw

Knew Concepts introduces a new member of its family of modular marquetry saws. After many requests, we listened, and have introduced a new, larger 12-in. version of our modular marquetry saw. The increased depth lets you handle larger projects and reach deep into panels for precision cuts a scrollsaw just can't handle. For those who need even more depth, there's always the Lee Marshall edition marquetry saw, which starts at 12 in. and goes all the way out to 24 in. of unequalled control.

With either version, a tilting guide tower, precision ball bearings, and a counterweight system keep the blade cutting at exactly the angle you want, without the weight of the saw getting in the way. It lets you pay attention to the cut, not the saw. Go to knewconcepts.shop/products/modular-marquetry-saw to order.





PantoRouter Woodworking Machine

The PantoRouter® Woodworking Machine makes joinery fast, accurate, safe, repeatable, and fun! Mortise and tenon has never been easier with over 150 perfectly fitting sizes using their patented tapered templates. You can set up and cut angled or compound-angled joints in

minutes, virtually dust-free due to the incredibly effective dust-collection hood. Go from set-up to glue-up in under five minutes in most cases. There's no other tool, jig, or dedicated joinery machine for woodworkers available today with the straightforward simplicity and the open-source potential to create unique and functional joinery, patterns, and designs.

- Mortise and tenon • Box joints and dovetails • Safe and easy to use
- Ideal for hobby and professional woodworkers or school woodshops

Precision woodworking has never been easier. For projects and videos, visit PantoRouter.com. For more information, contact us at (877) 333-7150 or info@pantorouter.com.



G1026 3-HP Shaper

If creating custom profiles is essential in your busy woodworking shop, you need this powerful, multifunctional machine to reduce your overall production time. This shaper includes ½-in., ¾-in., and 1-in. spindles sizes that work efficiently in combination with different sizes of cutters and spacers, letting you create the exact profile you need for every job.

This machine is equipped with three table inserts that provide a total of four table opening diameters for the highest adaptability. Use the smallest cutter size that works for a specific opening to reduce the amount of wood chips that fall into your machine. The independently adjustable cast-iron fence and precision-ground cast-iron table give essential stability during cutting, so you can get exceptional quality on every shaping pass.



G0990 1½-HP HEPA Wall-Mount Cyclone Dust Collector

This efficient dust collector offers space-saving convenience for small shops without skimping on filtration power. With the health benefits of HEPA filtration, this dust collector easily captures fine dust down to 0.3 microns. The user-friendly design allows for wall mounting to keep valuable floor space open for machines, workbenches, and other essential equipment. The two-stage cyclonic action keeps dust from settling on surfaces and hanging in the air, so you can achieve professional results when applying your final finish.

Dust disposal is simple with a quick-release collector drum, equipped with casters and a collection bag that is easy to disconnect for fast debris removal. Other convenient features of this competitively priced dust collector include remote control operation and a minimal 73 dB sound rating.

grizzly.com

On the Horizon



These Are the Screws You're Looking For

Can't find a specific screw your woodworking project or shop needs? Quickscrews has it. For nearly 40 years, Quickscrews has supplied professional-grade, application-specific wood screws to hobbyists and pros alike.

With a variety of drive types, unmatched quality, and features such as the Type 17 point and QuickCutter, Quickscrews users split less wood, drill fewer holes, and enjoy finishes, features, and sizes not found in big-box stores.

Selection, speed, and expertise. That's the Quickscrews promise.

Needed your screws yesterday? Understood. Quickscrews offers same- or next-day shipping, the widest selection of woodworking screws, and decades of expertise. That's why woodworkers across generations agree: Quickscrews are the screws you're looking for.



New StopLossBags® to Preserve Your Finishes

Introducing two new tools designed to make your projects easier and more efficient: the Sampler and the Steward.

For over a decade, woodworkers have trusted our original StopLossBags® to preserve valuable stains and finishes. Just pour the finish in and squeeze the air out. Now we've developed two new versions based on your feedback.

The Sampler is a 6 oz. bag, perfect for storing smaller amounts of finish or for sharing custom mixes.

For those working with thicker finishes like paints, glazes, and gels, we've created the Steward. It features two large nozzles for faster filling and pouring of high-viscosity liquids.

These new tools are both designed to keep the air out and the solvent in, ensuring your finishes stay good to the last drop.

Visit stoplossbags.com to place an order or find a trusted distributor near you.





Carbon Coat

A revolutionary new coating technology is saving woodworkers significant time and labor in the shop. Carbon Coat, developed by Carbon Method, offers a modern alternative to the repetitive cycle of applying traditional paste wax to cast-iron tool surfaces. Its innovative formula creates a durable, long-lasting barrier to corrosion that provides extended protection, eliminating the need for frequent maintenance, and letting woodworkers spend their time in the shop building, instead of maintaining tools. While Carbon Coat's primary function is preventing rust and corrosion, it also delivers superior wear resistance and creates an extremely low-friction surface—not only preserving the longevity of expensive machinery like table saws and jointers but also enhancing workshop efficiency and safety by allowing materials to glide smoothly across the surface of the tool. Visit CarbonMethod.com to order.



D6 Six-Stage HVLP System

Unmatched Precision. Unbeatable Efficiency. Undiluted.

Fuji Spray's D6 sets a new benchmark in spray finishing with a powerful six-stage motor rated at 11.5 psi. It atomizes even the highest viscosity coatings with little to no thinning, delivering consistent results. Engineered for cooler and efficient operation, the D6 prolongs motor life and maximizes return on investment.

The six preset pressure settings give users precise control over spray output, delivering professional results with minimal overspray and waste.

Featuring easy-pause remote control with a 75-ft. range for effortless operation across the workshop.

The advanced two-stage HEPA filtration system provides superior filtration to capture fine particles, while the check filter light alerts when cleaning or replacement is needed, ensuring optimal performance. Durable and built to last, the D6 excels in both workshops and job sites.



A New Twist to Some Old Classics



Melbourne Tool Company has created a range of fundamental hand tools that are accessible, easy to set up, and intuitive to use—without sacrificing accuracy and performance.

MTC's careful and thoughtful design has delivered some new twists on old classics. Their planes all feature a versatile bevel-up design, allowing the user to optimize the cutting angle to suit the job at hand. This allows you to simplify your tool kit; you just need one plane and three blades to do virtually everything you need for that size of plane. All MTC tools are designed in Melbourne, Australia, crafted from investment-cast steel, and fitted with M2 HSS blades. The entire range is available as an all-in-one kit, while each tool and individual blade is also available separately. Head over to melbournetool.com to explore the full lineup, find a dealer near you, or purchase directly from the site.



Essential non-woodworking tools

AN ARSENAL OF ITEMS TO MAKE YOUR WOODWORKING LIFE MORE EFFICIENT

BY CHRISTIAN BECKSVOORT

I have a variety of tools in my shop that you won't find in a woodworking catalog or on the average woodworking website. Most migrated from my house, since they are as useful there as they are in my shop. They were soon needed back in the house, however, so I've duplicated all these items in my shop because I found myself reaching for them over and over.

Waxing poetic

The most useful non-woodworking material is wax. A slab of paraffin wax will last decades when used to ease friction on table-saw tops, jointer tables, planer tables, miter-gauge tracks, hand-plane bottoms, and

Wax: A haiku

A simple substance

Drawers glide, eased screws, slick soles,

Wax brings joy, comfort



Smooth run. Rub wax on drawer runners, sliding doors, or anywhere you have moving parts that you want to move smoothly.



Easy twisting. Use a bit of honeycomb wax on the point of your screws before setting them so it's easy to hand-tighten them.

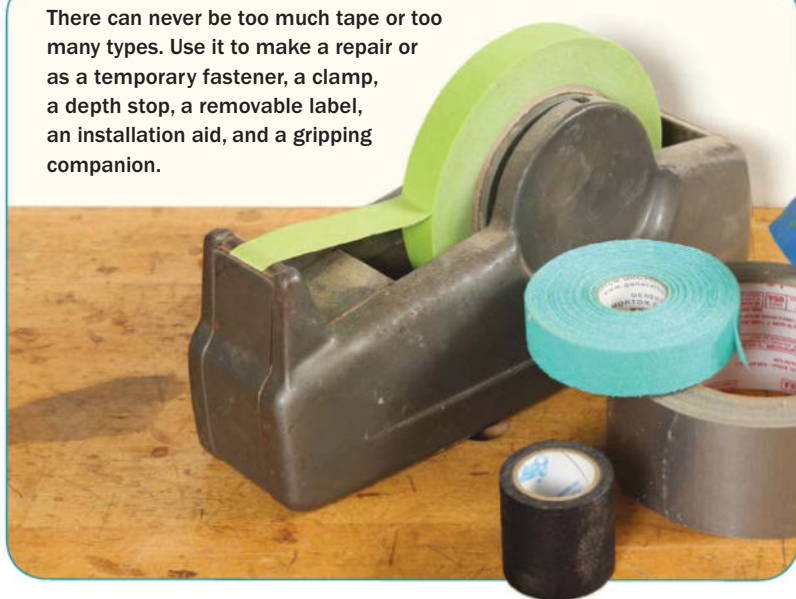


Paraffin polishing. Rub a block of paraffin wax on metal surfaces, and then buff them out with a dry rag. Your plane will fly across your work, and wood will glide across any waxed surfaces.



Versatile tape

There can never be too much tape or too many types. Use it to make a repair or as a temporary fastener, a clamp, a depth stop, a removable label, an installation aid, and a gripping companion.



along wooden sacrificial fences. For easing screws into hardwood, I prefer beeswax—actually, honeycomb wax sheets because they are easy to store and use, and one rolled candle has lasted me over two decades. Break off a tiny piece, roll it into a ball, and apply it to the screw tip. Finally, paste wax can be used to lubricate table-saw gears without attracting dust.

I don't use wax on the outside surfaces of furniture; wax encourages heat rings from hot beverage cups. I do use wax on interior surfaces, however; scented waxes are a plus there.

I also use wax wherever a drawer makes contact with its cabinet: runners, kickers, cabinet sides; and drawer bottoms, sides, and tops. The combination of a perfect fit and paste wax is as good as metal glides.

Long-lasting repair. Duct tape is strong enough and adhesive enough to permanently repair something like a split hammer handle. Squeeze as much glue into the handle as possible, and then tightly wrap the handle to hold the pieces together and cover any splintering. There's no need to remove the tape.

DUCT TAPE



Connections. Becksvoort uses duct tape to connect his shop vac hose to any tools that don't have a designated port. The duct tape is flexible enough to move a bit with the hose on the machine, strong enough to keep the parts together, and easy enough to remove when you want to unwrap it.



GREEN TAPE



Strong and stretchy clamping. Because of its elasticity, green tape is the ideal tape for clamping. Pull it tight across edging and down the sides of the substrate. Close up miters by stretching the green tape snugly around the corners.



More tape



Removable marks. It's fine to mark directionals and part identifiers on work before it is taken to its final surface, but you don't want to draw arrows or triangles on a finished surface, so mark the directions on the tape and just peel it off at the end. Similarly, when installing finished work on a wall, apply tape to the wall and draw on that, drill holes for hardware, and then peel off the tape.



Just stop it. Blue tape on a drill bit can guide you when you are drilling so you don't drill too deep. Wrap the tape on the bit, exposing the bit to the depth of the hole you want to drill.

Taping tips

Tape is invaluable in woodworking, and there are many different types that come in handy for a myriad of situations: duct tape, blue tape, green tape, mesh tape.

Duct tape can be used for a variety of quick fixes, whether they are intended to be temporary or permanent. It is sticky and uniquely strong. Got a cracked mallet handle? Duct tape. Want to attach a vacuum hose to your router? Duct tape.

I use blue tape for layouts, labeling, and even as a depth stop on some operations. Blue tape is relatively inexpensive and gets used a lot in my shop.

Green tape is a bit pricier but much stronger and stretchier, so I use it as a clamp when I'm edging plywood with solid wood and when I'm gluing up mitered frames or boxes.

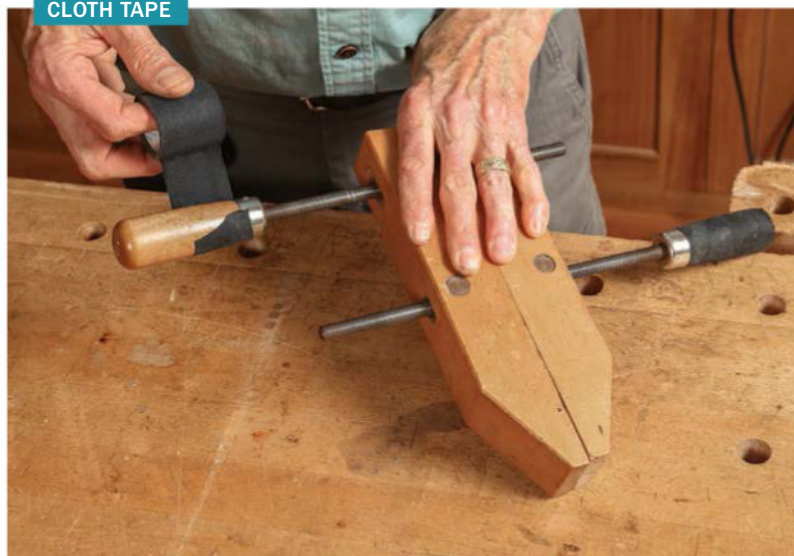
I also use Flexx-Rap when hand-sanding. It's a mesh tape coated with latex that sticks only to itself. It's great for wrapping fingers when you're sanding moldings or end grain—no more hot fingers or blisters.

Gluing gadgets

When it comes to gluing, there are a few items that have become indispensable in my routine. They are all inexpensive or free, easy to use, and make gluing tasks a breeze. I always have a putty knife, paint scraper, wax paper, and a few old credit cards close at hand.

Putty knives can be used for applying filler and plastic wood, heated for applying stick shellac, and used to scrape up partially dried glue. There is always a paint scraper on my glue-up bench. It makes quick work of removing dried glue, can level uneven spots in poor glue-ups, and can scrape away stains and surface

CLOTH TAPE



Add grip and protection. Some tapes are designed for ergonomics. Wrapping your clamp handles with cloth hockey tape adds a ton of grip strength, allowing you to tighten clamps firmly. A mesh tape like Flexx-Rap sticks only to itself; if you wrap your fingers with it while hand-sanding, it gives great protection against heat and blisters.

SANDING DISCS FROM KLINGSPOR

Klingspor offers a whole family of premium abrasive products engineered for woodworking, from material removal to ultra-fine finishing:

Discs | Belts | Sheets | Strips | Rolls

Choose one of these most popular products and enhance your sanding processes.



PS33 Aluminum Oxide Sanding
Discs and Sheets.



FP77 Anti-Loading Abrasives
for wet or dry sanding.



CS310 Heavy-Duty Belts &
CS311 Large Diameter Discs.



CS411 Tough Alumina Zirconia
PS36 for a long working life.

We also have saw blades, router bits, jigsaw blades, and reciprocating saw blades.



"Call today to speak with one of our technical advisors about your sanding project."
— Nick, Technical Advisor



KLINGSPOR
The Most Sanding Power for Your Money Since 1893!

800-645-5555
www.klingspor.com

Vacuum Pressing Systems, Inc.



The leader in vacuum technology for woodworking offers innovative products for:

VENEERING • LAMINATING CLAMPING

vacupress.com

Vacuum Presses, FlipTop Tables, Veneering Accessories and Videos

553 River Road, Brunswick, ME 04011 • 800-382-4109

Learning by Doing

Connecticut Valley School of Woodworking

Bob Van Dyke – Director

Featuring hands-on classes for all skill levels taught by nationally known craftsmen including

Will Neptune
Steve Latta
Peter Follansbee
Darrell Peart
Mike Pekovich
and more!



249 Spencer St., Manchester, CT 06040 • 860.647.0303
www.schoolofwoodworking.com

TRADITION & INNOVATION

Start your holiday shopping today!
Take advantage of our best **end-of-year deals** now!



Visit our **E-shop** to view exclusive deals



FELDER GROUP USA
CALL TODAY FOR MORE INFO Toll free 866-792-5288
sales-us@felder-group.com | www.feldergroupusa.com

Gadgets for glue-ups

Putty knives, paint scrapers, credit cards, and wax paper can help ease stress during glue-ups.



Two ways to remove glue. When glue is still soft and wet, use a putty knife to remove it, wiping the excess off as you go. When the glue has dried hard, switch to a paint scraper for more aggressive removal.



Wax paper liner. Wax paper is an easy way to protect your gluing surface. Spread it out under smaller glue-ups.

CREDIT CARD



Up your credit score. Becksvoort saves old credit cards and hotel key cards to use as glue spreaders. They are terrific for quickly spreading glue evenly over larger surfaces. You can also put the cards under your bar clamps to raise them up a tiny bit, keeping the metal clamp from interacting with the moisture in the glue and discoloring the wood.



Filling voids. Putty knives do double duty, as they are also great for squeezing wood filler into voids.

defects. Wax paper is good for more than sandwiches. When doing small glue-ups, throw a piece of wax paper under the work. Glue won't stick to it, and it will protect the surface.

Old credit cards—with the name and numbers scratched off, of course—have a few uses in my shop. They are wonderful glue spreaders. I simply squeeze glue across the work and then use a credit card to spread it evenly and quickly. I also use credit cards as spacers under clamps to elevate the clamps just slightly off the wood.

Pry those cans open

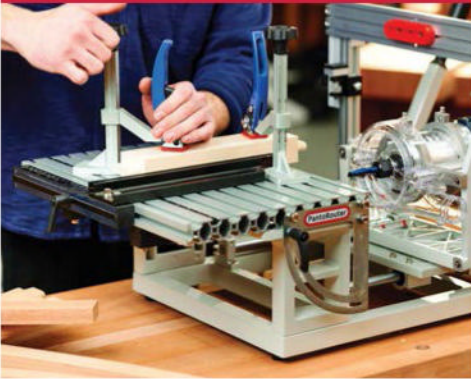
Every toolbox needs a paint can opener. Yes, you can use a screwdriver to open paint cans, but the loop end openers, especially the older ones with the wider curved ends, fit under the lip of a can lid with less deformation of the lid. When you put the lid back on,

It's Not Just a Router, it's a PantoRouter.®

A professional-grade tool for every craftsman.

Lifetime
guarantee on
templates

Minimal setup without
complicated jigs



Precision
and speed



Two fast and easy
half-blind options



PantoRouter

Dedicated to Joinery.

PantoRouter.com

(877) 333-7150

info@pantorouter.com



**THE ROCKING
HORSE SHOP**

**MAKE YOUR OWN ENGLISH
ROCKING HORSE**

- Plans
- Timber Kits
- Accessories

www.rockinghorse.co.uk

30% OFF use code FW30

Code can be used on plans & books via website or emails order T&C's apply



HEARNE HARDWOODS INC

WITH OVER 100 SPECIES OF DOMESTIC AND EXOTIC
HARDWOOD LUMBER IN STOCK, WE ARE ONE OF THE
LARGEST SPECIALTY LUMBERYARDS IN THE WORLD.

