POPULAR WOODWORKING PRESENTS 76 Pages of Sharp Advice

# Hand Tools
## In the Modern Shop

UPGRADE YOUR
SKILLS
IMPROVE YOUR
WORK

TUNE
All Your
TOOLS
Easy Steps to
Wild Success

GET FAST
RESULTS
WITH YOUR
- Block Planes
- Handsaws
- Card Scrapers
- Smoothing Planes
- Jack Planes
- And More!

FIND
Tools
That
WORK
(And Avoid
Junk That
Won't Make
The Cut!)

$5.99US $7.99CAN
01>
0 74470 01489 8
JANUARY 2006
DISPLAY UNTIL 01-09-2006

POPULAR Woodworking®

*January 2006*
***popularwoodworking.com***
*Editorial Offices 513-531-2690*



**SUBSCRIPTION SERVICES:** Subscription inquiries, orders and address changes can be made at popularwoodworking.com (click on "Customer Service FAQs"). Or by mail: ***Popular Woodworking,*** P.O. Box 420235, Palm Coast, FL 32142-0235. Or call toll-free 877-860-9140 or 386-246-3369. Include your address with all inquiries. Allow 6 to 8 weeks for delivery.

**NEWSSTAND DISTRIBUTION:** Curtis Circulation Co., 730 River Road, New Milford, NJ 07646

**ATTENTION RETAILERS:**
To carry *Popular Woodworking* in your store, call 800-894-4656 or write Magazine Retail Sales, P.O. Box 5014, Iola, WI 54945-5014.

Back issues are available. Call 800-258-0929 for pricing or visit popularwoodworking.com. Send check or money order to: *Popular Woodworking* Back Issues, F+W Publications Products, 700 E. State St., Iola, WI 54990. Please specify publication, month and year.





# Liberate Yourself

## How a broken storm door ended a long career of building router jigs.

Soon after moving into our 1929 Tudor-style house, it was obvious that I was going to have to build a new storm door. The old one had blown open during a gale and its curved top section had snapped off in a mess of splinters, paint and glass.

Building a basic storm door isn't too challenging, but the curved top was a concern. I wanted it to be sturdy, so I decided to construct the curve in sections with mortise-and-tenon joints.

I spent an enjoyable day in the shop rigging my plunge router to cut the mortises and tenons on these curved parts. As you can imagine, it was an involved piece of work to hold the curved parts for machining.

That evening, as I was cutting my first set of joints, I heard a noise that gives most woodworkers a sinking feeling. The bearings on my plunge router were going south. The tool was running rough and sounding like a hive of vengeful bees. I was out of commission until I could order a replacement tool. Or was I?

I got out my Japanese mortise chisels, a mallet and my backsaw. In less than two hours I had all my joints cut, fitted and ready for assembly.

It was at that moment that I made two important discoveries. The first discovery was about power-tool jigs. I had spent an entire day planning and building a single-purpose router jig for this door. Once this screen door was complete, the jig would be worthless.

Cutting these joints by hand didn't require a single jig. For the tenons, I merely marked where I wanted to cut, sawed to the line and cleaned up the results with a shoulder plane and a paring chisel.

For the mortises, I simply marked out where I wanted them to go and removed the waste from inside the marks. There were no test cuts needed. I simply fit each joint until it was tight.

I cannot tell you how liberating this was. I had freed myself from building any more router jigs. In fact, I now operate under the maxim that the most complex work is best done with the simplest tools.

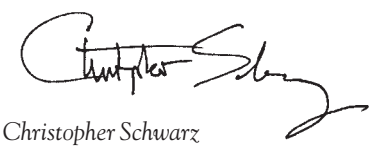
The other revelation was about the tools themselves. We think nothing of replacing a burned-out plunge router or a cordless drill when its batteries cannot take any more charges. Most hand-held power tools are disposable.

An acquaintance once put it: "Everything with a power cord eventually ends up in the trash."

Not so with hand tools, which are built to be used for generations, sometimes even centuries. That philosophy is more consistent with my approach to furniture.

When I build something out of wood, I want it to last. I don't want it to end up at the curb in my lifetime. If I demand that of myself, shouldn't I also demand it of my tools?

It's something to think about. **PW**



*Christopher Schwarz*
*Editor*

ON THE COVER

Never under–estimate the usefulness of a sharp handsaw. Learn to choose, set up and use essential hand tools with the help of this special issue.

PHOTO BY AL PARRISH

# Hand Tools
## IN THE MODERN SHOP

CONTENTS










## SAWS:



## CHISELS:



# WHY USE Hand Tools

Hand work is remarkably straightforward – once you overcome one barrier.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

Learning to use hand tools is far easier than acquiring the hand skills to type on a keyboard. I should know – I cannot type worth a dang (despite being a trained journalist) and yet I've picked up the skills to use chisels, planes, rasps, hammers and braces with little effort.

That's because I've found that using hand tools successfully is not really about manual dexterity. It's not about having natural gifts. It's not about years of frustrating training. And it's not about being an apprentice and having an old-world master to guide the way.

This tool cabinet (quite an improvement over my work 29 years ago) was built using a blend of hand and power tools. The rough lumber was dimensioned with machinery. Hand tools did the rest: truing and refining all the surfaces and all of the joinery in the case and drawers.

PHOTO BY AL PARRISH

Instead, it's about overcoming a barrier that stymies many home woodworkers: the fear of taking a gamble and messing up the project you're working on by trying a new process. I see this all the time with woodworkers. After we experience success with a certain operation, we then we resist trying a new way to do that operation because it seems risky. And because most of us (though not all) learned the craft with power tools (through shop class, television or magazines), that's what we're comfortable with.

I, however, was lucky. When I was 8 years old or so, my parents embarked on a crackpot adventure. We bought an 84-acre farm in rural Arkansas and decided to build two houses there. There was no electricity on the farm, and so the first house was built using mostly hand tools – a handsaw, brace and hammer. This kindled my interest in woodworking, and I lusted after my father's table saw and radial arm saw, which he kept at our house in town.

For obvious reasons, I was banned from the machinery. But I was allowed to use any of the hand tools, and I had my own small kit in the garage. I built a workbench with the help of my grandfather. I built an embarrassingly wretched tool tote. But it was all with hand tools, and so I knew that these tools could actually work in the hands of a kid.

As a result, when I started to get back into woodworking after college I had little fear as I picked up my first dovetail saw, plow plane and outcannel gouge. That fearlessness has taken me a long way and it continues to pay dividends as I've begun experimenting with turning and carving.

Me at age 8 with my workbench (note the enthusiastic nailing on the legs) and my first tool tote. Being limited to only hand tools as a child removed my fear of them in later years.

Fore planes (above) are rough tools that can hog off 1/16" in a pass. The jointer plane's long sole then trues the surface and takes a thinner shaving (about .006" thick). The smoothing plane is then used to remove a thin shaving (about .001" to .002" thick) to prepare the surface for finishing. You need all three planes to surface lumber and you need to use them in the correct order.

I can't give you the same experience I had growing up, but I can give you this truth: If an awkward 8-year-old can build a workbench with hand tools, then you can do it, too. Overcoming your fear of failure is the first step. The second step is to understand what the tools are used for – there's not as much information about hand tools out there as there is about power tools. And the third step is to learn basic sharpening. Acquiring this skill is absolutely the Rosetta Stone to all the other hand skills, and that's why we've devoted significant space to the topic in this special issue.

### The Myths of Hand Tools

There are some woodworkers who see little reason to even mess with hand tools. After all, we have all these amazingly fast and precise power tools at our disposal. Why should we "devolve" to an earlier technological state? That's quite against our progressive nature. Well the reason you should incorporate hand tools into your work is because just about everything you hear about hand tools is likely wrong. Let's look at some of the myths.

Myth 1: Hand tools are slow. The truth is that some people are slow. Hand tools have always been built to work as quickly as possible. They just have to be set up and wielded correctly. And you have to pick the right tool for the job. You wouldn't try to reduce a board in thickness with a sanding block, so why would you try to do that operation with a smoothing plane?

All tools are slow when used incorrectly. About seven years ago, one of our editors for our woodworking book line decided to build a cradle for his newborn child. It was a small project, yet he spent three full days planing down all the wood for the

This shaving is .001" thick and you can easily set a hand plane to remove this amount (or more, depending on your needs). Setting power tools to remove such small increments is almost impossible.

The bench hook guides your back saw and keeps it in place on your bench as you cut. It's a remarkable workshop appliance. The sawbench, shown on the cover of this issue, does the same thing with full-size handsaws. It's most important attribute is that it's 20" high and has a flat top.

project on our Delta 13" cast-iron industrial planer. Why? Because he refused to remove more than 1/64" in a pass. He was afraid he'd mess up.

The truth is that both hand tools and power tools can be remarkably fast when set up properly and used appropriately. You have to know that a fore plane is used for hogging off 1/16" of material in a stroke. You have to know that a 7-point hand saw will fly through a board in half the number of strokes you'd make with a 12-point saw. You have to know that a cabinet rasp will shape wood faster than a pattermaker's rasp. Once you know these things, you'll pick up speed.

Myth 2: Hand tools are less precise than power tools. Whenever I hear this one I laugh and ask the person if they can set their table saw to remove .001" from a board's edge. This is virtually impossible to do with a table saw, router, jointer or planer. Yet it is child's play for a hand plane. After an afternoon of practicing with a hand plane, you will be able to set any hand plane to remove a .001"-thick shaving. Imagine the sort of power that gives you. Fitting and trimming your joints can be effortless when you have that skill. And it's an easy skill to get.

The real truth is that hand tools free you from a lot of these arbitrary measurements anyway. Your door panels don't care if they are . 0625" thick or .061". All they care about is if they fit in the rails and stiles. If you cut a panel too thick to fit into its groove on a table saw, you end up engaging in the endless cycle of: cut, go to the bench, check the fit, tweak the setup; cut, go to the bench, check the fit. Then you have to sand the panel for finishing. When you fit a panel with a hand plane you do it all at the bench. Take a few passes, check the fit, take a few passes, check the fit. And here's the real kicker, once it fits you don't have to sand it – the hand plane produces a ready-to-finish surface. So now you're both faster and you're more precise.