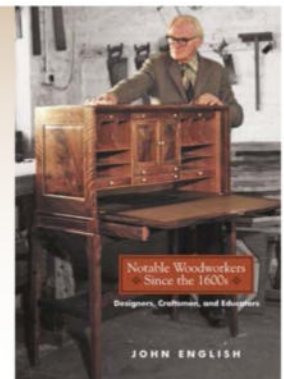
LIVE EDGE SLABS
LUMBER
TONEWOODS
BOOK-MATCHED BOARDS
BURLS, BLOCKS, TURNING
VENEER
HARDWOOD FLOORING



WWW.HEARNEHARDWOODS.COM

OXFORD, PA ~ 610.932.7400

*Come meet the masters!
Learn about the
influential woodworkers
who shaped the craft and
inspired us all.*



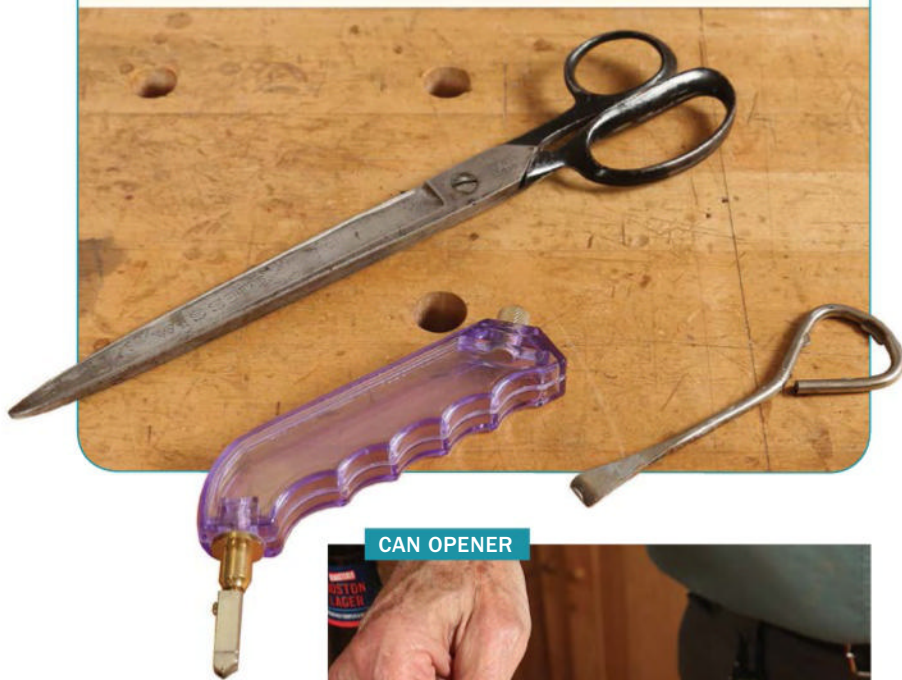
A perfect gift for the woodworker in
your life, *Notable Woodworkers Since
the 1600s*, the new book by John
English, is a sequential, chronologi-
cal index to those who have piloted
growth in the craft—in essence, a
Who's Who of woodworking since the
seventeenth century from Sheraton
and Stickley to Krenov and Maloof.



Available from fine booksellers everywhere
or by calling 1-800-345-4447.

Miscellaneous gizmos

While scissors, glass cutters, and paint-can openers don't conjure up images of romantic woodworking scenes, they are often used in the shop and should have dedicated spots in your tool cabinet.



CAN OPENER

Grand openings.

Opening a can of finish is a common occurrence. Use a dedicated paint-can opener; it will save your screwdrivers and won't deform the lid. Keep the opener handy for your postfinishing beverage.



GLASS CUTTER

Glass doors. It may not happen daily, but if you are making anything that has a glass panel or door, you'll need to order your glass to size or cut the glass yourself to fit the opening. Keep a glass cutter in your shop and you'll save the expense and time of having somebody else cut your glass.



it will seal tighter and the contents will be preserved better. In addition, you can use the loop end to pry off bottle caps.

Custom glass-cutting

Glass cutters may or may not find use in your shop. I frequently make glass doors and always have a big sheet of glass around that needs cutting. If you use a fair amount of glass in your work, you'll want a cutter; otherwise, you can just head for the hardware store and get your glass cut for you. It is more expensive and time-consuming to farm out your glass-cutting, though.

Scissor hands

A good pair of scissors is essential. I make a fair number of patterns from manila file folders—for anything from curves, small parts, and different-size objects—and I cut them all with scissors. This is much faster and less wasteful than using wood for patterns. Most old-fashioned, all-metal scissors will do, as will the newer ones with more-comfortable plastic handles. I find an 8-in. pair to be a good size. Keep your scissors sharp to ensure clean, precise cuts.

Contributing editor Christian Becksvoort is a semi-retired woodworker in New Gloucester, Maine.

SCISSORS



Rock, paper, scissors. Investing in a good pair of scissors is important. Becksvoort often uses his for carefully cutting shaped patterns in cardboard or oaktag. Keep your scissors sharp so you can make precise cuts without tearing or crushing your material.

SOURCES OF SUPPLY

**HARDWOOD HANDLE
CARBON STEEL
1¾-IN. EXTRA-
HEAVY-DUTY STIFF
SCRAPER**

hydertools.com

**SCRAPERS AND
BLADES**

allwaytools.com

**LOWE'S PAINT
MULTI-TOOL**

lowes.com

**SCISSORS AND
SHEARS**

fiskars.com

GLASS CUTTERS

delphiglass.com

GULF WAX

acehardware.com

BULK BEESWAX

beeswaxco.com

PASTE WAX

leevalley.com

FLEXX-RAP

flexx-rap.com

Groff & Groff Lumber, Inc.
Exceptionally Fine Hard Woods

A specialty lumber company with a large supply of
 kiln-dried & exotic hardwoods.

A large variety of LIVE EDGE SLABS and Matching Flitches, Walnut,
 Cherry, Curly Cherry, Maple, Oaks, Butternut, Purpleheart, Tiger Maple,
 Birds Eye Maple, Sycamore, Ash, Paulownia, Sassafras,
 Quarter Sawn Red and White Oak, Burl, Turning Blocks, & More!
 Custom sawing available.

858 Scotland Road, Quarryville, PA 17566

1-800-342-0001 • 717-284-0001 • sales@groffslumber.com

www.groffslumber.com

The Woodworker's Choice
Lignomat Moisture Meters

No more shrinking

Our pin and pinless meters are accurate and durable for a lifetime of woodworking.

Buy a Lignomat meter! Spend money only once!

Call today: 800-227-2105
 www.Lignomat.com

Wendell Castle WORKSHOP
 Scottsville, NY

APPLICATIONS FOR 2026 RESIDENCIES NOW OPEN

Classes in woodworking, metalworking, bladesmithing, and furniture design in Wendell Castle's former studio

wendellcastle.org

BROWSE CLASSES

EPIFANES
 Yacht Coatings

EIFANES.COM

Fine Woodworking

Get Our Best Deal!

SAVE UP TO **69%**

OFF THE COVER PRICE

Subscribe Now at
Subscribe.FineWoodworking.com

CENTER for FURNITURE CRAFTSMANSHIP
Teaching Creative Excellence

WORKSHOPS
 FURNITURE INTENSIVES
 TURNING INTENSIVE
 NINE-MONTH COMPREHENSIVE
 STUDIO FELLOWSHIPS

COME LEARN WITH US

Rockport, Maine 207-594-5611 www.woodschool.org

Introducing FineWoodworking UNLIMITED

Here to Inspire, Guide, and Support Your Woodworking Journey

- Complete site access • 500+ video workshop episodes • Online magazine archive •
- 1-year print subscription • And so much more!

FineWoodworking.com/Unlimited



Thirty years after my wife and I bought our house in Vancouver, I plunged deeper into woodworking and decided to convert the single-car garage into a shop. It was a basic structure, built around 1950, with 2x4s for wall studs, roof joists, and rafters. There was a bare concrete floor slab, a 15-amp electrical service, and no insulation in the roof, walls, or floor. With a footprint a bit over 200 sq. ft. and a ceiling height just over 7 ft., it wasn't exactly roomy for a

My snug shop

A TIGHT SPACE TURNED OUT TO BE PLENTY

BY ALAN McIVOR

shop, and the space constraints forced me to consider every move I made in placing machines and work surfaces and devising storage. But over the years I have been able to build many large

pieces of furniture in it, including a dining table nearly 8 ft. long.

I did all the updating of the shop myself, except for the electrical work and the installation of a double-door and two slider windows. Knowing I would need to utilize the walls for storage, I used ½-in.-thick plywood for them, which made it easy to hang brackets, tools, and cabinets. In total I spent about \$3,000 for doors and windows, lighting fixtures, lumber, hardware, insulation, and painting



Snug and sensible. The table saw and its outfeed/assembly table anchor the center of McIvor's small shop, and his other machines hug the perimeter. Wall space is utilized for storage right to the ceiling. Fixtures recessed in the ceiling provide ample light without reducing headroom.

materials, and another \$5,000 for the electrical and roofing contractors.

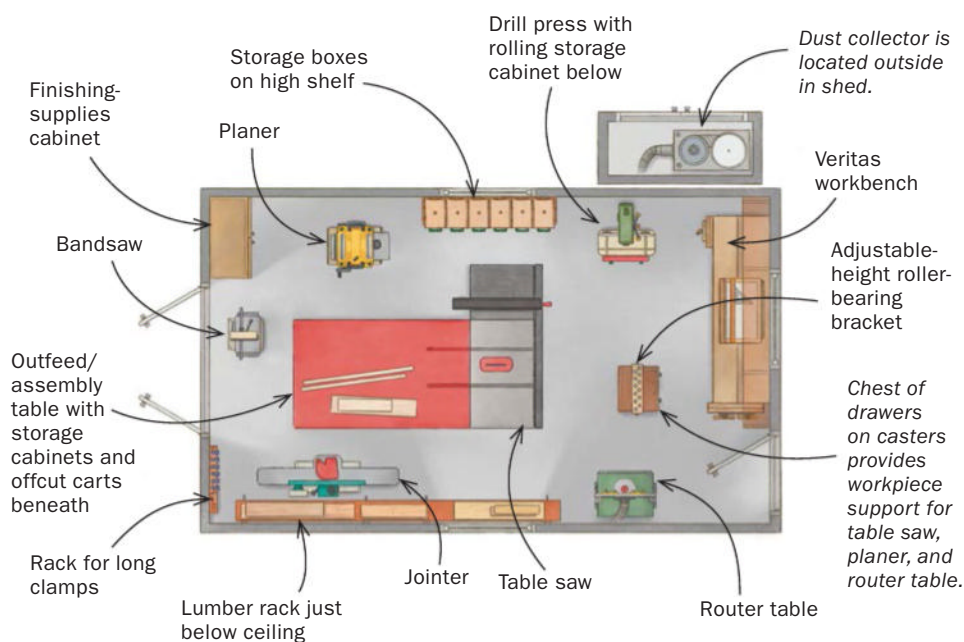
The heart of the shop

The most prominent feature of the shop is a combination outfeed and assembly table that measures 45 in. wide and 74 in. long. Besides supporting long boards and plywood during table-saw rip cuts, it provides a flat surface for glue-ups and serves as the base for my panel-clamping jig (shown in *FWW* #300). It is also where I apply finish to my projects.

The table top rests on two cabinets where I store small power tools, my router-mortising jig, and small clamps and cauls. To utilize the space between those cabinets, I built a couple of open-topped plywood boxes that slide out on casters and hold my offcuts.

For many years, my table saw was an 8-in. Rockwell Beaver that I inherited

LAYOUT AND STORAGE IN A SMALL SHOP





Smart storage

Double-duty workbench. A folding drawing board that McIvor built turns his workbench into a drafting table. Hand tools he uses at the bench are stored in the drawers he added below or on the wall behind the bench.

from my father. That saw made quite a lot of furniture. But the SawStop I replaced it with several years ago is a revelation: bigger, beautifully engineered, precise, and very accurate. And, of course, it has the flesh-sensing capability that instantaneously stops the sawblade. As a mechanical engineer, I very much appreciate the good design and high-quality workmanship of this machine.

I have built many crosscut sleds for the table saw—long ones, wide ones, short ones, one for cutting 45° bevels, and one to cut 45° miters. To store them efficiently, I varied their front-to-back dimensions so four can nest inside each other as they lean against the wall.

Versatility is key in a small space

Given the shop's size, I was careful in determining where to place the various



Rolling chest offers storage and support. A three-drawer cabinet on casters that McIvor built contains his table-saw blades and accessories and normally sits under the table saw's side extension. But when it's pulled out, the adjustable-height roller-bearing bracket on top provides outfeed support for the planer (above right) and can also support work at the table saw and router table.



machines to maximize infeed and outfeed space for each of them. Instead of adding infeed and outfeed tables to each machine, I built a three-drawer chest on locking casters that serves a number of them. Until it's needed, it sits under the side extension of the table saw holding extra sawblades and other table-saw accessories. I devised an adjustable-height roller-ball bracket that straddles the top of the chest and can be locked at the same elevation as the table-saw bed, the planer bed, or the top of the router table. When I'm rip-cutting long workpieces on the table saw, I use the chest as an infeed support; if I'm thicknessing long planks, it's an outfeed support at the planer; and it can serve as either an outfeed or side support for my router table.

I located the router table along the same wall as the jointer, so the outfeed bed of the jointer can provide infeed support for the router table. The router table is also in line with the front door to the shop, and opening the door gives me up to 12 ft. of outfeed space. If I want to shape a long piece of molding, I place the roller-ball chest just inside the door to provide outfeed support and run the molding right out the open door.

I built a router cabinet based on one by Bill Hylton in his book *Woodworking With the Router*. I paired it with a Veritas insert that lets me change bits from the top of the table. The cabinet holds all my router bits as well as my trim router, pattern guides, and various jigs.

Collecting dust

I use a Grizzly dust-collection system with a 1-hp motor, a radial fan canister filter, and a 2-cu.-ft. collection bag. To save space in the shop and keep it relatively quiet, I built a small wood-frame annex onto the outside of the garage to hold the dust collector. The ducting is galvanized sheet metal with polyurethane flex hoses connecting to the machines. Instead of installing blast



Stacked with storage. McIvor's router table provides easy-access storage for scores of router bits. Handheld routers and accessories fill the lower drawers.



Drawers dedicated to the drill press. The chest that sits below McIvor's floor-model drill press holds a wide array of bits and drilling accessories. Built on casters, it can be rolled away from the drill press when McIvor needs to lower or tilt the table to drill large workpieces.



Smart storage continued

Low-ceiling lumber solution. The shop's 7-ft. ceiling height kept McIvor from storing lumber on end, so he made a mini lumber loft, stacking planks on heavy-duty brackets high on one wall.



Offcut trolley. To utilize dead space under the middle of the large assembly table, McIvor made a pair of open-topped plywood boxes for offcuts and put them on casters.

gates, I purchased two nozzles with handles to isolate the particular machine in use. The various ducts come together at an “octopus” platform near the planer, where I can connect any one of them to the dust collector.

Small-shop storage solutions

With the shop's low ceiling, it would have been impossible to store 10- and 12-ft.-long planks on end, so I installed a set of heavy-duty wall-hung brackets high on the wall above my planer, and I stack my lumber there. Sheet goods and some offcuts are stored directly below.

I constructed a clamp storage rack that holds my parallel-jaw clamps on a lower shelf and my pipe clamps on an open rack above. Hand-screw clamps hang in a layer behind the pipe clamps. Small F-clamps and C-clamps are hung on the sides of the assembly table supports.

On the wall above my planer, I installed a high shelf for a double row of lidded storage boxes I built. The boxes are labeled and their contents segregated; different ones contain jig fixtures, cabinet hardware, small cauls, drafting tools, shims, mortising materials, and other supplies. Each box has a handle on the front, so when it's needed, I pull it out like a drawer and bring it down to the assembly table to open it. This is a very efficient storage system.

What about the workbench?

I bought my Veritas workbench, with its twin-screw end vise, when I first built the shop, and it has served me very well. I upgraded it by building a slide-in cabinet based on one by Christian Becksvoort in *FWW* #258. Mine has three compartments: one with drawers that contain bench stops, hold-downs, small

handsaws, sanding supplies, and dovetail guides, and two that hold various bench hooks and planing jigs.

When I am designing a new piece and need a place to draw, I open the collapsible drafting board I built and my workbench becomes a drafting table. When the design is done, I fold up the board and put it in a slot by the bench.

Due to the size of my shop, I had to place the workbench against a wall, so I cannot work on both sides of it. However, it sits right below a window, so it has good light. My chisels and measuring and marking tools hang on this wall, easily accessible from the front of the bench. My binder of drawings, my *Fine Woodworking* collection, and various books and catalogs are on a shelf just above the bench.

The process of organizing a shop never quite ends. I recently added a shelf by the bench to hold sandpaper blocks with all the main grits.

Alan Mclvor builds furniture in Vancouver, B.C., Canada.



Interlacing long clamps. The wall-mounted rack Mclvor made accommodates pipe clamps hanging above and parallel-jaw clamps between them, supported on a shelf below. Hand-screw clamps laid flat to the wall hang behind the pipe clamps.



Drawers without a chest. A dozen lidded storage boxes Mclvor made are stacked on a shelf above a window. Each box is labeled and fitted with a handle.



Nesting sleds. Mclvor built his many table-saw crosscut sleds with different front-to-back dimensions so they could nest inside each other for more-efficient storage.



Before. Old fluorescent lights not only dim over time, but their color also shifts. When combined with failing ballasts, they can produce an underlit shop that's difficult to do good work in.

After. Mike Pekovich's shop hadn't had a lighting update since 2011. Retrofitting with LEDs shines a new light on a familiar space.

Pump Up Your Shop Lighting

In the time it takes to replace your old fluorescent ballasts, you can upgrade the whole shop to LEDs

BY DOUG LEE



Three paths to LEDs

You can improve shop lighting with LEDs in these ways: replace the tubes, retrofit the old fixtures, or replace the old fixtures with new ones.

Replacement tubes. The easiest option to install and the least expensive to buy (\$12 per tube), T8 LED tubes can quickly brighten up your shop. But the light output may leave you wanting.



Plug-n-play tubes.

Installing these replacements is as easy as swapping out the fluorescent tubes.



Direct-wire tubes.

Using these requires removing the existing ballast and rewiring the fixture. You gain more energy efficiency and better performance.



Retrofit kit. You can upgrade existing fixtures with a retrofit kit, replacing the old ballast and tubes with an LED driver and lighting strips (\$73). This option provides the same performance as a new fixture with easier installation and lower cost.



New fixture.

If you are starting from scratch, or adding light to a dark spot in your shop, a new fixture (\$99) offers high performance with no more effort to install than a traditional fluorescent fixture.



When I set up my shop 20 years ago, I loaded it with fluorescent fixtures. They provided plenty of light, but colors were somewhat washed out and dull with a slight greenish cast, an especially frustrating problem when trying to match a finish. In a few years I also noticed a decline in the lights' brightness, increased flickering, and eventually some ballasts completely failing. When it came time for an upgrade I turned to LED lighting, which has become the common replacement bulb for its annual energy savings and the longevity of the fixtures.

Bright and comfortable

Balancing the intensity and color of light is an important step in keeping your space from feeling like an industrial clean room.



Makeshift light meter. You can measure your light intensity with your smartphone and a clip-on diffuser. A sheet of white paper also works, but readings won't be as accurate.