Myth 3: Hand tools require great skill. A lot of people are under the assumption that to use hand tools you need years of practice to develop a feel for the tool. While true mastery of any tool (hand or power) is probably unobtainable, most hand tools can be learned after a couple hours (not years) of practice. Go down to the shop and decide to practice on some scrap. Drill it, cut it, plane it, shape it, carve it. When you have some success, then apply those skills to a project.

There's another bit of missing information that helps propagate this myth about hand tools: people think they are used entirely freehand. This is wrong. There are a number of simple "appliances" or jigs that will help you guide your hand tools. Shooting boards assist you in planing perfect square edges and ends on boards. Bench hooks hold and guide your work while using a backsaw. Sawbenches help make your handsaw fly through the work. Planing stops eliminate complicated workholding apparatuses.

Building a few of these appliances (I'd start with the bench hook on page 67) will immediately unlock the hidden abilities of your hand tools.

Myth 4: Simple hand tools aren't cut out for complex work: We have an amazing array of commercial and shopmade jigs for power tools these days. There are dovetail jigs that cost more than my first pickup truck. Believe me, these modern jigs work. I've used a lot of them. And I think that these jigs sell so well because some woodworkers really like gizmos (nothing wrong with that) and some woodworkers think they need a complex jig to perform a complex operation, such as cutting a mortise-and-tenon joint.

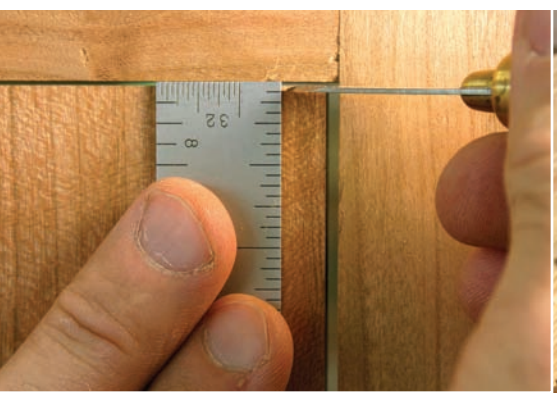
Hand tools largely free you from complex jiggery. Think for a moment how difficult it is to cut a compound miter on a table saw, particularly on a panel. There is an immense amount of setup and

test-cutting involved. Lots of wasted sample pieces. And if you really want to do it well, you should buy an aftermarket miter gauge that is accurate to half a degree.

When I want to cut an unusual angle, I mark it out on my workpiece and simply saw to the line. Then a couple strokes with a plane clean up the cut and get it precisely fit. No test cuts. No wasted material. No jigs. Mark the line; cut the line. It is one of the most liberating feelings you will ever experience. And it's not hard to do. An 8-year-old can handle it.

Or how about fitting a door in a face frame? If your door or face frame is crooked (let's say it's off by 1/32"), how are you going to correct that error when using power tools? A tapering sled on the table saw? A few stopped cuts on the jointer? A tapered straightedge guide for your router with a bearing-guided pattern bit? I've used all these methods. Here's what I do now: I mark the taper I need on the door's rail or stile. I plane to that line by using a quick series of stopped passes. When I get to the line, I'm done. As a bonus, the edge of that door is ready for finishing, too.

Myth 5: Hand tools are cheaper than power tools: I bet you weren't expecting me to say that. Good tools cost. Period. End of story. It's true you can buy vintage hand tools or vintage machinery for a lower up-front cost. But getting these tools to work correctly can cost you a lot of time and effort.



Fitting a door with a hand plane is fast and accurate. First mark out how much material you need to remove and draw a line on the door showing what you want to remove (above). Then plane to that line and the door will fit perfectly (right).

Good hand tools never wear out (unlike even the best routers or cordless drills). So spending a bit more money on them is a good idea because you'll never have to buy a replacement and you'll never outgrow it.

If you have a lot free time and enjoy tinkering with metal things, then this is the route for you.

For those of us for whom time is scarce: Buy the best tool you can. You will end up sharpening it less, fooling with it less and using it more. This has always been the case, even hundreds of years ago. In Joseph Moxon's "Mechanick Exercises" of 1678, he exhorts craftsmen to buy superior steel saws over the less expensive iron ones and even tells them exactly where in London on Foster Street to get them. And virtually every other old text on woodworking I own insists that you should always buy the best you can afford. "Audels Carpenters and Builders Guide" (Audel Co. 1947) puts it thus: "(I)t is important to buy only the best regardless of cost."

As a kid, my first coping saw was a Craftsman. Some tools from Craftsman are good; some are not. This one was decidedly a piece of junk. The blade clamp never worked right. The frame buckled under normal use. The riveted handle was loose. The mechanism that controlled the angle of the blade routinely came loose. Pretty much everything on that saw was a stinker. So it was no wonder I struggled with that tool. I now have a nice Olson Saw Co. coping saw. The day I started using that saw my sawing skills increased ten-fold. Cheap tools are barriers to good work. Good tools make the work as easy as possible.

### Where to Begin

If this all sounds good to you, you're probably wondering where you should begin. The first step is to educate yourself about the tools before you start buying them and using them. While there's indeed sound information contained in this issue, you need a few books to help you really get the critical mass

of information you need. I have a number of favorite books about hand woodworking. You need at least two: One on sharpening and one about the tools. I'd buy the book on sharpening first.

There are two sharpening books I really like: "The Complete Guide to Sharpening" by Leonard Lee, and "The Complete Illustrated Guide to Sharpening" by Thomas Lie-Nielsen. Both books are from The Taunton Press and both will guide you in all the basic moves required to sharpen a wide variety of tools.

For an overview of hand tools and their uses, here are some good sources to look for at the bookstore and the library (some of these books are out of print but still available used and at libraries).

• "Hand Tools" by Aldren A. Watson (Norton). Although Watson has a bit of a boatbuilder's perspective, the information and his beautiful hand illustrations are solid gold. This book is inexpensive, readily available and packed with excellent information you'll turn to regularly.

• "Traditional Woodworking Handtools" by Graham Blackburn (Blackburn Books). The first woodworking book I ever owned was written by Blackburn. This book combines many of his columns for magazines during the years into a very nice reference book on hand work.

• "Tools for Woodwork" by Charles H. Hayward (Drake). Sadly, this fine book is out of print. Hayward explores all the basic tools you need to do woodworking with clear explanations and perfect illustrations.

• "Restoring, Tuning & Using Classic Woodworking Tools" by Michael Dunbar (Sterling). If you are going to go the route of fixing up vintage tools, you need this book. It can be difficult to find, but it is worth the effort.

• "The Workbench Book" by Scott Landis (Taunton). You need a good workbench for hand work, and Landis's book is the classic. Avoid imitators; this is the best book on benches available.

And then you should get a catalog from Astragal Press, which specializes in publishing and selling books on traditional craft work. You will find many excellent books that will help take you down paths that interest you, such as hand planes or braces or saws. How to contact Astragal: Visit astragalpress.com, call 866-543-3045, or write to them at: P.O. Box 239, Mendham, NJ 07945.

### Not a Rejection of Electricity

There's one final point I'd like to make about hand tools. Using them does not force you to reject power tools or machinery. Many people who visit my shop at home are puzzled by my big 8" Powermatic jointer, Delta Unisaw and Grizzly 15" planer. "I thought you were a hand tool guy," is the inevitable comment that falls from their lips.

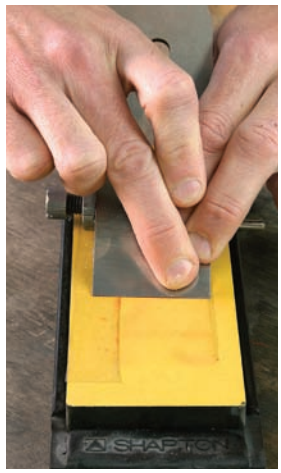
Then I point out the obscene number of braces hanging on the wall behind my band saw and the collection of hand planes stored in a cherry cabinet above my grandfather's workbench.

"I like all tools," is my standard reply.

Hand tools and power tools co-exist very peacefully in a modern workshop. The two perspectives complement one another in surprising ways and allow you to work faster, more accurately and with less waste and more joy.

You can blend the two perspectives to your heart's desire. I use my powered planer and jointer for prepping all my rough stock, but the hand tools handle all the final truing and make the work ready to finish. I use my table saw for ripping and crosscutting (its true purpose in life) and use my hand tools for most of the fine joinery. The rough work is handled by the power tools in my shop and the fine work is done by the hand tools.

The result of knowing both hand and power tools is that I'm a more fearless woodworker. New tools, techniques and projects are much more doable when you have a lot of different ways of going about any given task. And when I do hesitate or cringe at a task ahead of me, I simply remind myself to act more like an 8-year-old boy. **PW**



Sharpening your tools is the first skill to master. Once you get past this hurdle, you will find yourself able to master any edge tool.

A good workbench makes the work easier and faster. Buy Scott Landis's book on workbenches to learn everything you need to know before you build or buy one.

# SHARPENING

# Plane Irons & Chisels

We've tried just about every sharpening system there is – from sandpaper to ceramics to waterstones. Here's how to get the best possible edge with the least fuss.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

PHOTOS BY AL PARRISH

Learning to sharpen your edge tools will open up a lot of doors in woodworking. Sharpening is half the battle when learning handplanes, turning and carving.

When I took my first class in woodworking some years ago, the first thing the instructor showed us was his shop-made waterstone pond.

With a reverence and care usually reserved for religious artifacts and small injured animals, the teacher brought the pond out from its special place in his cabinet. For more than an hour he talked with a furrowed brow about secondary bevels, wire edges and polishing the backs of our edge tools.

All of us in the class did our best to stifle our yawns. I kept looking at the rows of chisels and backsaws and wondered when we were going to get to the important part.

Within a week we all realized that we should have paid more attention to the sharpening lecture. Soon there were only two sharp chisels in the shop for a class of 10 students, and we quarreled over them. Trimming tenons with the equivalent of a butter knife was no fun.

So I made it a point to learn to sharpen well. And I've been fortunate to be able to use a variety of methods, including: oilstones, diamond stones, waterstones, ceramic stones, sandpaper, electric grinders and the Tormek system.

Each system has its good and bad points. Some are simple, others don't make a mess, some are less expensive and most systems can put an astoundingly good edge on tool steel.