Measure at working height. By taking your readings just over bench or tool height, you will focus on the points that matter most—where the work is being done.

Options for LEDs

Once I started researching LEDs, I found a few good options for upgrading to them. You can make use of existing fixtures in a couple of different ways. The easiest option is simply to replace your fluorescent tubes with LED tubes. Some LED tubes can be dropped right in, while “direct wire” tubes require removing the existing ballast.

Although changing to LED tubes will provide a better color and quality of light than fluorescents, it won't measure up to the light that is produced by LED strips. You can convert your old fixtures to LED strips with a retrofit kit consisting of an LED driver, which replaces the ballast, and self-adhesive LED strips, which replace the tubes. While this approach requires more work than dropping new bulbs, the strips offer greater light intensity with more consistent color. The final option is to start from scratch with new LED-strip fixtures.

LIGHTING TEMPERATURE GUIDE



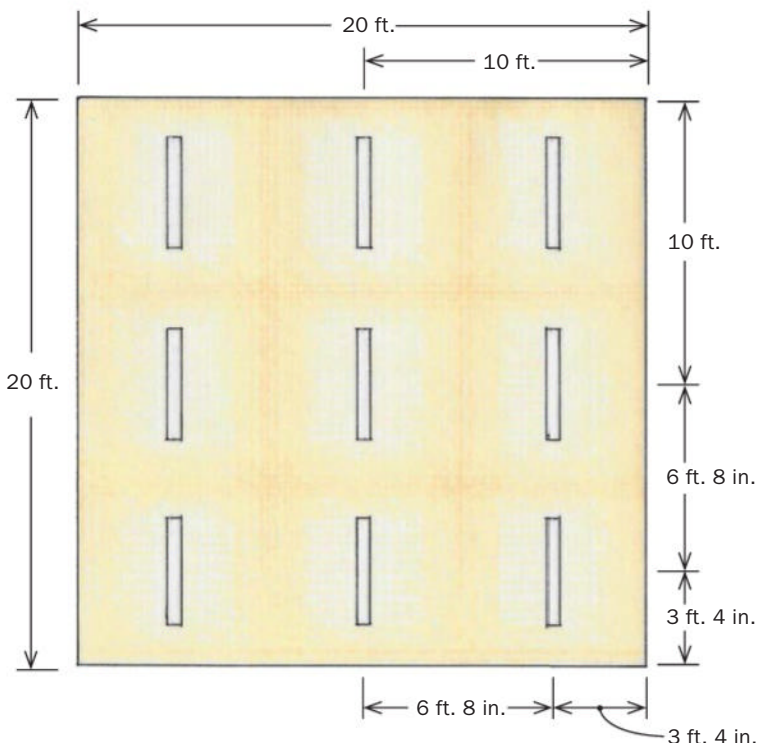
Color temperature is measured on the Kelvin scale, which scores light according to warmth or coolness. Candlelight registers 1,500K, direct sun (or “daylight”) 5,600K, and midday blue sky 10,000K.

MATCHING THE LIGHT OUTPUT

EXISTING FLUORESCENT BULBS	REPLACEMENT LED STRIPS
4-ft. 40W bulb (1)	4-ft. 12W strip (1)
4-ft. 40W bulbs (2)	4-ft. 24W strip (1)
4-ft. 40W bulbs (4)	4-ft. 24W strips (2)

With a lower wattage but equal output, the LED strips punch above their weight.

STARTING FRESH



As an example, we laid out fixtures for a 20-ft. by 20-ft. space, the size of a two-car garage. Even spacing creates a consistent light intensity and leaves no dim spots.

Out with the old

To prepare the fixture for the retrofit kit, remove the bulbs, ballasts, and tombstones.

TIP

REMEMBER TO RECYCLE



When you're removing the old tubes, don't just throw them in the trash. Fluorescent bulbs contain mercury, so be sure to contact your local transfer station about appropriate disposal.

Color temperature and rendering

Understanding the color-temperature numbers on the box can help guide your lighting choice. As you slide up the Kelvin scale, you go from warmer to cooler. In the shop, I want lighting that is as close to natural daylight as possible to lessen any surprises when I bring a piece to the outside world. I go for LED strips that provide a temperature of 5000K, which approximates the color temperature of direct midday sun. You can get LED strips at temperatures of 2700K to 3000K, which produce warmer light, but you may find that you need more fixtures or additional task lighting for detail work. Warmer light might also impair your ability to match colors on a project's finish. That said, avoid going too high on the Kelvin scale, or your shop will feel cold and industrial.

A second scale, the color rendering index (CRI), assesses the accuracy with which a light source renders colors. The higher the CRI number, the more accurate the rendering. CRI measures the visible wavelengths of the color spectrum on a scale from 1 to 100. Working with color temperature, a higher CRI will bring you even closer to the look of natural daylight. You may find LEDs with a 5000K temperature but a color rendering similar to that of fluorescents. A few manufacturers have started to produce high-CRI LEDs with color rendering



Expose the wires. Lee removes the wire cover carefully so as not to dent or bend it. The cover will be remounted after the retrofit is complete, which can be difficult if it's damaged.



Disconnect the power. Always make sure the power is cut off at the source, either by unplugging the fixture or flipping the breaker.



Remove the lamp holders. Also known as tombstones, these can be disconnected from the ballast and either left in the fixture or removed.



Remove the ballast. Unscrew the ballast from the fixture, but hold on to the mounting screws, as the new driver may fit in the same location. Ballasts contain PCBs and, like the bulbs, need to be disposed of carefully. Lee disposes of his at a local transfer station, which accepts both ballasts and tubes.

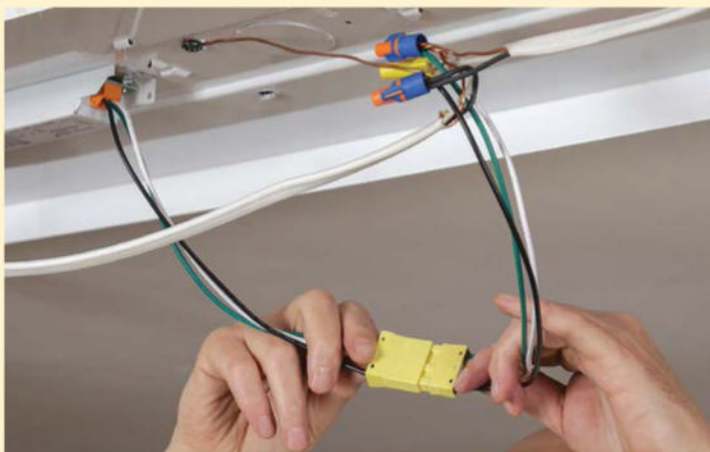
In with the new

LED strip lighting lasts 100,000 hours on average, vs. the 9,000 hours of a fluorescent tube, so it's worth the effort to make the switch. It will be a long time before you have to repeat it.

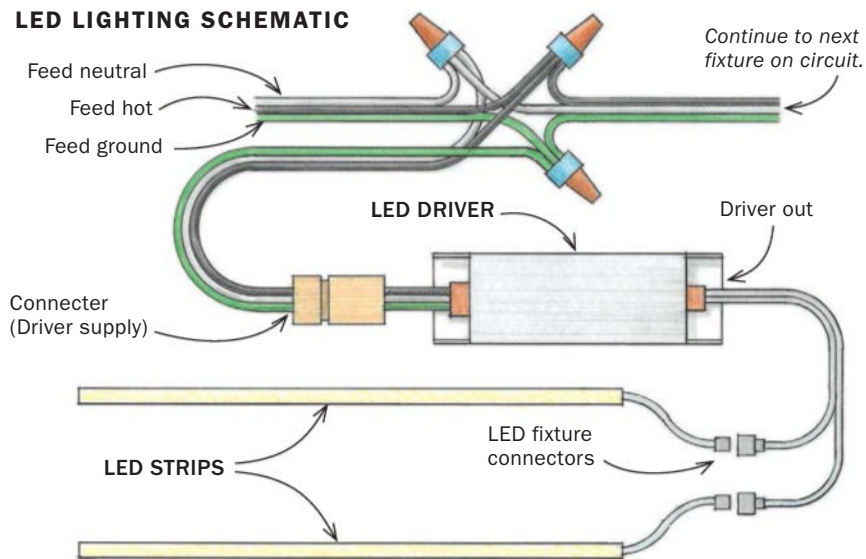
Replace the ballast. Screw the new LED driver into the same slot where the old ballast was held. The driver filters the alternating current (AC) from the power source to direct current (DC) to ensure a constant flicker-free light to the human eye.



Quick connect. Most LED drivers have a quick-connect plug at the power-in and power-out points, making it easy to swap out for more or less wattage if your needs change.



LED LIGHTING SCHEMATIC



scores around 95, as opposed to the average fixture that lands at 80.

They do watt?

When thinking about upgrading your own shop lighting, it helps to keep a few equivalents in mind. In terms of light output, one 12-watt LED strip roughly equals one 40-watt fluorescent tube, and one 24-watt LED strip equals two 40-watt fluorescent tubes. A two-strip 24-watt LED fixture would then be equivalent to a fixture with four 40-watt fluorescent tubes. If you had an existing two-tube fixture, you could double its output by installing two 24-watt LED strips. This is where the flexibility of the retrofit kit really shines. Fixture size and wattage will depend on your lighting needs and shop layout.

Time for an upgrade

Having replaced all the fixtures in my own shop, for the sake of demonstration I sought out a shop in need of upgrading. Mike Pekovich's shop hadn't had a lighting update since its renovation in 2011. It had nine 4-ft. fluorescent fixtures, uniformly spaced, each with four tubes. The fading and flickering tubes had dulled in intensity over time, leaving the shop dim.

Pekovich's original layout gave him generally uniform light at all his work surfaces, so it made sense simply to do a retrofit. We selected a retrofit kit for each fixture with two 4-ft. 24-watt, 5000K, 95-CRI LED strips and a 48-watt driver. In terms of light emitted, this is equivalent to the original four fluorescent tubes with much better color rendering and lower overall wattage.

In my shop, the lights hang from chains with Romex feeds from junction boxes running to and from the fixtures. I took them down after disconnecting them from the power circuit to retrofit them at the bench and then hung them back up. In Pekovich's shop, the lighting circuit was fully contained in a run of conduit attached to each fixture, so it was easier to do the retrofit with the fixtures remaining in place.

If you are comfortable with minor home-wiring projects, a job like this is a snap. Start by disconnecting power to the lighting circuit if the fixture is hardwired, or unplug it if it has a power cord. Remove the diffuser lens and the fluorescent tubes, along with the wire cover from the fixture housing. Disconnect the ballast from the

Let there be light

The final steps can be the most rewarding or the most frustrating. Seeing your shop in a new light is instantly gratifying; on the other hand, flipping the switch to darkness is instantly heartbreaking. Check that each fixture works before moving on to the next. This will save time if you have to troubleshoot any problems.

TIP

PEEL AND STICK



When removing the protective layer from the double-stick tape on the back of the LED strip, peel back only a small portion to get started. This will allow you to position the strip properly.

incoming circuit wiring and remove it from the fixture along with the tombstones.

Shine a new light on your shop

Now it's time to reconfigure the housing to fit the new parts. Start by installing the LED driver where the old ballast was previously mounted. If the driver is a different size, use a 1/4-in. #6 self-tapping sheet-metal screw to mount it. Feed the leads from the driver to one end of the fixture, leaving 6 in. to 8 in. of slack free at the end to connect to the lighting strip. Then connect the 120-volt wiring to the LED driver, making sure the connection is snug and grounded.

Attaching the rigid LED strip is as simple as removing the protective tape from the strip's adhesive back and sticking the strip to the fixture. After doing that, connect the driver leads to the strip. Tidy up the LED leads from the driver with a zip tie before replacing the wire cover. Put the diffuser lens back on the fixture, and repeat for the rest of the lights on the circuit. Restore power to the lighting circuit and take in your updated shop in a new light. □

As a hobbyist, Doug Lee has been designing and building homes, furniture, and cabinetry for the past 35 years.



Tidy up the wires. Zip ties work well for organizing the excess wire loops before you replace the wire cover.



No turning back. The adhesive on the back of the LED strip is incredibly strong, which is great for longevity but cause for caution during installation. Starting with a short length of exposed tape, align the strip and work your way down slowly, removing the protective backing as you go.



Restore the power. Connect the LED strips to the driver and test the circuit. Replace the diffuser lens and repeat the process for the rest of your fixtures.

All About Sandpaper

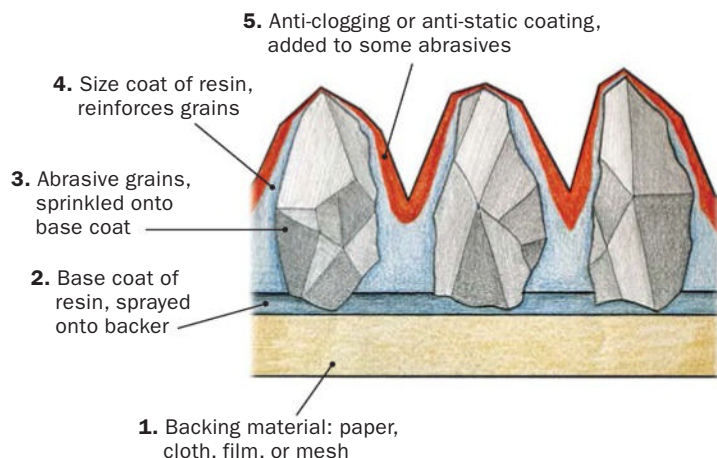


A buyer's guide to abrasive sheets, disks, belts, and sleeves

BY ADAM GODET

ANATOMY OF COATED ABRASIVES

Sanding products for woodworking are more properly called “coated abrasives.” All types include four major components, and some receive a fifth element, a special coating (shown here in red).



I don't know any woodworkers who love sanding, but all of us would agree that it is critical to the success of our projects. So it pays to figure out how to sand successfully.

While sanding practices haven't changed much in the recent past, many abrasive products have. These new papers, belts, disks, and other abrasive media not only deliver better results, but they do it faster, helping us to get back to the woodworking tasks we enjoy most.

We sand for a variety of reasons, using a wide variety of tools. Belt-, disk-, spindle-, and drum-sanding machines are employed to shape woods, and the abrasive grits they use tend to be relatively coarse. The next sanding stage is smoothing—or preparing surfaces for a fine finish—which is usually done with random-orbit (RO) disks and flat papers, with finer sanding grits. Then there is the light sanding done to smooth surfaces between coats of finish, using even finer papers and films.

The field of woodworking abrasives is a large one, which makes it impossible to test every product out there. To come up with the recommendations in this article, I conducted extensive interviews with experts at the major abrasives companies and referred back to earlier product tests in *Fine Woodworking*. I also leaned on my own experience as a long-time professional woodworker, and even on user reviews, as well as tests conducted by generous folks online.

To scale down the size of the topic, I left out the fine papers and films used for grinding and honing hand-tool edges. Those have been covered in past articles and will no doubt be revisited again in this magazine. I also left out wide-belt sanders, as they are mostly industrial tools found in big professional shops.

How sanding works (and doesn't)

Abrasives are cutting tools. In fact, at high magnification they look a lot like tiny chisels and sawteeth, and the wood dust they create looks a lot like tiny hand-tool shavings.

As you work your way up through the grits, each successive grit removes the deeper scratches left by the previous one, until the scratches eventually become invisible to the naked eye. Note

Backing materials

Paper is flat and inexpensive. Paper makes consistent contact with workpieces and is favored for flat sandpaper sheets. It is sometimes coated with resins (as with the 220-grit 3M paper at right) for added stiffness and durability.

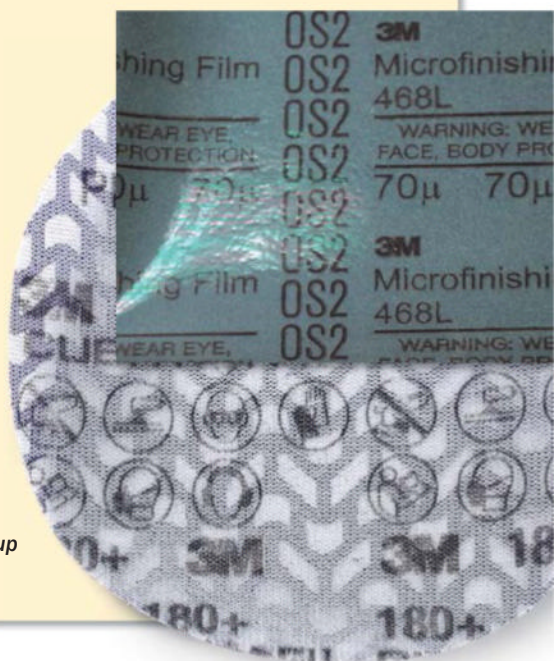


Cloth is durable and flexible.

Woven from cotton, synthetics, or both, cloth is the backer of choice for sanding belts. It also gives added durability to flat paper for sanding curves.



Plastic film is very flat. Pricier than other backers, plastic film excels when extreme flatness is critical, such as for sharpening.



Mesh is the latest innovation. Designed to improve airflow, mesh backers allow more-efficient dust collection, while preventing heat buildup and clogging.

Abrasive grains

Friability refers to a grain's capacity to fracture and expose sharp new edges. Therefore, friability factors into durability. (Abrasive grains courtesy of Norton.)



Aluminum oxide is the workhorse. AO is the most common and most affordable mineral used for abrasive grains, and it works well on everything from flat paper sheets to wide belts. It is both durable and effective.



Silicon carbide is best for fine sanding. SiC is the hardest of the commonly used abrasives. It's also the most brittle and least durable. It works very well for finish sanding and sharpening.



Alumina zirconia is best for heavy work. AZ is as durable as AO, but more friable under heavy pressure. So it is very effective for heavy stock removal with large disk sanders, for example.

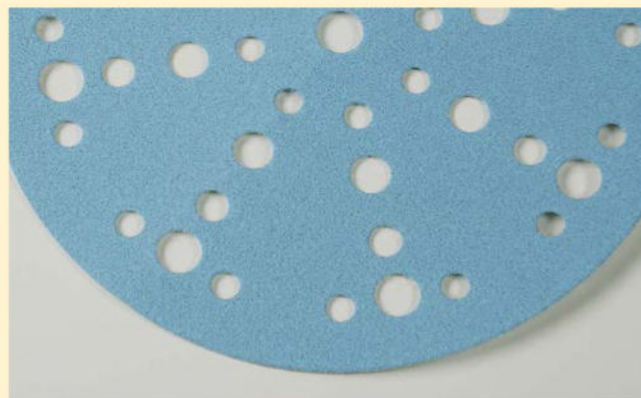


Ceramics are new and exciting. Ceramic abrasive grains are formed from tiny AO particles—in a variety of shapes, depending on the application. Aggressive and durable, ceramic abrasives tend to cost more than other types.

Special clusters and coatings



Clustered grains work well on RO disks. This recent innovation allows better airflow, preventing heat buildup and improving dust extraction. Clusters also tend to improve cutting action and performance overall, especially on random-orbit disks.



Anti-clogging coatings are common and effective. Unlike yesterday's anti-clogging stearate coatings, which were soapy in consistency and could cause trouble with certain finishes, today's stearates are clear, trouble-free, and more widely used.

that finishes tend to highlight sanding scratches, making some visible that would be hard to detect on bare wood. So it's very important that you sand the entire surface consistently with each successive grit to avoid seeing the deep scratches and swirls left behind by previous ones.