For me, the two most important qualities a sharpening system needs are that it must be fast and it must produce the keenest edge. I'll pay a little more and suffer a little mess to get a good edge in a hurry and get back to the bench.

That's because I'm more interested in woodworking than I am in the act of sharpening. I have no desire to look at my edges under a microscope or fret about tiny imperfections in the metal. I'm not the kind of guy who wants to meditate on my power animal as I proceed up to #500,000 grit. I want to be done with it and get back to the good part.

### Familiarity Breeds a Keen Edge

The steps I'm about to describe will work with every sharpening and honing system I know of on the market. That's because no matter what system you use, sharpening is about one thing: Grinding and polishing the two intersecting planes of a cutting edge to as fine a point as possible.

The tools you use to get there are up to you. But here are a few words of advice: Pick a sharpening system and stick with it for a good long time before giving it up. Many woodworkers who I've talked to jump around from system to system, trying to find the best thing (and spending a lot of money).

If you don't polish the backside of your newly acquired chisels and plane irons, your cutting edges will always be jagged and easily dulled. You need to polish just the area up by the cutting edge. This is a process you'll only have to do once.

## Grinding the Edge

1

To begin grinding your edge, put the tool in your honing guide and adjust it until the cutting bevel is flat on your stone. Eyeball it at first. After a couple passes on the stone you'll know if you're off or not.

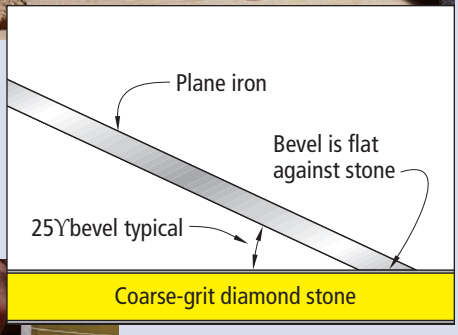
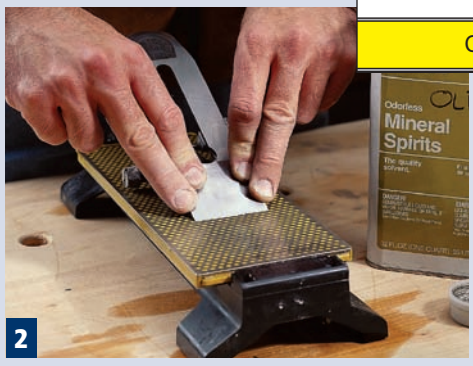



ILLUSTRATION BY JOHN HUTCHINSON



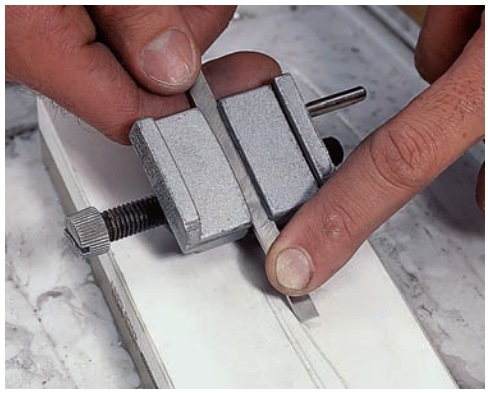

2

Flat-grinding your cutting bevel should not take long on a coarse diamond stone. If you're having trouble gauging your progress, color the cutting bevel with a permanent marker and you'll get a quick snapshot of where you stand.

3

When you're done grinding, this is what your edge should look like.

If you stick with one system, your edges will improve gradually as you get better and better at using your particular set of stones or sandpaper. Skipping around from one system to the next will only stunt your sharpening skills.



When honing narrow chisels, this is the best way I've found to keep things steady and square. Put one finger on the cutting edge; put the other behind the jig to move it.

## Why I Switched to Waterstones

There are a lot of sharpening systems out there. And while I haven't tried every one of them, I've tried most. After much experimentation, I settled about seven years ago on a system that used DMT diamond stones and oilstones. My system worked pretty well, but the oilstone part was slow, and my final cutting edge was always "almost" perfect.

A few years ago, I got my hands on a set of Norton's American-made waterstones and it was like a door had been opened for me. These things cut wicked fast. And the edge they produce is darn-near perfect.

They feel different than many Japanese waterstones I've used. The best way to describe the difference is that the Norton stones give you different "feedback" as you sharpen. The #4,000-grit Norton actually feels like it is cutting (it is). The #4,000-grit Japanese stones I've used have a more rubbery feel to them in use in my opinion. And they didn't seem to cut as fast at that level. The #8,000-grit Norton waterstone also provides great feedback to the user.

The downside to all waterstones is that they need to be flattened regularly. For this job, I use a DMT DuoSharp stone with the coarse grit on one side and the extra-coarse on the other. I also use this same diamond stone for grinding the cutting edge of all my chisels and plane irons.

The most economical way to get started with this system is to buy a Norton combination waterstone that has #1,000 grit on one side and #4,000 grit on the other. Then buy an #8,000-grit Norton waterstone for polishing. Norton also makes a #220-grit waterstone, but if you buy the DMT diamond stone you won't need it. — *CS*

Norton waterstones and the DMT DuoSharp stone are a great combination. The DMT handles the grinding jobs and flattens the Norton waterstones (800-446-1119 or nortonabrasives.com).

Second, please buy a honing guide. It's a big old lie that these things slow you down. In fact, these simple and inexpensive guides are quick to set up and ensure your edge will be perfect every time you sharpen.

However, don't buy a whole rolling army of honing guides. I use a $14 Eclipse-style guide (the gray-colored side-clamp contraption shown in most of the photos) for sharpening my chisels and most plane irons. I also own a Veritas honing guide. It excels at sharpening skew chisels and specialty plane irons that won't fit in the Eclipse guide, such as irons for shoulder planes.

Each honing guide holds the blade a little differently, and few of them are ever perfectly square. That's OK because what you're after with a honing guide is repeatability. Use the same guide over and over, and your edges will come out the same.

### Polish Your Backside

There are three sharpening operations that must be performed on all chisels and plane irons that are new to you. First you must polish the flat backside (sometimes called the "cutting face") of the tool. Next you grind the cutting bevel. Finally you hone and polish a small part of that cutting bevel, which most people call the "secondary bevel."

Keep in mind that these three steps are only for tools that you have newly acquired. Once you do these three things, maintaining an edge is much easier. You'll probably only have to polish the backside once. You'll have to regrind an edge mostly when you hit a nail or drop the tool. Most sharpening is just honing and polishing the secondary bevel so you can get back to work.

Begin with the backside of the tool. This is the side of the tool that doesn't have a bevel ground into it. It's one-half of your cutting edge so you need to get it right.

Start sharpening by rubbing the backside back and forth across a medium-grit sharpening stone or sandpaper. You don't need to polish the entire back, just the area up by the cutting edge. I begin this process with a #1,000-grit waterstone, then do the same operation with the #4,000-grit and then the #8,000-grit stone. The backside should look like a mirror when you're finished.

### The Not-so-daily Grind

The next step is to grind the cutting bevel of the tool. You can do this on an electric grinder that has a tool rest, which will produce a slightly dished cutting bevel called a hollow-ground edge. Or you can do it on a coarse sharpening stone, which will produce a flat-ground edge.

Lots has been written about the advantages and disadvantages of each system. In comparing my hollow-ground edges vs. flat-ground edges I personally have found little difference between them in terms of edge durability.

I typically grind using a diamond stone for three reasons. First, it will never destroy a tool due to overheating (which can happen with electric grinders). Second, I use the diamond stone to flatten the waterstones. And third, the diamond stone is great for touching up my router bits.

I use DMT's extra-coarse stone for grinding my edges unless I have a lot of metal to remove (800-666-4368 or dmtsharp.com). Put the tool in your honing guide and set it so the cutting bevel is dead flat against the stone. Most tools come ground at a 25° bevel, which is good for most tasks. Mortising chisels should be set for 30°; tools for light paring only can be set for 20°.

Don't get too worked up about angles as you begin sharpening. Somewhere in the 25° neighborhood will be fine for most tools.

I use mineral spirits to lubricate my diamond stone. Most people use water, but a sharpening guru at DMT turned me on to mineral spirits. It evaporates more slowly than water and won't allow rust to build up easily on the stone.

Rub the cutting bevel against the diamond stone and then check your progress. You want to

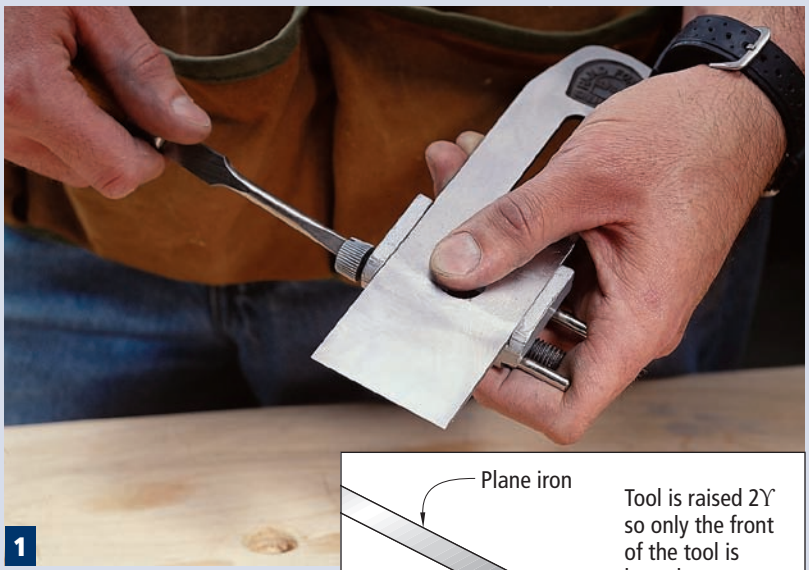
## Shapton Stones: The Latest Thing In Sharpening

If you think white-lab-coat wizardry is reserved for the manufacturers of power tools, think again. Some of the highest-tech science-fiction stuff happens in the knuckle-dragging hand-tool industry: think unbreakable "nodular" cast iron, cryogenically treated tool steel and super-strong "rare earth" magnets that are incorporated into both tools and jigs.