Beyond proper technique, the abrasives themselves play a big role in sanding success. According to Dan Bygd, abrasives application engineer at 3M, manufacturers aim for a performance trifecta of cutting speed, finish quality, and durability.

Heat and dust are two of the primary challenges coated abrasives face. Excessive heat can cause the bonding agents to release grains, which lowers the abrasive's efficiency. And loose grains can create overly deep scratches. Heat also softens resins in the wood, turning it into gummy pitch that can clog the abrasive, making a 150-grit disk perform more like a 320-grit disk, for example. The soft resin can also form high spots on the abrasive, which can leave behind deep marks and an uneven sheen.

A buyer's guide, tool by tool

HAND HAND-SANDING SHEETS

Use a block on bare wood. When prepping flat surfaces for a fine finish, back up the paper with a block of some kind to help maintain flatness. A block also works well for breaking sharp corners.

Hand-sanding follows RO sanding in many cases. It's also used on surfaces too narrow for an RO sander to balance on. And it works great for breaking sharp edges and smoothing finished surfaces between coats.

When dust is trapped between the abrasive and the wood, it not only blocks the sanding action but also accelerates the buildup of heat. This is why it is so important to attach dust collection to a random-orbit sander, for example, as well as all other sanding machines. Proper dust collection also keeps fine sanding dust out of the air and out of your airways.

A related challenge for manufacturers is consistent contact across the surface of the abrasive. The critical variable here is the backing that the abrasive is attached to. These backings vary widely, and I'll discuss them below.

Anatomy of woodworking abrasives

Coated abrasives have four main parts: the backing material, the base coat of resin that holds the abrasives on the backer, the abrasive itself (referred to as "grains" or "minerals"), and a final layer of resin (often called the "size" coat) that keeps everything in place. The individual components are varied to suit the tool and task. Some abrasives also receive specialized coatings, designed to release compacted dust and prevent clogging.

The resins used for bonding the abrasives tend to be proprietary, with manufacturers hesitant to share details. I can say that hide glue was the traditional choice, while today's resins are various types of polymers.

Go handheld between coats. Use light finger pressure to smooth finished surfaces. This will allow the abrasive to reach into slight dips or defects to ensure an even sheen across the whole surface.



RECOMMENDATIONS

There are a number of great sheet products for hand-sanding. The following have earned high marks from experts and users alike.

NORTON PROSAND

- Fiber-impregnated paper; AO grains; anti-clog coating
- Great all-around performer

3M PROGRADE PRECISION

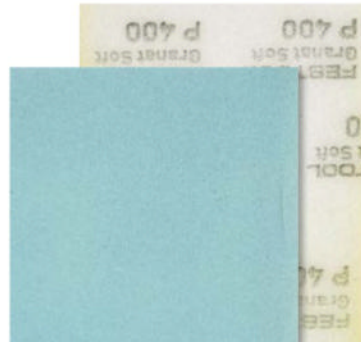
- Reinforced paper; ceramic grains; anti-clog coating
- Great all-around performer

FESTOOL GRANAT—FOAM-BACKED

- Foam backer; AO abrasive grains
- Good choice for sanding contours

KLINGSPOR PS11A

- Paper backer; SiC abrasive grains
- Good choice for sharpening and sanding between coats of finish



RO

RANDOM-ORBIT SANDERS

When used properly, an RO sander will leave a flat, smooth surface behind, and nearly undetectable sanding scratches. The widespread use of RO sanders, and the unique challenges they pose for abrasives, have driven innovation in this category.

RO sanding tips. Dust is the enemy here, inhibiting efficient sanding action and dulling the abrasive grains prematurely, so always connect your RO sander to a shop vac. Keep the sander flat, using only light hand pressure, and move it slowly and deliberately in straight paths to make sure you are removing material evenly and maintaining a flat surface.

Use an interface pad with mesh disks. Sold as a "hook saver" or "pad saver," this thin hook-and-loop disk prevents the hooks on the sander's own pad from extending through a mesh sanding disk and becoming damaged.



RECOMMENDATIONS

Godet has tested many of the latest and greatest RO sanding disks. Here are his faves.

3M XTRACT CUBITRON II NET DISK 710W

- Mesh backing; mix of AO and ceramic grains arranged in clusters
- Cut three times faster than other disks tested, but sanded surface was not as refined as others using same grit; excellent choice for surfaces that will receive a film-forming finish

MIRKA ULTIMAX LIGNO

- Blend of AO and ceramic grains arranged in clusters
- Left highest sheen of all products tested at 320 grit; best choice for penetrating oil finishes

DURA GOLD PREMIUM GREEN FILM

- Film backer; mix of AO and AZ grains; anti-loading coating
- Good value, comparable to Festool Granat for less

While many aspects and components of coated abrasives have not changed much in the past few decades, there are still significant improvements being made—namely, with mesh backing materials and ceramic grains.

Backing materials are a key component

There are four backing materials commonly used for woodworking abrasives: cloth, paper, film, and mesh.

Cloth—Woven cloth backings are much more durable than paper, making them better for belts. Cloth backers also work well for flat sheets in coarser grits. Cloth backers are made from cotton and various synthetic fibers. They are available in grades J, X, and Y, ranging from lightest

and most flexible to stiffest and strongest.

Paper—Paper is generally smoother than cloth and therefore makes more-consistent contact with the workpiece. It tends to be favored for surface prep with higher abrasive grits. Newer papers are often impregnated with latex to improve their flexibility and durability. These modified papers are usually a bit more expensive, but they pay for themselves with improved performance.

Like cloth, paper is also graded with letters, from A to F (lightest to heaviest). The heavier grades are typically reserved for larger machines, like wide-belt sanders.

Film—More costly are abrasives attached to plastic-film backers, which perform similarly to the modified papers but are even flatter, smoother, and more durable—and suitable for wet/dry applications.

Mesh—The latest backing material is mesh, which has earned praise for its performance on RO sanding disks. It is also used for some belts and sheets as well. The primary advantage of mesh is full-surface dust extraction. Greater dust extraction and airflow reduce heat buildup, which improves overall performance.



DISK SANDERS

Industry reps agree that mesh disks for RO sanding perform best with the use of an interface pad—sometimes sold as a “hook saver” or “pad saver.” Essentially it’s a separate hook-and-loop disk that goes between the sander’s pad and the abrasive disk. Without it, the hooks on the sander’s pad can pass through the mesh, contact the wood, and become damaged.

Types of abrasive grains

There are four main minerals/grains used in coated abrasives: aluminum oxide (AO), silicon carbide (SiC), alumina zirconia (AZ), and ceramics. By reading the packaging and the specs on websites, careful consumers can determine what is used in any given product.

Aluminum oxide—If the abrasive isn’t specified for a given product, it’s probably AO, which appears in everything from flat paper sheets to wide belts and is the most common mineral used. It handles most woodworking tasks pretty well and is also the most affordable.

AO is made with bauxite, the source mineral for aluminum. When crushed it forms a pyramidal shape, which helps to make it durable. It is also somewhat friable, which means its grains fracture over time, exposing new, sharp cutting edges. Bottom line: AO has been a proven performer for decades now, and it is also the least expensive commonly used abrasive grain.

Silicon carbide—SiC is the hardest of the commonly used abrasive grains. (Diamond is harder, but it is not commonly used for sanding wood.) However, it is more brittle than most, so it isn’t as durable. Formed with silica, its grains are icicle-shaped. SiC is generally recommended for abrasives with finer grits that are used for final surface prep and sanding between coats of film finishes. It is also employed in micro-abrasives used for honing edge tools.

Garrett Aryan, VP of sales and marketing at Maverick Abrasives, uses an analogy to compare AO and SiC. He thinks of AO as a No. 2 pencil: “You start with a sharp point, and it will write for a long time. And even when it has lost the initial sharpness, it keeps working.” SiC, by contrast, is more like a mechanical pencil. It has a fine point that will break away and expose a new one. But the points break with relatively light pressure, making SiC less durable overall than AO.

Alumina zirconia—AZ combines the durability of AO with the easy friability of SiC. However, the pressure required for friability is much higher. That makes it a very sharp, very durable

Disk-sanding machines use large self-adhesive disks, which haven’t changed much of late. Tough cloth backings and AO abrasives are still the go-to components, along with anti-clogging/anti-static coatings, but pricier AZ and ceramic abrasives can pay for themselves with their longer lifespans.



Disk changes can be difficult. High heat can dry the adhesive, making the disk difficult to remove. To minimize heat buildup, choose high-quality disks and clean them often during use.



Magic cleaning stick. Crepe sticks like this one do a great job cleaning embedded dust and resin out of disks and belts. Use them to extend the lives of disks, belts, and sleeves.

RECOMMENDATIONS

NORTON BLUEFIRE

- Very stiff cloth backing; AZ abrasives; coating not needed
- AZ abrasive is pricier than AO but will stay clean and sharp longer

KLINGSPOR CS310 X

- Stiff cotton cloth backer; AO abrasive; anti-static coating
- Solid workhorse disk

BELT SANDERS



Belts are used on handheld sanders as well as stationary units, including large edge-sanders. Our advice is similar for each. Not covered here are wide-belt sanders, a more industrial tool.

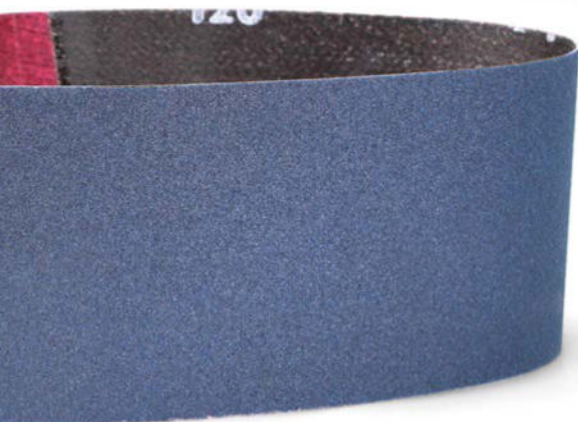
A few tips. As always, attach dust collection to the sander. Heat builds up quickly, so don't bear down hard, and take occasional breaks to let the belt and wood cool. Clean the belt (using a crepe stick) when it becomes clogged.

RECOMMENDATIONS

Sanding belts haven't changed much. AO abrasives are the workhorses, but slightly longer-lasting AZ is worth a try. The following are just two examples of many.

UNEEDA RKXO

- Heavy cloth backer; AO abrasives; anti-clogging
- Typical of Uneeda's AO belt options



NORTON PROSAND BLUEFIRE

- Heavy cloth backer; AZ abrasives; anti-static
- Slightly pricier due to longer-lasting abrasive

SPINDLE SANDERS



These sanders come with a variety of drum sizes and use stiff abrasive sleeves. AO is still king here, as it is for belts and most other shaping sanders.

User tips. Choose the largest available drum that will fit into the curve you are sanding, and clean the abrasive frequently with a crepe stick.

RECOMMENDATION

Klingspor offers solid choices in this category.

KLINGSPOR ALUMINUM OXIDE

- Heavy cloth sleeve; AO abrasives; open coat



abrasive that is most effective in the lower grits for heavy stock removal—such as thickening with a drum sander or shaping with a disk sander.

In short, AZ is more expensive than AO, but it's worth it on machines that need to remove a lot of wood, helping you avoid belt or disk changes.

Ceramics—Ceramic abrasives are a most recent and exciting innovation in abrasives technology, and definitely an area to keep an eye on for continued advancements. The ceramic grains are formed from nanoparticles of aluminum oxide by means of a heating and shaping process. Grain shapes can be tailored to specific uses, and they are very tough and hard to break down, so they keep cutting efficiently for a long time. When heat and

pressure do break them down, they do so with tinier fractures than other abrasive grains, which lets them expose new, sharp edges many times over.

According to Bygd at 3M, the first challenge for the use of these abrasives in woodworking was producing the right shape in the finer grains. The next was making them work with the unique motion of RO sanders.

To balance the speed and aggression of ceramic abrasives with the quality of the finished surface, and to reduce costs a bit, some manufacturers combine ceramics with AO. This may not be necessary in the future, however, as ceramic grain shapes continue to be refined.

Innovations and improvements

Manufacturers have also come up with performance and efficiency enhancements to their products.

Grain clusters—Some of the latest sanding disks have their grains arranged in distinct clusters. Air channels are created by the clusters, which help with dust extraction and help to dissipate heat, which in turn helps the abrasives last longer. Mirka's Ultimix Ligno clusters its abrasive grains in hourglass shapes, while 3M's Xtract Net Disk 710W uses a wavy pattern.

Stearate coatings have improved—Stearates are made from the metallic salts of stearic acid, such as calcium and zinc. They are designed to pull dust away from the workpiece and onto the coating, and then allow it to flake off. Manufacturers identify these coatings with terms like "anti-clogging" and "anti-loading." Norton calls its stearate coating "No-Fil." While past stearate coatings had a soapy look and a reputation for interfering with finishes, today's clear stearates cause no such problems. And they are used more commonly than ever.

Related to stearate coatings are anti-static treatments, also intended to reduce clogging. These are most commonly used on large, machine-based woodworking belts and disks, where static electricity can build and attract dust.

Future developments

Experts anticipate that current abrasive trends—namely, mesh backings, grain clusters, and, most importantly, the use of ceramic abrasives—will continue. According to Greg Mihaich, an applications engineer at Norton, ceramic abrasives are constantly improving, and new grains will be developed for specific applications, "leading to improvements in performance and surface finish across the board, from hand-sanding to wide belt sanding." The cost of ceramics will also come down as the technology proliferates. □

Adam Godet is a professional woodworker in Washington, D.C.



Abrasives are sold in rolls. The narrow belts are wrapped around the drum and secured at the ends.



User tips. Make shallow passes to avoid building up too much heat and loading the abrasive.

RECOMMENDATIONS

Roll abrasives are very similar to sanding belts. AO is the value choice, while AZ lasts longer. The following are two good choices out of many.

UNEEDA RKXO
•AO workhorse

KLINGSPOR CS411 Y
•AZ abrasive lasts longer than AO and costs more





Before

To demonstrate his upgrades, Finnigan chose to work on the Grizzly G0844 midi lathe, which he likes for its affordability, stability, and good power.



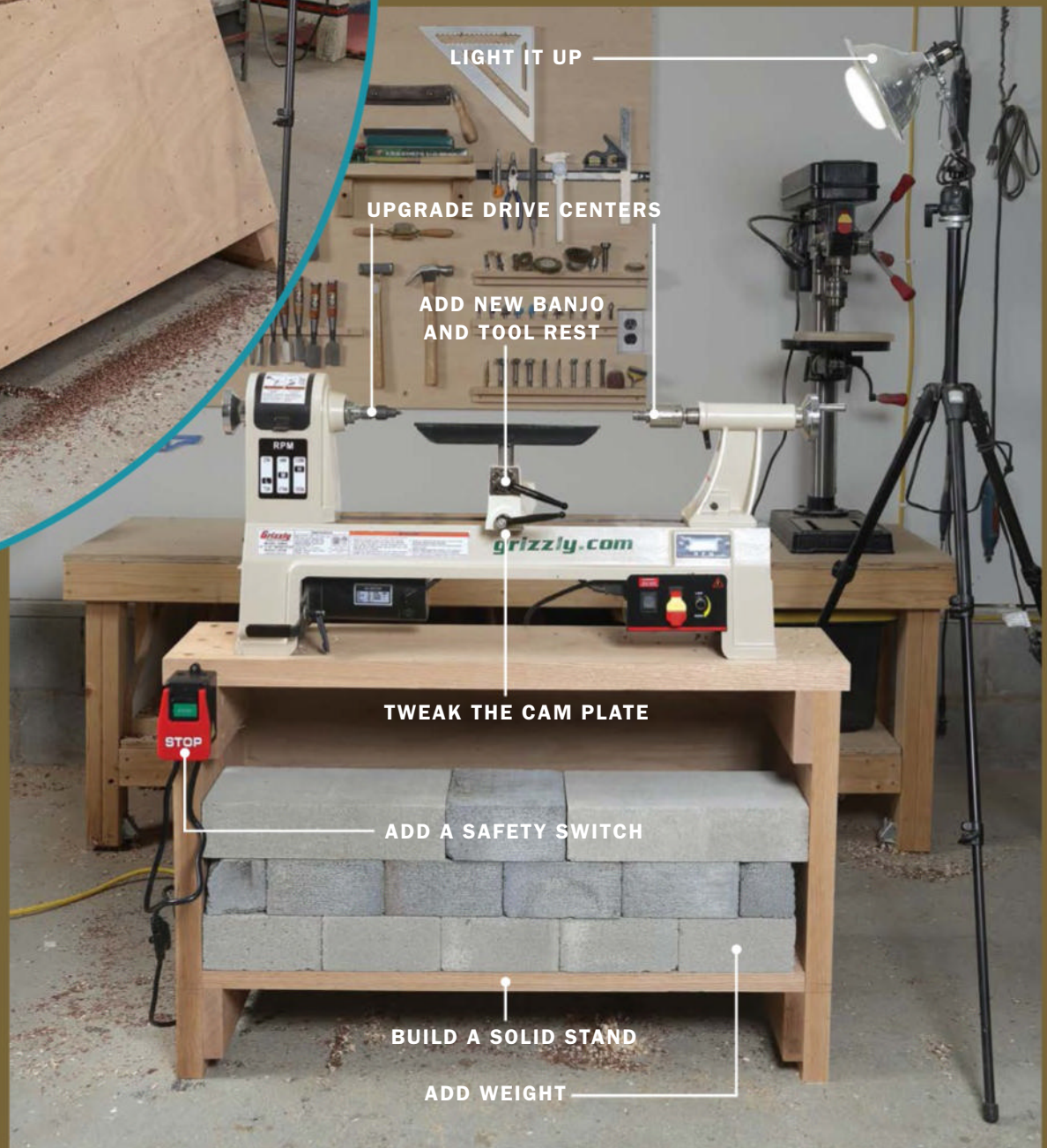
LIGHT IT UP

UPGRADE DRIVE CENTERS

ADD NEW BANJO
AND TOOL REST

After

Finnigan's improvements include building a solid stand, adding a new banjo and tool rest, tweaking the cam plate under the banjo, and adding a safety switch. Any lathe can be upgraded in this way.



Upgrade Any Lathe

Solid tips to elevate your lathe's performance

BY ANDREW FINNIGAN

Whether it's brand-new or has been rusting and gathering dust in the corner, a lathe can often be improved with a minimal amount of time, effort, and money. While aftermarket upgrades, accessories, jigs, etc., can always be added to a machine to improve something specific, I'd like to cover some fundamental things that will improve the overall stability, functionality, and safety of a lathe. A stable lathe that functions properly and adjusts easily allows you to turn more efficiently and more enjoyably.

Midi lathes, with a combination of affordability, modest footprint, and portability, tend to be a good first lathe purchase compared with full-size machines, which are more expensive, or mini lathes, which are less versatile. Once you've spent time with your midi and logged turning miles, you may want to make some upgrades to make the lathe perform even better.