And now the latest innovation is in sharpening. Shapton waterstones from Japan are all the rage among the sharpening gurus, who say the stones cut faster and wear longer than other stones. They also are expensive. There are several grades of the Shapton stones, and a basic setup of three stones can cost more than $200 – plus you'll need some way to flatten them.

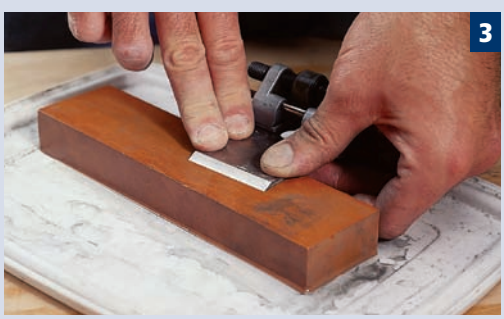
We use the stones in our shop now and are impressed. They do cut faster and stay true longer than other waterstones. Visit shaptonstones.com or call JapaneseTools.com at 877-692-3624 for more information. — *CS*

## Honing the Edge

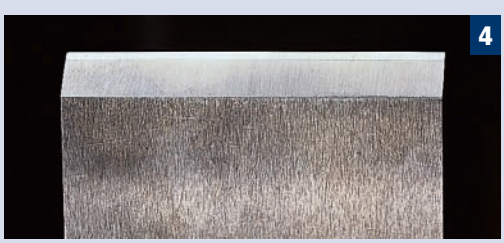



1 Before you begin honing the secondary bevel, loosen the clamp on your honing guide and nudge the blade backward in the guide about 1/8".

2 Begin with a #1,000-grit stone and rub the tool back and forth across the work. Try to wear the stone evenly by moving the tool in a regular pattern.



3 After a dozen licks, turn the tool over and remove the burr from the backside by rubbing it a couple times over the #8,000-grit stone.



4 After honing the tool on the #1,000-grit stone, this is what the secondary bevel should look like.

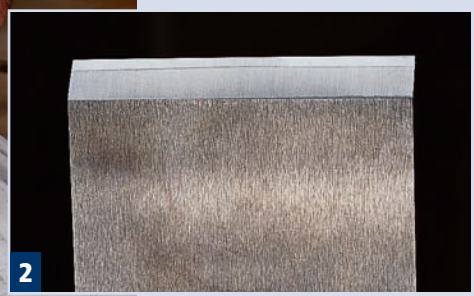
grind the entire cutting bevel of the chisel or plane iron all the way across. If you set the tool properly in the jig, this should be approximately five to 10 minutes of work.

As you progress on this coarse stone, you should make a substantial burr on the backside of the tool. This is called a "wire edge," and you'll want to remove it by rubbing the backside on your finest-grit stone a couple times. Never rub the backside on your coarse stone. That just undoes all your polishing work there.

How you hold the jig is important, too. For plane irons and wide chisels, put a finger on each corner of the tool up near the cutting bevel and use

## More Honing and Polishing

Continue honing the edge by switching to a #4,000-grit stone. Remove the burr on the backside with the #8,000-grit stone. Note that some woodworkers skip this intermediate #4,000-grit stage when honing. I have found this trick works best with waterstones and when the secondary bevel is small.

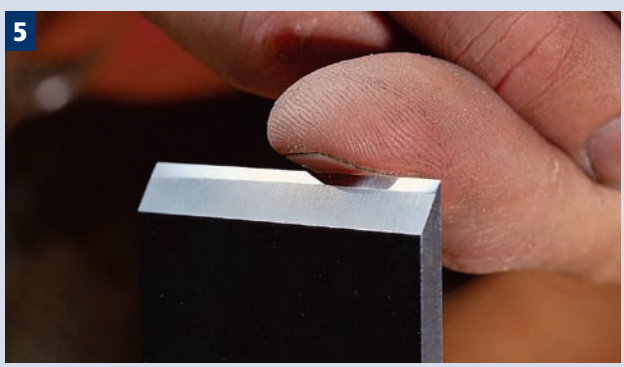

After working the 4,000-grit stone, here's what the secondary bevel should look like. It got a little bigger and it is more polished.

Repeat the same process on the #8,000-grit stone. You are almost finished. Tip: You can move the tool back 1/32" in the jig and hone a third bevel, another trick used by some sharpeners. If your entire bevel isn't getting polished after a few strokes, your stone likely needs to be trued.



Polish the secondary bevel on the 8,000-grit stone until it is a mirror.

Here's how to test your edge without flaying your finger open. Pull your thumbnail across the edge at about a 90° angle. If the edge catches and digs in immediately, you're sharp. If it skids across your thumbnail, you have more work to do.



your thumbs to push the jig. For narrower chisels, put one finger on the tool by the cutting bevel and push the jig from behind with one finger.

With the cutting bevel ground, it's time to refine the leading edge to a keen sharpness.

### Honing: the Fun Part

Honing is quick and painless if your stones are flat and you've done the first two steps correctly. The first thing to do is to reset the tool in your honing guide. Loosen the screw that clamps the tool and slide the tool backwards about 1/8". Retighten the screw of the honing guide.

This will set the tool so only a small part of the cutting bevel will get honed. This speeds your sharpening greatly.