After doing a tool test on midi lathes in *FWW* #307, I decided to use one of those machines to demonstrate a few simple ways to notch up the performance level of any lathe. The Grizzly G0844 is a good vehicle to demonstrate on because it is an all-around nice machine with good power. On its own it's a good investment. By building a solid stand for it, adding a new banjo and tool rest, modifying the cam plate under the banjo, and adding a safety switch, it's even better. Any lathe can be upgraded in this way.

The best part of these upgrades is that you don't have to do all of them or do all of them at once. The lathe you have may only need one or two of these tweaks. You can decide when to take the time and spend the money on upgrades.

Stability is a huge factor

I'll start with the stand. Whatever your lathe sits upon, it will perform better with ballast. Ballast is simply a heavy material used to improve stability and control. Ballast can be as simple as sandbags, loose stone in a box, or masonry. At some level, vibration is responsible for most turning frustrations. The addition of ballast greatly reduces vibration throughout the entire system, which leads to better work and less sanding, and makes for a much better turning experience.

Routine maintenance for old or new

Lathes often come from the factory greased and with edges and corners that are still fairly sharp. The bedways, the tailstock, the headstock, the underside of the banjo, and the top of the tool rest should be smooth and deburred. Older machines often get rusty and/or grimy and develop sharp edges and nicks. Remove the grease and debris with a rag, and file or sand sharp edges. The cam mechanisms that lock the banjo, tailstock, and headstock (if sliding) should all clamp down easily, tightly, and within a range that does not approach too closely a vertical position.



Break sharp edges. Use a piece of 220-grit sandpaper and potentially a file for more aggressive removal. Edges only need to be dulled so as not to hang up motion or break skin open. Major material removal or rounding over is not necessary.



Clean and oil at the same time. A final cleaning with a rag and a light lubricant such as sewing oil or 3-in-One allows everything to move smoothly and prevents rust and sawdust buildup.



Adjust handles. Tightening or loosening the locknut under your cam's locking plate lets you alter your locking range.

Add a sturdy base

This stand is sized specifically for the model of midi lathe Finnigan is using and for his height. A good stand should be stoutly built, joined with construction-grade fasteners like lag screws and framing screws, and have plenty of room for ballast. It should fit the lathe without being so massive that turning access is hindered.

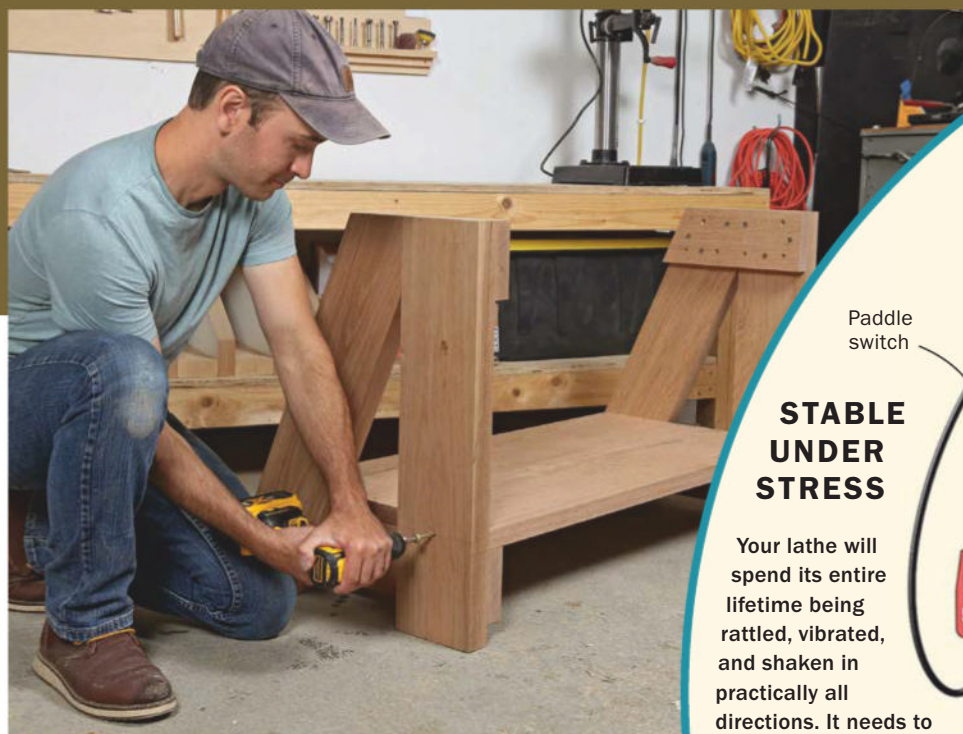


Two ends and a shelf. Each end has two legs attached by cleats at the top and bottom. The shelf sits on the top of the bottom cleats. Screws are driven through the shelf into the cleats, and through the legs into the ends of the shelf.

Top it off. The top sits atop the legs and top cleats, and it has a nailer on the underside for screwing the back to later. Set the top in place and go overboard screwing it in place. Finnigan screws from the top down into the top of the legs and cleats. He also toe-screws through the cleat and into the top from underneath.



Add a back. Sheathe the back with $\frac{3}{4}$ -in. plywood for shear strength to cut down on vibration and keep chips and shavings from filling up the stand.



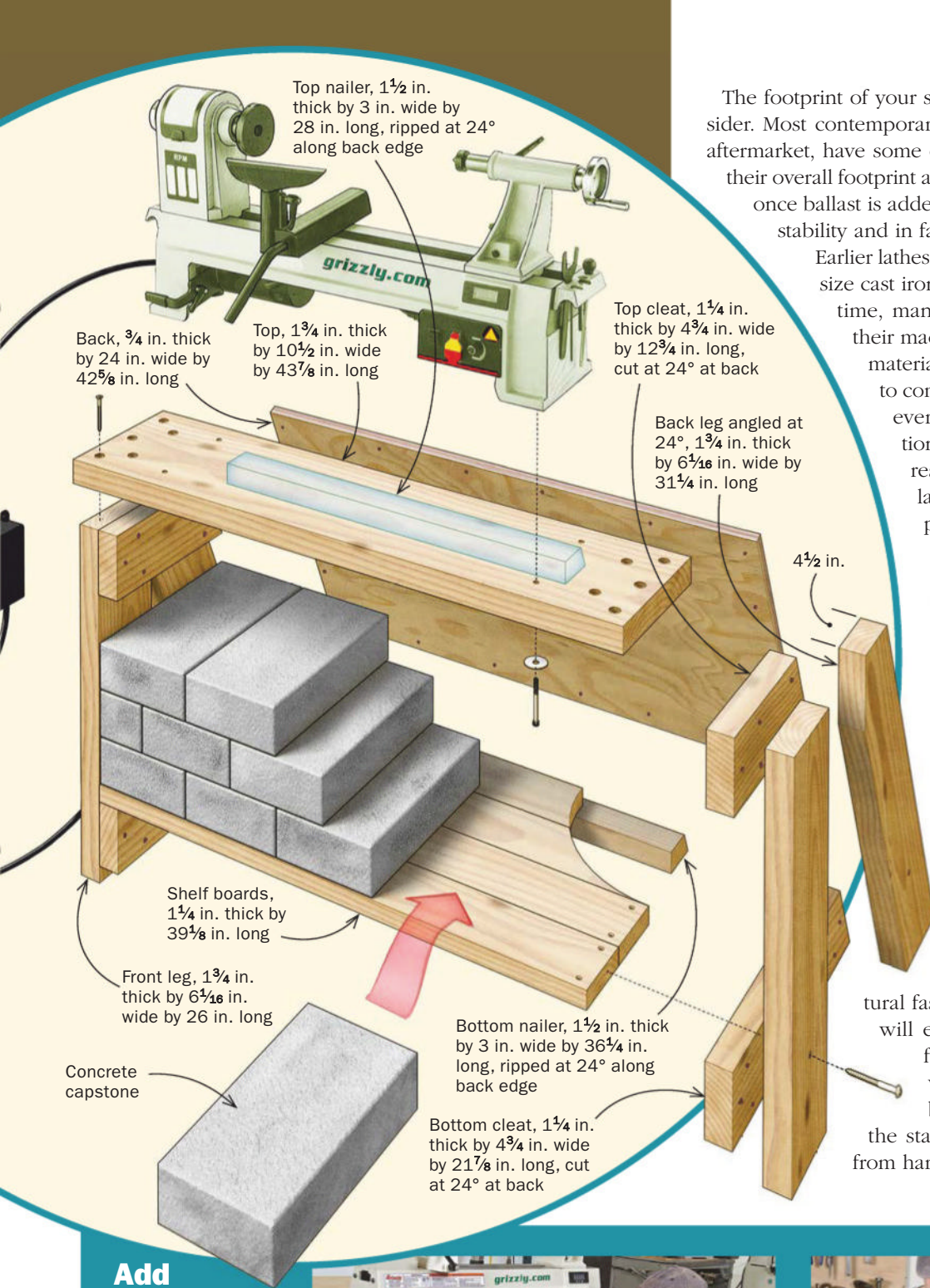
Paddle switch

STABLE UNDER STRESS

Your lathe will spend its entire lifetime being rattled, vibrated, and shaken in practically all directions. It needs to be positively attached to a large, stable base, such as a bench, heavy legs, or a dedicated stand like this one.



Attach the lathe to the stand. Each lathe is different. Some have blind holes you have to screw into from underneath, and some have visible holes in the top. Set your lathe in place on your newly built stand. Mark the holes to secure it in place, drill into the stand, and attach the lathe to the stand using grade 5 bolts and washers.



The footprint of your stand is another important factor to consider. Most contemporary commercial stands, whether stock or aftermarket, have some degree of rake and/or splay to increase their overall footprint and make the lathe more stable. However, once ballast is added, the larger footprint is unnecessary for stability and in fact can get in the way of use.

Earlier lathes were generally very stocky, built in over-size cast iron, and were fairly square in design. With time, manufacturers have repeatedly redesigned their machines to use fewer, lighter, and cheaper materials, and lathe footprints have expanded to compensate for the decreasing weight. However, a wider footprint is not a true solution to the problem of a lack of ballast. The result can be a light, somewhat unstable lathe that takes up too much room and pushes the user farther from the lathe.

Stand your ground

Take height into consideration when modifying your lathe setup. Turning is physical, and hunching over or standing uncomfortably has a way of adding up. As a guideline, the center of your spindle should land just about at elbow height. If you're building a dedicated stand, this is easy to account for in plans. But if your lathe is mounted to legs or a bench, you may need to raise the lathe or build a platform you can stand on to bring you up to height.

I built this stand with common solid 5/4-in. and 7/4-in. red oak and plywood. It's important to use structural fasteners, as the stand is rather heavy and will endure stresses. I used lag screws and framing screws to construct the stand, wood screws for the back, and grade 5 bolts with washers to attach the lathe to the stand. All these products can be sourced from hardware stores and lumberyards.

Add ballast

Finnigan's go-to for ballast is solid concrete capstone. It's inexpensive and clean, comes in a variety of sizes, is easy to work with a cold chisel and mallet if you need to size it, and can be rearranged and reused easily.



Size your stand

A general rule of thumb is that the center of your spindle should be approximately elbow height when you're standing with your body relaxed.



Room for improvement

There are many places you can look to improve a lathe's function: the tool rest, the banjo and its cam plate, the drive centers, faceplates, the on/off switch, and lighting.

BETTER BANJO

The only job a banjo has is not to move. If your banjo can't hold its adjustment, or if you can hit it out of place when it's locked down, consider an upgrade.



In with the new—but keep the old. Finnigan swapped out his original banjo for the holding power of a Oneway banjo, but he kept the original to use in a double-banjo setup.

I sized the top slightly wider and longer than the lathe's own footprint—enough to accommodate bolts and screws but not so much as to hinder access to the lathe as I turn. The thick legs don't splay, but the back legs rake out enough to allow for concrete blocks to fit in the stand. The shelf is suspended 6 in. off the ground for foot access, and the back is sheathed in $\frac{3}{4}$ -in. plywood.

Consider your tool rest

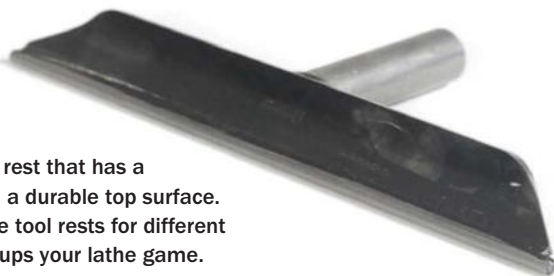
The tool rest should create a stable, adjustable pivot point to support your cutting tool. The tool rest and banjo are the most frequently adjusted working portions of your lathe, and they should move easily and lock securely with minimal effort. On many lathes, unfortunately, the supplied tool rest is designed without ergonomics in mind. And its construction often is less than robust, so eventually it will need replacement.

Dway, Best Wood Tools, Oneway, and Robust all make nice aftermarket tool rests. Robust's tool rests, for example, are ergonomically designed for extended use, give good accessibility to the work, and have a hardened top bar that resists denting and marring.



TIPTOP TOOL RESTS

Look for a tool rest that has a low profile and a durable top surface. Having multiple tool rests for different functions also ups your lathe game.



Wider and stronger. A streamlined design like that of the Robust tool rest gets you closer to your work. A wider rest also gives you a longer working range, so you don't have to stop and reposition as often. It also has a hardened top bar that will extend its life.



Double-post setup. With an extra banjo, you can use a double-post tool rest. It will give you support on longer pieces without interruption.

Add a curved rest. A tool rest with a curve supports your tool when you are cutting into concave or convex surfaces, such as interiors and exteriors of bowls.



PREFERABLE PLATES

Whether you are using the banjo that came with the lathe or upgrading to an aftermarket model, check the cam plate under the banjo. The plate should glide smoothly under the bedways and lock securely. If not, make a new plate or shore up the old one.



Back up an existing plate.

There wasn't much flex in the Grizzly cam plate to begin with, but Finnigan eliminated what little there was by adding a washer between the plate and the locknut to stiffen it up.



DIY cam plate. Because the cam plate that came with the Oneway banjo didn't fit the Grizzly bedways as well as Finnigan would have liked, he opted to make his own plate. He drilled four $\frac{1}{8}$ -in. holes halfway into the stock with lubrication and at low speed. He then hammered brass rod into them to create small guides to keep the plate from rotating as the banjo moves.



SWITCH IT UP

To easily turn the lathe off without having to use your hands, install an inline paddle switch that you can hit with your thigh, knee, or other body part.



Beef up your banjo

A good banjo is an essential counterpart to the tool rest. If your banjo is subpar, tune it up or replace it. The banjo is held in place with a plate that clamps from under the bedways and locks with a handle on the front of the banjo. Banjos vary in how hard you must lock them down to achieve security. The variation usually depends on how far the banjo is pulled from the bedways.

Often banjos simply can't hold their adjustments consistently. If you're able to move any part of your tool rest or banjo with a good tap or hit when it's fully locked down, that's a dangerous situation, and you need a better banjo. If you do decide to replace your banjo, however, keep the one you are replacing. Even a poorly designed or poorly made banjo can be useful when paired with a good one in a double-post tool-rest setup. The original Grizzly banjo held its position well, so it will be great in a dual setup.

In my experience, some of the better aftermarket banjos are those made by Powermatic, Oneway, and Robust. I find Oneway's banjos hold very securely at nearly any position with consistent locking pressure. Some of these companies will also fabricate cam plates or customize their parts to fit your machine.

SWAP OUT YOUR CENTERS

A lathe often comes with a four-prong drive center and an undersize revolving live center (above). Finnigan advocates replacing them with a friction drive and live center.



Ditch the spurs. If your lathe comes with a pronged drive center, invest in a friction drive and live center (below left). Oneway and Robust have mastered the system by making friction drives and live centers that are machined to identical cuplike rings with a centering pin.



Whether you're replacing your banjo or just enhancing the cam plate on your existing banjo, be sure that none of the hardware beneath the cam plate is obstructed by anything within your bed-way and that you're using a plate that fits your machine.

A bit more on cam plates

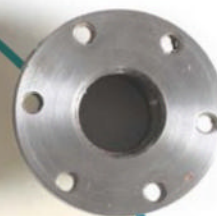
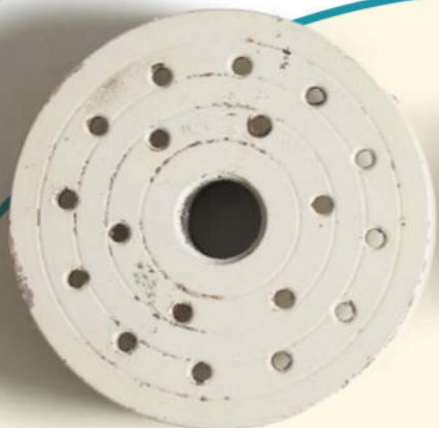
The cam plates on many contemporary lathes skim on quality and performance. They may be undersize, not rigid enough, made of a cheap metal, and/or shaped poorly. Round plates are easy to produce and never catch during movement, but they provide little surface area for the plate to clamp against the underside of the bedways.

On smaller machines, it's possible to replace small round cam plates with a grade 8 washer.

If you are comfortable with basic metalworking, a square or

FACEPLATES ABOUND

Having a selection of high-quality steel faceplates allows you to accommodate different-size workpieces and to have multiple pieces mounted on different faceplates at the same time.





LIGHTING

Always make sure your work area is well lit with overhead lights and movable task lighting that you can direct wherever you want it.

rectangular piece of mild steel thicker than your existing plate, with metal dowels to locate it, and drilled out in the center, makes for a great plate. Or you could have a metal shop make the plate.

The flip of a switch

Having a large, easily accessible paddle switch near you while you work is a very useful safety feature. A simple inline paddle switch can be found at many hardware stores and online retailers. It installs easily by plugging in between your machine and the wall, and

it can be mounted so that it's within easy reach. Although this switch does not bring the machine to an immediate halt, it gives you the ability to turn it off without using your hands.

Driving force

Many lathes come with a four-prong drive center and an under-size revolving live center. These are often of poor quality and made to an old, since-improved design. I believe that most common spindle turning can take place on friction drives. Friction drives are simply centers that rely upon friction to drive instead of a positive attachment, such as that found in a two- or four-prong spur center. Except for larger-diameter bowl and spindle turning, multi-prong spur centers provide an unnecessary amount of drive to a workpiece.

Good material, turned at proper speed with sharp tools, should require only a minimal amount of effort to shape. Once friction centers are seated, minimal pressure between centers provides ample power for turning and gives you the ability to flip your material easily.

Never too many faceplates

While your lathe may come with one faceplate, having a variety of them is very useful. Different sizes provide proper support for a range of different-size work. It's also convenient not to have to make one plate work for every project and to be able to have more than one item ready to turn on a faceplate.

Light it up

Lastly, lighting is enormously important in turning but is often overlooked. Overhead, spot, and/or task lighting should be used. None of this needs to be expensive or complicated.

My setup consists of one cheap LED shop light suspended directly over the lathe with rope that allows the light to be lowered and raised. This not only lets me flood the area with light in a way that won't cast shadows on my work, but to control the sharpness and intensity of the light as I raise and lower it. For detailed work, I favor having the light very close. For general work, a less harsh light makes working easier. Additionally, I direct several mobile task lights as needed. □

Andrew Finnigan is a woodturner and furniture maker in Kerhonkson, N.Y.



A table saw is often seen as a must-have for any shop, but not having one shouldn't be a barrier to taking up the craft. While a table saw does perform a variety of valuable tasks, for the people who don't have the space or budget for one, or who are uneasy about using one, there are workarounds.

I'm not against using a table saw, and I've owned table saws in the past. Despite all the tasks a table saw can do, though, I currently don't use one in my shop. The prime reason is that I don't like the amount of space it requires. Taking into account the size of the machine plus the infeed and outfeed areas, the average

No Table Saw? No Problem

With the right handheld power tools and other machines, you can do without this shop fixture

BY VIC TESOLIN

Cutting across the grain

You can make accurate, repeatable crosscuts without a table saw, either using a miter saw or a track saw on a multifunction table.



Strike a line. All accurate cuts start with good layout lines. Reliable squares and a good pencil are a must.



Miter-saw setup. An auxiliary table with a back fence attaches to the miter saw, creating a larger work surface and zero-clearance support for crosscuts. It also allows you to easily add stops for repeatable results.

cabinet saw's footprint can be up to 160 sq. ft. if you plan on processing sheet goods. That's 40% of a two-car garage.

When I did have a table saw, it was often cluttered with project parts, tools, and other shop detritus. It was also used as a second work surface with extremely poor work-holding solutions. Not having a table saw works well for the type of woodworking that I do, and I don't miss it. Instead, I have two smaller, multifunction work surfaces that, combined with a small collection of power tools, allow me to do any kind of woodworking, with any power or hand tool I choose.

Ultimately, you can use whatever tools and techniques you want in your shop. You may prefer to use a table saw, but you certainly don't need one to make beautiful things. For that matter, you also don't need a single power tool, but that's a different article. Here I'm focusing on all the things you

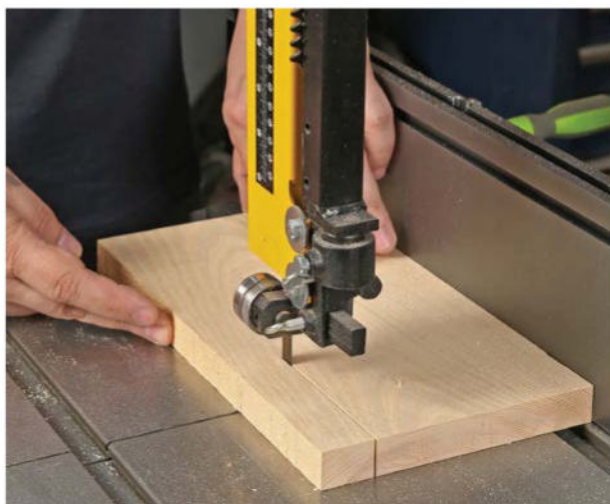


A hinged guide rail and track saw. Working on an MFT (multifunction table) makes it easy to square up and secure workpieces against a fence and stop. With the flag stop set, you can ensure repeatability and accuracy.



Cutting with the grain

As with crosscutting, there are quick and easy options for rip-cutting on the bandsaw and with the track saw.



Bandsaw rips. When ripping solid wood, a bandsaw, with no potential for kickback, is safer than a table saw. A hand plane makes short work of removing machine marks left by the bandsaw. A couple light passes do the trick.



A track saw works too. To rip your board with a track saw, work on a sheet of rigid foam insulation. It grips the workpiece and serves as a sacrificial cutting surface.

can do with other power tools or machines such as a track saw, miter saw, bandsaw, and handheld router. Here's how I do it.

Ripping and crosscutting

When I studied furniture design and making at Rosewood Studio, we were strongly encouraged to rip solid wood on the bandsaw. Ripping can go pear-shaped on the table saw, especially if the saw is operating without a riving knife. Ripping can release tension and cause the wood to move. If the kerf closes on the spinning blade, the wood can be thrown back at the operator at a high rate of speed. Space and safety are on a bandsaw's side. Even a large bandsaw has a much smaller footprint than a table saw, and it is safer because with the blade running down toward the table, the wood has nowhere to go.

An argument against using the bandsaw is that the resulting surface is not as nice as that created by a table saw. This may be true, but both

Two ways to add angles

Miter saws produce miters and bevels just as easily and cleanly as a table saw does, as do track saws and bandsaws.



Miter saw and a fence. Using double-sided tape, add a sacrificial fence to the existing fence on the miter saw to make a quick zero-clearance setup. With the sacrificial fence in place, cut accurate bevels by lining a pencil mark up to the kerf in the fence.



Miter saw and a jig. To cut miters on short and long pieces alike, add an auxiliary table with a back fence to the miter-saw table and clamp a 45° fence to that. A small, leather-faced holding stick screwed to the angled fence puts a tenacious grip on the workpiece and keeps your digits far from the blade.

machines will leave their scars behind that need to be jointed, planed or sanded away prior to finishing. You have to do a cleanup pass no matter which method you use.

No bandsaw in your shop? That's OK! You can easily rip solid wood with a track saw fitted with a rip blade. With the

track saw, the wood is stationary and your hands are on the tool moving over the wood. To me, moving a tool across the wood is easier than pushing wood past a spinning blade.

When it comes to crosscutting, that can easily be done with a track saw and work table. Multifunction work

tables come with a network of holes, fences, and stops that help to line up cuts and all but guarantee accurate and repeatable cuts. You can also create an auxiliary table for a miter saw that will convert a tool typically suitable for "rough" work to one that is capable of furniture-quality cuts.

Miters and bevels

For cutting miters, the consistent answer for me is to use the miter saw. I always try to get the fit off the saw, but I have the option of tuning up a miter with a shooting board and a hand plane.

I use two methods for cutting bevels depending on the

Beveled ribs

Crosscutting a bevel or miter on the end of a board is one thing, but when you want to rip a bevel along the board's length, you have to change your plan of attack. For this, Tesolin turns to the track saw or bandsaw.



Track-saw beveling is a breeze. Working again on a piece of rigid foam insulation, line up the track with your marks, tilt the blade, and make your cut. The foam keeps your workbench from being scarred with kerf marks.

direction of the cut. In the case of a rip cut, I often set the table of my bandsaw to the bevel angle required and then push the piece through. If I'm going across the grain, then the miter saw or track saw is the answer, depending on how long the cut is. I make short shadow-box-type cuts with the miter saw and the multifunction workbench, and I make longer cuts with the track saw.

Dadoes, grooves, and rabbets

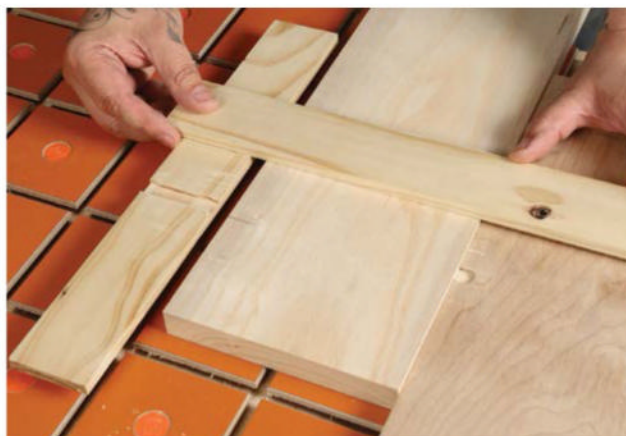
I turn to the router for most dadoes, grooves, and rabbets. A simple router with a straight piece of plywood as a fence can make short work of cutting both stopped and through-dadoes. Add a plunge base and it is simpler still to make stopped cuts; it is also a lot safer than dropping a piece of wood on a spinning table-saw blade. You can even clamp two components together to cut the

Tilt your table. Making a bevel cut on the bandsaw is as easy as tilting the table. Switch the bandsaw fence to the right side of the blade so that gravity can help you keep the work against the fence.



All kinds of dados

Whether you are cutting stopped or through-dadoes, you don't need a table saw. A handheld router will get you to the dado of your dreams.



Running through. The router makes cutting through-dadoes a simple task. A T-square fence clamped in place not only guides the router but shows exactly where the cutter is, so lining up to a mark is simple.

dadoes at the same time. This technique ensures that the joint is located in the same place on both pieces.

When using the router to cut grooves, I use a straight bit and the fence that comes with the router. Often these fences can be micro-adjusted for precise work. As with dadoes, a plunge base on the router can easily create stopped cuts.

Rabbets can be routed with the same setup; however, the fence needs to have an adjustable gap (or a sacrificial face



Back up your cut. Placing a spoil board at the end of the cut ensures the exit cut is clean.



Stop your cut. Add a stop to the spoil board to achieve a stopped dado. The router leaves a rounded end, but some quick chisel work will square it off.

Grooves and rabbets

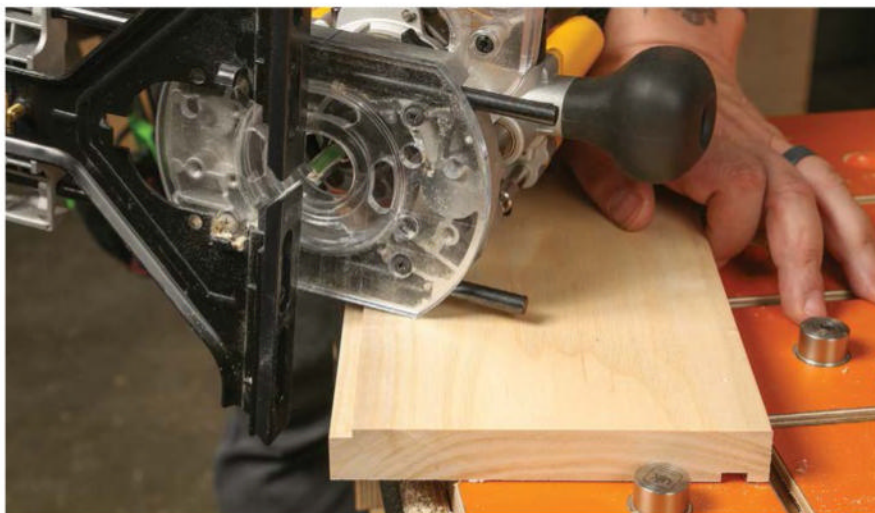
Turn again to your handheld router to cut any grooves or rabbets you may need.



Rely on your fence. Most routers have a fence that allows you to control the position of the cutter with reference to a board's edge. This fence makes it easy to cut a groove—just set the fence and run it along the edge of the board.



Two ways to cut a rabbet. For routed rabbets, one approach is to use the fence, but opened enough at the center to allow the bit to make a partial cut. Alternatively, you can chuck up a rabbet bit to easily cut rabbets, riding the bearing on the edge of the board itself. Buy a bit with different-size bearings to control the width of the rabbet.



added to it) so that the straight bit can make a partial cut into the workpiece. Another option is to skip the fence and use a rabbet bit. To cut rabbets of various depths, you can buy a single bit and several bearings for it of different diameters.

When making stopped versions of any of these joints, the router bit will leave a rounded end, but that can easily be straightened with a chisel. When using a table saw to make similar stopped joints, you end up with a ramp that you need to flatten, which is more work.

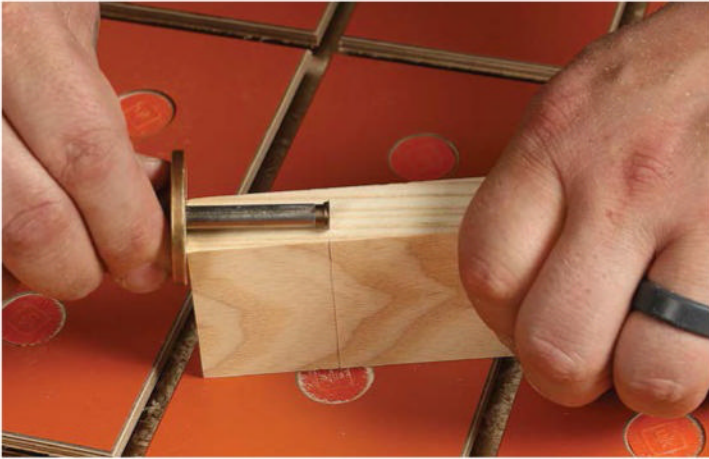
In the case of through-cuts, you can use a router mounted in a table if you have one. You can also cut all of these joints using a track saw, but because you can't mount a dado blade in one, you will have to make multiple passes to achieve the same result.

Tenons without a table saw

The way I've been working for years is to crosscut the shoulder of a tenon in one

Two-step tenons

To cut tenons, you need to cut the shoulders and then the cheeks. For the shoulders, you can use a handsaw, a miter saw, or even a track saw; then move to the bandsaw to zip off the cheeks.



Accurate marking. Before you can begin cutting shoulders for a tenon, you must scribe the shoulder lines onto the workpiece.



Shoulders by hand. Sometimes ditching the machines and cutting shoulders with a handsaw is most efficient, since there is no setup time.

of several ways: track saw, miter saw (with a spacer), or handsaw, with a move to the bandsaw to cut the cheeks. I keep a scrap of the same thickness and species to check my fence positioning before cutting the joints. If the tenon has elements of rake and/or splay, then I'll often mark the joints and cut them by hand. I'm not a production woodworker, and this method is often fastest for one-off projects. □

Vic Tesolin is a woodworker and teacher in Hamilton, Ont., Canada.



Shoulders via the track saw. The advantage of cutting shoulders on the track saw is that you can lay like pieces side-by-side and cut multiple shoulders at once. Set your blade depth and go.

Shoulders via the miter saw. Most miter saws have a depth control that can be used to cut a shoulder. Set the stop, and place a spacer between the fence and the workpiece to get a complete cut.



That's cheeky. The bandsaw is well suited for cutting the cheeks of a tenon. With the aid of a fence to keep things straight, the surface right off the saw is usually good enough to go straight to glue-up.

Rehab a Vintage Backsaw

These techniques will help you maintain your saw for peak performance

BY MARK HARRELL



Elbow grease. You can tune up a saw you own already or turn a flea-market find into a high-performance hand tool by cleaning off rust, tightening the handle, and straightening the toothline. All you need is a few simple tools.



Used and abused. Harrell picked up this vintage 14-in. Simonds tenon saw from a local dealer. Covered with decades of grime, it had a loose handle and a wavy blade.

Before and after

The goal here is not to make an old saw look brand-new, but to help it cut sweetly again.



Ready for action. After a relatively rapid overhaul, plus a sharpening job (see Harrell's article in FWW #250 for that process), the saw made flawless cuts.

Many a vintage hand-saw has been passed over unnecessarily at a flea market, collectors event, or online marketplace. The handle might have been loose or broken, or the blade might have been a little rusty or wavy. Unbeknownst to many woodworkers, many of these formerly great tools are just a few steps away from working beautifully again.

Among the lost arts of traditional woodworking is how the thick spine (the “sawback”) on a vintage backsaw can be manipulated to straighten and retension the blade (the “plate”). Positioning the sawback correctly will also lock a shifty handle in place, solving two problems at once.

While this basic knowledge was common among our predecessors, there are quite a few modern users who don’t know how this works, or how easy it is to do. Removing rust and grime is just as straightforward. I teach all of the above in saw clinics around the United States, and I’ll cover the main points in this article.

You can also fix a broken handle pretty easily by patching on some new material and reshaping the profile, though I won’t go into that here.

If you already own a vintage saw that’s working great, it’s still likely to go out of tune at some point when you push it too hard or drop it. Changing temperatures can also shift the parts over time. So I will also show you how to keep your vintage backsaw

(or any modern saw built similarly) in good working order for as long as you own it.

You already own most of the tools needed to rehab and maintain a backsaw. The rest are widely available.

The final part of a full backsaw restoration job is resharpener and resetting the teeth, another lost art that is surprisingly straightforward. I covered that process in a 2015 article, “Sharpen Your Own Backsaw” (FWW #250).

The difference between old and new backsaws

Before we get into the step-by-step, a bit of background is in order. Backsaws have thinner saw plates than other traditional handsaws. A thin plate is easier to push through hardwoods, and it helps the saw to make furniture-grade joinery cuts. Running along the top of that thin blade is the sawback, a thick spine that keeps the plate rigid and provides additional mass, momentum, and balance.

Until a few decades ago, backsaws were made with a folded sawback—either brass or steel—which was sprung tightly onto the saw plate. This old technology is brilliant in its simplicity and effectiveness. These backs not only provide the benefits listed above, but they can also be manipulated to straighten the blade.

The handles on vintage backsaws have a mortise that receives the sawback as well as the plate. Seating the sawback in that mortise stabilizes the handle and makes the plate more rigid at the same time. Many people try to tighten loose handles by cranking on the fasteners alone, marring their screwdriver slots in the process and sometimes even cracking the wood.

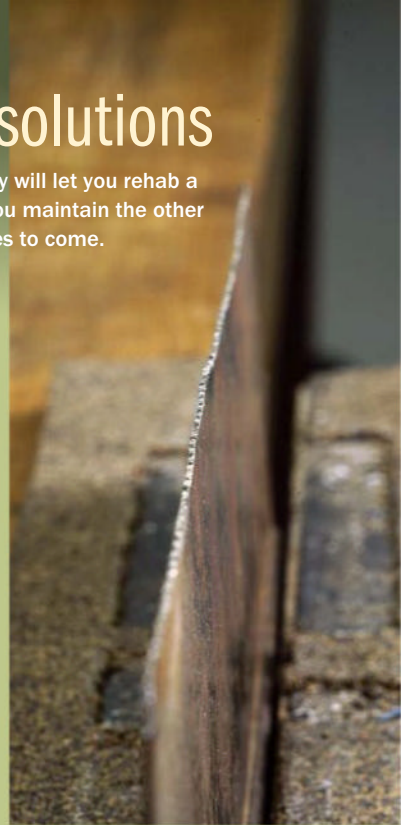
Many modern saws are different—In the 1990s, when

Problems and solutions

The techniques in this article not only will let you rehab a vintage backsaw but also will help you maintain the other saws you own, new or old, for decades to come.



Misuse. This smallish saw is being asked to cut through thick hardwood, which can cause the blade to kink. Note that the user’s elbow is not in line with the saw, which is another reason that saws become kinked.



Wavy toothline. A backsaw can pretty easily develop a wavy toothline from being dropped, stepped on, or misused. But a crooked toothline is easy to straighten on a vintage saw.



Loose handle. The most common cause of a loose handle is a sawback (the thick spine atop the blade) that has pulled away from the handle. This is also easy to fix.



The magic of a vintage sawback. Unlike many modern sawbacks, which are epoxied permanently onto the blade, the spines on older saws are sprung onto the plate. That’s what allows them to be manipulated—to both straighten the blade and tighten the handle.

Remove the handle and sawback

To restore the blade plate, you'll need to remove the handle and the sawback. Here's how the pros do it.



Hot-rod a hand screw. Drill a large hole in one jaw of a hand screw clamp, and attach cork rubber with spray adhesive. Place a plastic bag between the rubber layers, and tighten the clamp overnight. Then cut away the cork rubber covering the hole.



Tune your screwdriver. To avoid marring the brass bolts, your screwdriver must fit them very well. Choose a wide screwdriver, and adjust its thickness to fit the screwdriver slots snugly.

interest in hand tools was growing rapidly, modern saw makers realized that they could lower the price of top-quality saws by milling a tight-fitting slot in the sawback—instead of folding it—and epoxying the plate permanently into the slot. This production-friendly technique meant that these high-performance backsaws were now accessible to more people. The static sawback also keeps the saw plate locked firmly in place and helps (somewhat) to prevent it from kinking under duress.

There's a downside, however: Static-backed saws are difficult to repair. If one of these is dropped or used improperly and you see a waver, bow, or kink along the toothline, your best bet is to send it back to the manufacturer for repair or replacement. If the manufacturer is no longer in business, there are reputable saw technicians who can true it up, sharpen it, reset the teeth, or whatever else you need. Here are a few recommendations: Matt Cianci at TheSawWright.com, Bob Page at LoonLake

Tools and supplies

You already have most of what you need to rehab and maintain a vintage backsaw. Here are a few basic things you might not have.



Handle-bolt helper. It can be tough to unscrew the brass handle bolts, which tend to spin in place. But you can adapt a common wood hand screw to hold them still while you unscrew them.



Cleaning supplies. There are lots of products for cleaning steel and brass; these are the ones Harrell relies on most. Clockwise from back left: rubbing alcohol, Wizards Metal Renew polish, WD-40 lubricant, a small razor-blade scraper, abrasive pads, and a cleaning and polishing block.

DIY saw vise. To turn any woodworking vise into a saw vise, add 18-in.-long sections of angle iron, with rubberized cork adhered to them.





Remove the bolts. The far jaw of the hand screw locks the back end of the bolt while you reach into the hole to loosen the slotted side.



Pull off the handle. The handle will slide off, giving you a clear picture of the built-up grime on the parts.



Lubricate the sawback. Squirt some oil or WD-40 inside the sawback and along its seams, and leave it overnight to soak in. This will help the back come off without bending.

Toolworks.com, and yours truly at SawSharp.com.

The difficulty of repairing static-backed saws is why my former company, Bad Axe Tool Works, continues to build backsaws with a folded, sprung sawback. Although it makes the saws a little pricier, it allows users to straighten the toothline and firm up the handle on their own.

Remove the handle

The first step in rehabbing a vintage-style backsaw is removing the handle. This makes the rest of the steps easier, including removing rust or scale from the plate.

If the fasteners are frozen, your screwdriver will only spin them around without releasing them. That brings us to trick number 1, which involves a wooden hand-screw clamp, altered slightly so it will lock down the back of a handle bolt while letting you twist the slotted end. You'll need some cork rubber (available at craft stores and McMaster-Carr). There is a PSA ver-

sion of the cork rubber, but I find its adhesive to be weak and impermanent, so I buy plain cork rubber and use 3M spray adhesive to attach it.

Make sure your screwdriver tip fits snugly into the slotted nut/bolt of your vintage saw. It should match in both width and thickness and reach to the bottom of the slot. These

fasteners are usually brass and are easily marred or deformed, which can make them difficult to tighten. Start with a screwdriver that is a close fit, and then alter it on a bench grinder if necessary.

If the nuts are too damaged to use, you can cannibalize better ones from an otherwise seriously damaged saw. There



Pry off the sawback in stages. Clamp the blade with the toe end of the sawback sticking up a little and the back end firmly against the vise jaws. Then use a crowbar upside down as shown, raising its handle to begin prying the toe end of the sawback upward. (Note the slotted square of leather that protects the sawback.) You'll need to reposition the saw in the vise a few times to pry the back high enough to pull it off by hand.



Clean up the parts

Go easy. The goal is to clean up the handle and sawback without removing their vintage character. Smoothing the blade also eliminates unnecessary friction when cutting.



Scrape away the grime line. Use a razor to scrape away the line of grime and debris that builds up where the back meets the blade.



Abrade the blade gently. With alcohol as a lubricant, use abrasive pads to begin removing the grime on the blade. You can do this by hand or with the assistance of a random-orbit sander placed over the pad.

are lots of these on eBay, available for a few dollars each.

Remove the sawback

The next step is removing the sawback, which will give you full access to the plate. To remove the sawback, I add a set of shopmade jaws to the wood jaws of my bench vise. These are nothing more than 18-in.-long sections of angle iron (mine are 1½ in. by 2½ in. wide, and the steel is ¾ in. thick) that are lined with more of that grippy, durable cork rubber.

You can use a simple crowbar to pry off the sawback. Before prying, however, cut a slit in a small square of leather and slide it around the plate, above the crowbar fork, to protect the sawback.

Clean up the plate and handle

Even though the set of a saw's teeth creates a sawkerf that is slightly wider than the plate, your strokes won't always be perfectly straight, so the plate will rub against the wood. That means you will feel the effects of rusty scale, paint blotches, or anything else built up on

the sides of the plate. That roughness can also lead to jams. This is why it's helpful to spray your plate with wax from time to time.

The goal with plate-cleaning is simply to reduce friction during the cut, not to polish the plate to a high shine. This is a good time to remove rust and/or grime from the sawback as well.

Finally, I use a series of dental picks to clean out the fasteners, and then I buff those too. There's no need to make them brilliant; rather, aim to achieve the dull gleam you'd find on a well-kept antique.

All that's required on most vintage saw handles is to gently clean and rejuvenate the wood. There is no one solution, and the goal is to preserve the patina while making the surfaces look cared for.

Reassemble and retension

If you follow the right procedure when remounting the sawback on the plate, you'll retension and straighten the toothline at the same time. You can do this any time the plate becomes kinked or wavy. And as you'll see, manipulat-



Wipe off the gunk. Use a cotton rag to wipe away the grime you've lifted off the blade plate.



Give it a light polish. Harrell uses Wizards metal polish with another abrasive pad, powered by his sander again. Don't use sandpaper this way, however, as heat can build, softening the steel.



Try a rust eraser. These abrasive blocks can be very helpful. Lubricate the block lightly with alcohol or metal polish.

ing the sawback properly will also tighten the handle.

Start by clamping the plate in your vise, between the cork-rubber-lined pieces of angle iron, with the teeth facing down. Leave about $\frac{3}{8}$ in. of the plate exposed above the vise jaws.

Seat the sawback on the top edge of the plate again, but push it only partway into position. Gently tap the sawback onto the plate, as shown in the photos. Along the way, you will occasionally need to reseat the toe end, which will tend to cantilever upward due to the taps farther down the sawback. Aim for roughly $\frac{1}{4}$ in. of the plate to be engaged in the sawback. You don't want the top edge of the plate coming anywhere near the inside fold of the sawback. You will need a significant gap there for the final retensioning process.

Once the sawback is partially but evenly mounted on the plate, give its heel a few strikes until the toe end protrudes from the plate about $\frac{1}{4}$ in. This will leave room for the handle to be attached at the heel end.

Now the handle goes back on. Do not crank hard on the fasteners. Just give them a turn until you feel that they are firmly engaged. Remember that the fasteners do not lock the handle in place on their own; rather, you need to push the sawback fully into



Clean the sawback too. Go easy, as most backs are made from brass, which is significantly softer than steel.



Scrape the handle. The razor will remove dry paint and thick grime, but don't dig all the way down to bare wood. Abrasive pads work well too.



Give wood a coat of oil. After removing most of the grime, but not the character, give the handle a fresh coat of any oil finish.

Polish the bolts. Spin the bolts in a drill, and polish them with a rag.



Attach the back partway

Before attaching the handle, push the sawback onto the blade, but only partway at this point.



Clamp the plate and wax the edge. Clamp the blade between the jaws with about $\frac{3}{8}$ in. of it exposed. Rub paraffin wax onto the top edge to help you spring the sawback in place without bending it.



Attach the sawback. Starting at the toe end, make a series of taps with a dead-blow hammer to seat the back on the blade. Stop when it's just $\frac{1}{4}$ in. or so onto the plate, and even from end to end.



One last tap. To make room for the handle to be attached, tap the heel end of the sawback until the toe end sticks out roughly $\frac{1}{4}$ in.

the handle mortise to do that (but not just yet).

You can simply rest the saw against the bench for the final steps. Start by making alternating taps at the heel and toe until the lower gap in the handle mortise is closed. There should still be plenty of air-space between the top of the plate and the inside fold of the sawback. You'll need this gap for future maintenance. If you feel the plate/sawback junction with your thumb and forefinger as you tap, you can keep track of small movements.

When you are happy with the vertical position of the sawback, you are ready to close the horizontal gap between

the sawback and the handle. Give the toe end of the sawback light sideways taps until its heel end just kisses the back wall of the handle mortise.

Future maintenance

If the toothline becomes wavy again from hard use, or the handle loosens, you can fix either problem very quickly. This is one of the great things about saws with sprung backs. You won't have to go through the entire procedure covered above, and you can keep the handle and sawback in place. To retension the plate and straighten the toothline, simply give the sawback a light downward tap fore and aft—in



Attach the handle. Tighten the bolts firmly. Do not overtighten them or you will mar them.

Ready for the next steps? If you attached the sawback correctly in the previous steps, there will be a gap between the back and the end of its mortise in the handle, and the back will be sitting significantly higher than its original position.



Finish positioning the sawback

As you tap the sawback downward and backward, you'll straighten and retension the blade, and tighten the handle in the process.



Tap it downward. Starting near the handle, begin tapping the back down into its handle mortise. Do the same near the toe end, going back and forth until the back end of the sawback is seated in the bottom of the handle mortise.



Measure at the front and back. The back should be seated in the bottom of the handle mortise but also be attached evenly to the blade plate, with the same amount of blade exposed at both ends.

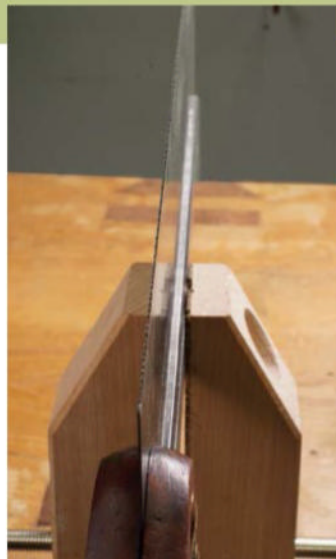


Now tap it backward. Tap the back lightly at the toe end to push it back into the handle mortise. Stop when it touches the wood.

less time than it takes to adjust a hand-plane blade. To tighten the handle, give the sawback a gentle backward tap at the toe end to push it back into the handle mortise so it just barely kisses the wood again.

Now if you also read my article on saw sharpening, you'll have everything you need to keep your saw in great working condition for the rest of your life. □

Mark Harrell repairs vintage saws and teaches saw-maintenance and saw-sharpening seminars.



Straight as an arrow. The blade has been retensioned, and the toothline is straight.



Future maintenance. If the blade gets kinked in the future, tap the sawback downward and backward into its handle mortise to retension it, which will straighten the toothline. This will also firm up a loose handle.

Planing bevel up

TWEAK THE ANGLE TO
MATCH THE TASK

BY BOB VAN DYKE

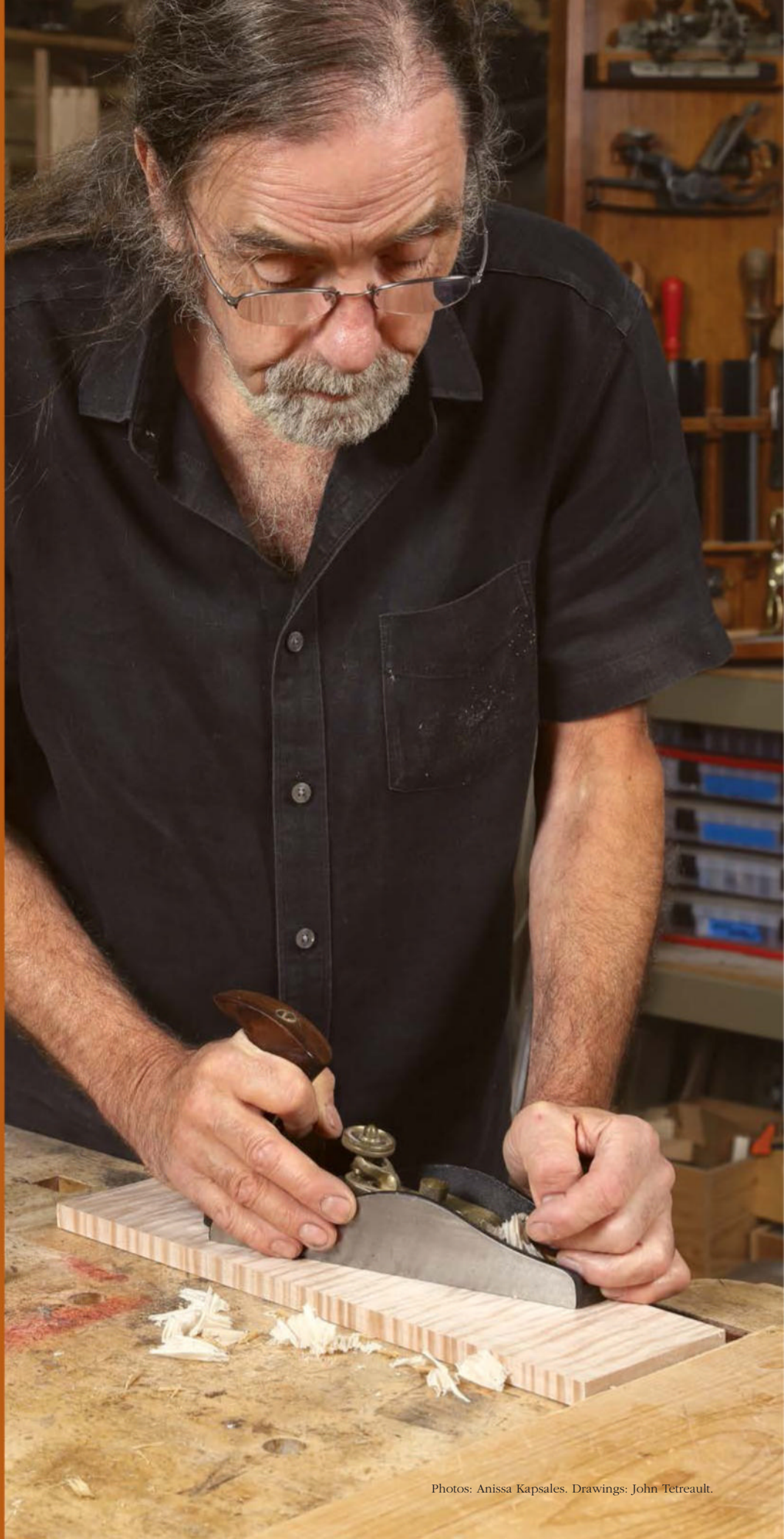
Any discussion of hand planes must lead with the basic truth that unless the iron is incredibly sharp, it will never work well. Just as important as the degree of sharpness, however, is the angle of attack of the cutting edge into the wood being planed.

For example, when planing end grain, a low angle of attack makes it easier to push the plane and leave a glasslike surface. Conversely, when planing face grain and edge grain, especially in highly figured woods where the grain direction is constantly switching, a higher angle of attack is best because it leads to less tearout. There is a trade-off, however, since with the higher angle the plane will be harder to push through the wood.

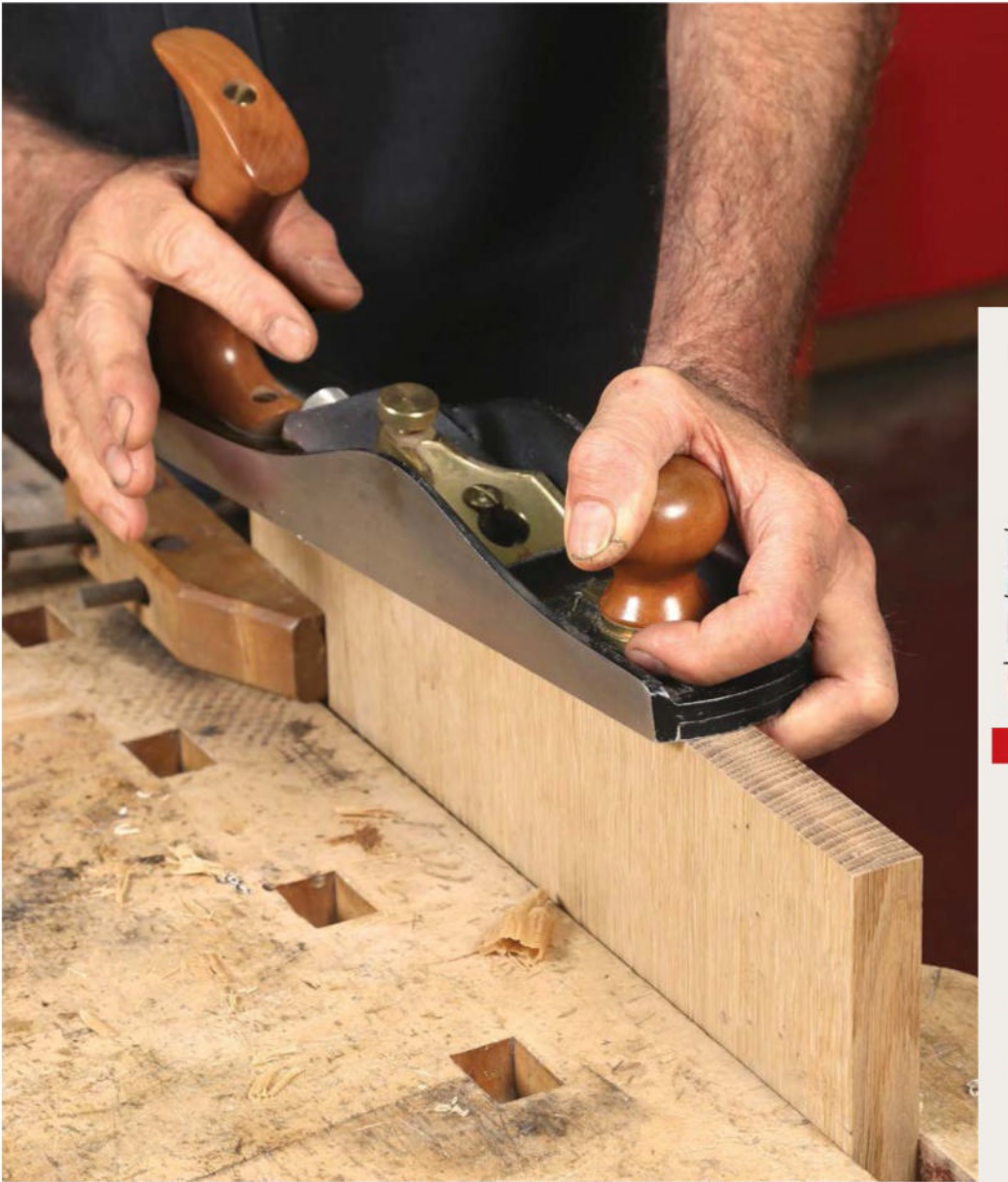
Bevel down

The bevel of the iron in traditional bench planes faces down, which means the angle of attack is solely a function of the bed or frog angle. Early plane makers quickly determined that an angle of attack of 45° was a good middle ground, being relatively easy to push and able to produce a glass-smooth surface in most woods. For those harder-to-plane woods such as highly figured tiger maple or quartersawn white oak, bench planes with a higher frog angle resulted in a smooth, tearout-free surface but were harder to push.

Historically, some bench planes were made with the York pitch frog at 50°, the Middle pitch frog at 55°, and even the “half pitch” or Cabinet pitch at 60°



Low angles



to accommodate furniture makers who often worked with hard-to-plane woods.

Most bevel-down bench planes have chipbreakers, which improve their performance by helping stabilize the iron and minimize tearout. Perhaps most importantly, bench planes also have significant mass.

Bevel up

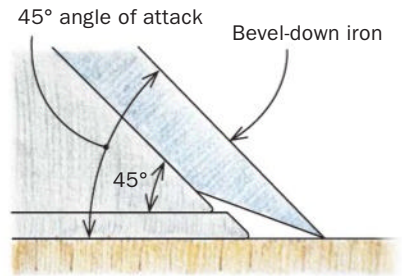
Unlike on traditional bench planes, the bevel on a block plane faces up. This

means that the plane's angle of attack can be controlled by varying the bevel angle, making it simple to change the angle of attack from one extreme to the other.

The angle of attack on block planes is a combination of their bed angle, which is typically 12° or 20°, and the iron's bevel or microbevel angle. The typical microbevel of 30°, combined with a 12° bed, yields an angle of attack of 42°—which is pretty close to the standard

TRADITIONAL

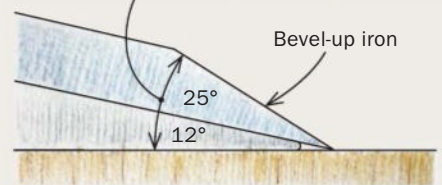
A traditional bench plane is bevel down.



BEVEL UP

With a 37° cutting angle on a bevel-up plane, you can easily clean up end grain.

A 25° bevel results in a 37° angle of attack.



TACKLE END GRAIN



End-grain buster. With the combination of a 12° bed and an iron with a 25° bevel, you can tackle light end-grain work with a block plane. The same combo in a heavier plane such as Lie-Nielsen's low-angle jack plane allows you to take on more massive end-grain work, like a butcher block.

45° of a bench plane. I sharpen my “everyday” block plane like this, and it is fine for small jobs like planing a quick chamfer or flushing a protruding joint.

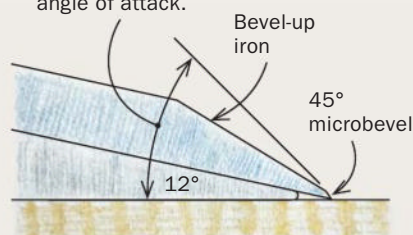
A microbevel increased to 45°, when combined with the 12° bed, produces an angle of attack of 57°. My second

Steep angles

The biggest advantage of a steep angle in planing is reduced tearout, particularly on figured or squirrely grain. This holds true whether you're using a small block plane or a larger, heftier bevel-up plane.

MICROBEVEL

A 45° microbevel results in a 57° angle of attack.



Two bevels. The higher the angle of attack, the more of a scraping action—and the less tearout—you'll get. Van Dyke uses a primary bevel of about 25° on most chisels and plane irons. To that he adds a microbevel that can be 5° to 20° higher than the primary bevel.



FIGURE TAMER

Just a wild and crazy grain. A bevel-up plane with a 45° microbevel excels at cutting highly figured hardwoods like tiger maple. At this angle, you can plane with or against the grain on tough or swirly grain with the same results.



block plane utilizes the 45° microbevel exclusively. This block plane is perfect for situations such as chamfering an edge when the planing direction is a best guess. Often the grain direction of one surface can be opposite the grain direction of the intersecting surface.

The ultra-high bevel angle allows me to plane with or against the grain safely,

so I always get a clean, crisp chamfer. Additionally, I use this plane for leveling any inlay or for performing any other small planing task where I'm concerned about tearout.

Tackling end grain

Sharpening a block plane iron at a low angle like 25° and then combining it

49 Years

of projects, tips, & techniques to
make you a better woodworker



**Get the 2024 *Fine Woodworking* Magazine
Archive on USB or digital download.**

Enjoy 314 fully searchable issues of
Fine Woodworking magazine in one place.

Available at Store.Woodsmith.com

Steep angles continued

TRIM AND SHAPE

Grab and go. Use a block plane with a standard 30° microbevel for a number of small trimming and shaping tasks—from doing a quick bevel or roundover on a small part to flushing a protruding joint or chamfering the end of a table leg.



A little bit higher now. Use a block plane with an ultra-high 45° microbevel for chamfering edges.



FLUSH INLAYS

Clean up inlay. Use a block plane with a 45° microbevel to flush inlays without tearing out the inlay or the surface you are flushing it to.



with a 12° frog results in an angle of attack of 37°, which is great for planing end grain but not so great for planing most face grain.

The downside of standard block planes is their small size and the consequent lack of mass. They do well for very light planing of end grain in easy woods like pine or cherry. When faced with planing a lot of end grain or any heavier-duty task like planing 8/4 or 12/4 maple or white oak, I turn to my heavyweight bevel-up planes.

Block plane on steroids

Years ago, Lie-Nielsen Toolworks and other companies started manufacturing planes based on the Stanley No. 62. Introduced in 1916, this plane was developed specifically for flattening end-grain butcher blocks. It has everything you need for that daunting task: a 12° frog, a heavy cast-iron body, and a thicker-than-normal iron. Currently there are any number of bevel-up planes available in various sizes. All of them are essentially large block planes. These planes combine significant mass with the flexibility to alter bevel angles easily.

I can use a low-angle bevel for heavy end-grain work or, most importantly, with a microbevel angle of 45°, I can create an ultra-high angle of attack of 57° for working hard-to-plane woods such as quartersawn white oak or crotch walnut.

I use these bevel-up planes, in particular my Lie-Nielsen low-angle smoother, when I'm planing swirly tearout-prone face grain or planing a lot of end grain. I have separate irons sharpened for each type: 25° for end-grain jobs and 45° for hard-to-plane face-grain work.

The ultra-high-angle bevel on these massive planes has consistently given me results far better than those I've gotten from my standard bench planes, including my old No. 4½ with the York pitch, a tool specifically made to plane difficult wood.

Bob Van Dyke is the founder and director of the Connecticut Valley School of Woodworking in Manchester, Conn.

CLASSIFIED

The Classified rate is \$9.50 per word, 15 word min. Orders must be accompanied by payment. The WOOD & TOOL EXCHANGE is for non-commercial individuals only; the rate is \$15/line, min. 3 lines. Email to: *Fine Woodworking* Classified Ad Dept. ARobertson@aimmedia.com. Deadline for the March/April 2026 issue is December 23, 2025.

Instruction

PENLAND SCHOOL OF CRAFTS, in the spectacular North Carolina mountains, offers one-, two-, and eight-week workshops in wood-working and other media. (828) 765-2359. www.penland.org

Wood

RARE WOODS Ebony, boxwood, rosewood, satinwood, ivory wood, tulipwood + 120 others. (207) 364-1520. www.rarewoodsusa.com

WOOD AND TOOL EXCHANGE

Limited to use by individuals only.

Selling

FINE WOODWORKING issues #1 thru #320 (complete set, great condition). \$800 plus shipping. Call Bill Jacobs at (817) 379-1337. Keller, Texas.

Statement of Ownership, Management, and Circulation

1. Publication title: *Fine Woodworking*. 2. Publication number: 561-410. 3. Original filing date: October 1, 2025. 4. Issue frequency: bi-monthly plus special issue. 5. Number of issues published annually: 7. 6. Annual subscription price: \$34.95. 7. Complete mailing address of known office of publication: Active Interest Media Holdco, Inc., 2143 Grand Ave, Des Moines, IA 50321; Contact person: Paige Nordmeyer, 515-875-7053. 8. Complete mailing address of headquarters of general business office of publisher: same as no. 7. 9. Full names and complete mailing addresses of the publisher, editor, and managing editor: Publisher, Erica Moynihan; Editor, Michael Pekovich; Deputy Editor, Jonathan Binzen; all at 2143 Grand Ave, Des Moines, IA 50321. 10. Owner: Active Interest Media Holdco, Inc., 2143 Grand Ave, Des Moines, IA 50321. 11. Known bondholders, mortgagees, or other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities: None. 12. N/A. 13. Publication Title: *Fine Woodworking*. 14. Issue date for circulation data below: September/October 2025. 15. Extent and nature of circulation:

	Average no. copies of each issue during preceding 12 mos.	No. copies of single issue published nearest to filing date
A. Total no. copies	104,094	86,332
B. Paid circulation:		
1. Mailed outside-county paid subscriptions:	84,968	83,875
2. Mailed in-county paid subscriptions:	0	0
3. Paid distribution outside the mails:	3,066	0
4. Paid distribution by other classes mailed through the USPS:	0	0
C. Total paid circulation:	88,034	83,875
D. Free or nominal rate distribution (by mail and outside the mail):		
1. Outside-county as stated on Form 3541:	1,423	1,420
2. In-county:	0	0
3. Other classes mailed through the USPS:	0	0
4. Free or nominal rate distribution outside the mail:	586	583
E. Total free or nominal rate distribution:	2,009	2,003
F. Total distribution:	90,043	85,878
G. Copies not distributed:	14,051	454
H. Total:	104,094	86,332
I. Percent paid circulation:	97.8%	97.7%

16. (no electronic election) 17. This Statement of Ownership will be printed in the *Tools & Shops* 2025 issue of this publication. 18. Signature and title of editor, business manager, or owner: I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties). Paige Nordmeyer, V.P. Circulation, Active Interest Media

WOODWORKERS MART

BEST DOVETAILS

It's the truth.
Order your Keller Dovetail System now!
(800) 995-2456

Made in the USA since 1976 • DVD/Video \$8.95 + \$2 p/h

www.bestdovetails.com



Listen in!

Fine Woodworking
SHOP TALK LIVE

ShopTalkLive.com

**CASH PAID FOR HIGH QUALITY
HAND WOODWORKING
& ANTIQUE TOOLS
ONE PIECE OR ENTIRE SHOP
OR COLLECTION
GUARANTEED HIGHEST
PRICE PAID**

CALL 860-377-6258

Michael Rouillard

Please Visit us at

www.michaelrouillardtools.com

INDEX TO ADVERTISERS

ADVERTISER	WEB ADDRESS	PAGE
Center for Furniture Craftsmanship	woodschoool.org	31
Connecticut Valley School of Woodworking	schoolofwoodworking.com	27
Epifanes	epifanes.com	31
Felder USA	feldergroupusa.com	27
Festool	festool.com	7
Grex USA	grextools.com	19
Grizzly Industrial	grizzly.com	2
Groff & Groff Lumber	groffslumber.com	31
Hearne Hardwoods	hearnehardwoods.com	29
Highland woodworking	highlandwoodworking.com	19
Infinity Cutting Tools	infinitytools.com	19
Keller Dovetail System	bestdovetails.com	81
Klingspor Abrasives, Inc.	klingspor.com	27
Lignomat Moisture Meters	lignomat.com	31
Linden Publishing, Inc.		29
Micro Fence	microfence.com	81
Oneida Air Systems	oneida-air.com	9
PantoRouter	pantorouter.com	29
Red House Tools	redhousetools.com	15
Rocking Horse Shop, The	rockinghorse.co.uk	29
Rouillard, Michael	michaelrouillardtools.com	81
SCM Group	scmwood.com	11
Shaper Tools	shapertools.com	5
Vacuum Pressing Systems, Inc	vacupress.com	27
Wendell Castle Workshop	wendellcastle.org	31
Woodpeckers	woodpeck.com	83

Closing up shop

BY JIM WHETSTONE



In 1975, I had been in my shop just one year when a letter arrived from Paul Roman describing the new magazine he was launching. He wrote, “Subscribe to *Fine Woodworking*. We will teach.” So the journey began.

Then two summers ago, after all these years of sweeping up sawdust—41 of them while running my full-time custom-woodworking business, Quality Cabinetry—I realized it was time to close up shop. My hands, with increasing arthritis, were saying enough, and business had been tailing off anyway. I would need to set up a sale for my tools and contact all my customers. I knew it would be hard. As I walked around the shop, everything I touched had a story.

The scrollsaw sparked memories of making Christmas ornaments with our children, Laura and Jeff. Toward the back of the shop were bending forms for a 48-in. bent-laminated mahogany mirror that had required four woodworkers and nearly 50 clamps to glue up. On the bulletin board were lots of thank-you notes from customers. There was a photo of Scott Landis, author of *The Workshop Book*, when he came to visit, and another of Kelly Mehler that reminded me of the week I spent studying with him at the Marc Adams School of Woodworking. Hanging on the wall were templates for the rockers for Rusty, the rocking horse I made for Laura.

I always numbered the things I made, and here was #1,341, a jewelry box in walnut, white oak, wenge, and tulipwood, which I made in 2020 for a contest titled “Art Therapy in the Time of Covid-19.” Among the many test-joinery samples that I had kept was one from piece #1,000, in which I used through-dovetails for the first time. My final piece, #1,379, an oval table, went to our granddaughter, Ella. Introducing her to woodworking in my shop and creating things together with her was priceless.

When the time came for the sale, I waited with some apprehension for people to arrive. But after the sale was

underway, I discovered a certain pleasure in the process. Everyone seemed delighted with their purchases. A couple of maintenance men from a nearby inn bought my jointer and a sander; two electricians drove three hours to pick up my drill press and bandsaw; the radial-arm saw, which I had bought in 1969, went to a local man in his 70s who reports he is “well pleased—it is a tremendous saw.”

And I was delighted when Mary, who was setting up her first shop, came for my table saw and left with not just the table saw but my scrollsaw, a sandpaper box I had built, clamps, exotic wood, and much else. She later wrote, “I’m not sure I have the right words to describe how excited I was about the projects I would now be able to complete.”

My biggest joy came from helping our nearby Cumberland Perry Area Career and Technical Center. They now have my power miter box along with other tools and jigs, and I am thrilled to say that they are the new owners of my complete set of *Fine Woodworking* magazines as well as my library of woodworking books.

In the past I have enjoyed knowing that the products of my shop have in a little way improved the lives of some people, but I didn’t expect to feel so good when, by dismantling it, I contributed to the woodworking journeys of others.

The whole experience drove home for me how important it is for us to continue teaching fine woodworking skills. In *FWW* #125, Toshio Odate wrote, “A craft depends on society. Society demands, then a craftsman tries to fulfill those demands with his best ability. However, if society does not seek the craft, then the craftsmen and the skill will disappear, no matter how high the quality.”

The shop is empty, but I like to think I can smell the sawdust somewhere else. I sure love working wood.

Jim Whetstone lives in New Cumberland, Pa.

Woodpeckers®

MADE IN
USA
Woodpeck.com

Precision Woodworking Squares

- One-piece central core.
- Stainless model includes scribing guides.
- Lip keeps the square flat on your work.
- Guaranteed perpendicular to $\pm .0085^\circ$ for life.
- Available in inch or metric.



Precision Woodworking Square

Includes a wall-mountable Rack-It®

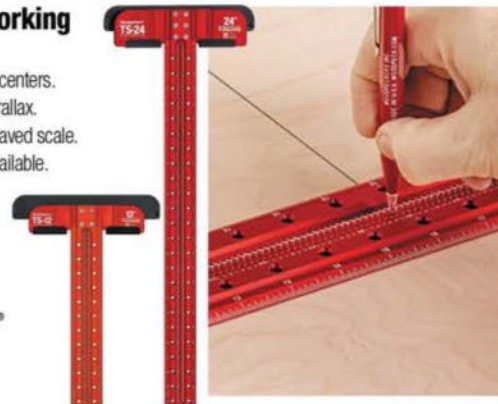
12"\$139.99

12" Stainless Steel....\$159.99

Other Sizes Available on Woodpeck.com

Precision Woodworking T-Squares

- Scribing guides on 1/16" centers.
- Beveled edge reduces parallax.
- Tight tolerance laser-engraved scale.
- 600mm metric version available.



Precision T-Square

Includes a wall-mountable Rack-It®

TS-12 12"\$139.99

TS-24 24"\$159.99

TS-32 32"\$189.99

in-DEXABLE® Combination & Double Squares

- Push-button index locks head at any full-inch.
- Laser-cut scribing guides for precision parallel lines.
- Retractable support keeps head aligned to your stock.
- Available in inch or metric.

in-DEXABLE Squares

Includes a wall-mountable Rack-It®

Double 6"\$139.99

Center Finder 6"\$149.99

Combination 12"\$179.99

Protractor 18"\$249.99

Other Sizes Available on Woodpeck.com



Joinery Sled

- Half-Laps, Bridle Joints, Sliding Dovetails, Tenons & More!
- Works with table saws & router tables.
- Patented leaf spring miter bar fits all 3/8" x 3/4" miter slots.
- Table adjusts from 44° to 91°.
- Micro-adjuster positions vertical table precisely.



Joinery Sled....\$339.99

Includes a wall-mountable Rack-It®



Router not included.

Rout-N-Plane® Benchtop Board Mill

- Perfect for end grain cutting boards.
- Adjusts to work with almost any size or style router.
- Two sizes: 15" and 24" wide. Both work from 3/4" to 3" thick.
- When it won't fit your planer, plane it with Rout-N-Plane!

Rout-N-Plane
Benchtop Board Mill

15"\$179.99

24" XL....\$239.99

Router Plane

- Includes square & spearpoint blades.
- Blades lapped perfectly flat. Bevels ground and ready for final honing.
- 12 blade positions ensure maximum access & support.
- Fine-thread adjustment with no backlash.
- Ductile iron base with black-nitride treatment.
- Optional fence keeps plane parallel to an edge.

Router Plane....\$279.99

Fence Add-On Kit....\$69.99



ULTRA-SHEAR® by Woodpeckers

ULTRA-SHEAR
FREE SHIPPING
ON ROUTER BITS & SAW BLADES

*US 48 States only. Ultra-Shear brand only.
Cannot be combined with other products.

Finger Grip Groove Bits

These bits create a subtle concave recess in the edge of your cutting and serving boards. Bearing controls depth of cut.

Carbide-Tipped, Finger Grip Groove Bits, Round, 2-Flute

1/2" Shank for 1-1/4" boards....\$54.17 **\$46.99**

1/4" Shank for 3/4" boards....\$48.05 **\$39.99**

1/4" Shank for 1" boards....\$51.93 **\$43.99**

More Router Bits are available on Woodpeck.com

Flat Top Grooving Saw Blades

When you need flawless, flat-bottomed cuts, our 40-Tooth Flat Top Grooving Blade delivers. The chisel tooth design yields a perfectly square groove.

10" x 40 Flat Top Grooving Blade, 5/8" Arbor

1/8" Kerf....\$166.78 **\$129.99**

3/16" Kerf....\$186.83 **\$149.99**

1/4" Kerf....\$196.86 **\$179.99**

Other Saw Blade options available on Woodpeck.com

ULTRA-SHEAR® by Woodpeckers



Visit Woodpeck.com for hundreds of other American Made Tools!

Woodpeckers, LLC • Strongsville, Ohio • 800-752-0725

Prices are subject to change without notice.

Also Available at Your
Local Woodcraft Store!

WOODCRAFT®



Check Out the Latest E-Learning Courses

FROM

FineWoodworking

Unlock your woodworking potential today
with Fine Woodworking Online Courses.
Updated frequently throughout the year with
new courses, plus a library of On-Demand
Courses available now. Each course offers
a full year of on-demand access.
Get inspired and improve your skills today!



Scan To Learn More!

To learn more, go to
courses.finewoodworking.com