Start honing with a #1,000-grit waterstone, soft Arkansas oilstone or #320-grit sandpaper. I use the #1,000-grit Norton waterstone. Lubricate your stones as recommended by the manufacturer. Rub the tool back and forth on the stone. Turn it over and check your progress. You should see a secondary bevel appear up at the cutting edge. Rub your thumb along the backside; you should feel a small burr all the way across the cutting edge. If there's no burr, then you're not sharpening up at the edge; so continue honing until you feel that burr.

Once you have that burr, remove it by rubbing the backside across your #8,000-grit stone. Go back to your #1,000-grit stone and refine the secondary bevel some more until all the scratches on your secondary bevel look consistent. Use less and less pressure as you progress on this stone and remove the wire edge on the backside as you go.

Put the #1,000-grit stone away and get out a #4,000-grit waterstone, a hard black Arkansas oilstone or #600-grit sandpaper. Go through the same process you did with the #1,000-grit stone. Remove the wire edge on the backside with your #8,000-grit stone. At this stage, the bevel should look a bit polished in places.

Finally, you want to polish the secondary bevel with your finest-grit stone or #1,500-grit sandpaper. I use an #8,000-grit Norton waterstone. There are Japanese waterstones at this grit level, too. However there are no comparable oilstones. A translucent oilstone is somewhat close.

Polishing is a little different. You're not likely going to feel a wire edge on the backside of the tool after polishing the bevel. Work both the secondary bevel and the backside of the tool on the #8,000-grit stone and watch the scratches disappear. And when they're gone, you're done.

Test the edge using your fingernail – see the photo at left for details. Some people finish up by stropping their edges at this point with a piece of hard leather that has been charged with honing compound. I don't find it necessary. In fact, if you're not careful, you will round over your cutting edge while stropping.

Remove the tool from your honing guide, wipe it down with a little oil to prevent rusting and go to work on some end grain.

The tool should slice through the wood with little effort. And if that doesn't convince you of the value of sharpening, I don't know what will. **PW**

## Sharpening Jigs For Almost Every Job

There are a lot of honing guides on the market these days. After trying most of them, I'm convinced that two will handle most edge tools.

The gray side-clamp jig you see at woodworking shows is the workhorse in my kit. You can find this tool for about $12 to $14. None of these gray jigs I've inspected grinds a perfectly square edge, but they're close. Be sure to tighten the jig's clamp with a screwdriver when you fix a tool in the guide.

Veritas (Lee Valley Tools, 800-871-8158 or leevalley.com) has two guides. The original guide (below) handles many oddball tools, including skew chisels, shoulder-plane blades and irons that are tapered in width. The Veritas Mk. II jig does all this and comes with a special registration guide that allows you to set your honing angle with amazing precision. Plus, you can even hone back-bevels on your tools. It's fantastic for sharpening any tool with a straight cutting edge. For sharpening curved edges, you'll need something else. *— CS*

The original Veritas jig will help you hone tools that would normally have to be sharpened freehand. It's a good investment.

## Supplies

**Woodcraft**

800-225-1153 or
woodcraft.com

- Side-clamp honing guide #03A21, $11.99
- DuoSharp 10" coarse/x-coarse #817201, $124.99
- Norton 1,000/4,000 waterstone #818263, $54.99
- Norton 8,000 waterstone #822462, $89.99
- Veritas honing jig #03B41, $32.99

**Lie-Nielsen Toolworks**

800-327-2520 or
lie-nielsen.com

- Lie-Nielsen sells the Norton stones. The 1,000/4,000 stone is $45; the 8,000 stone is $75. There also is a 1,000/8,000 stone available for $65.

*Prices correct at time of publication.*

# SIMPLE, USEFUL
# Cabinet Scrapers

The cabinet scraper is an effective weapon in the war against tear-out.

by Don McConnell

Don McConnell recently moved from Ohio to Eureka Springs, Ark., to join the plane-making team at Clark & Williams. He's most recently kept busy creating custom furniture and ornamental carvings.

PHOTOS BY AL PARRISH

In trained hands, a cabinet scraper can prepare a surface for final finishing and remove localized areas of tear-out left behind by a hand plane or machinery.

The cabinet scraper (also known as a card scraper) holds a remarkable place among the traditional woodworking tools that are used to deal with especially dense timbers and difficult grain.

When woodworkers discuss hand planes that are able to deal with such woods, the talk invariably turns to earnest consideration of tiny mouth apertures, secure iron bedding, carefully considered angles, flat soles and a fine depth of cut.

The cabinet scraper gets included in such discussions, even though the tool – essentially a piece of thin steel usually cut into a rectangular shape – doesn't exhibit any of these traits. Its inclusion is based on the fact that it's capable of taking fine shavings while hardly ever tearing out the wood fibers. Further, the denser and harder the timber, the better the tool seems to perform.

The cabinet scraper is capable of this performance because, despite the fact that it's called a scraper, it actually is a self-limiting cutting tool when it's properly prepared, sharpened and manipulated. Let's take a closer look:

## Scraper Actually Slices

Without getting into a tedious analysis, this self-limiting cutting action is determined by the geometry and scale of the tool's burr, or wire edge, which enables it to perform as if it was a very finely set, high-angle smoothing plane with an extremely short sole. This, however, has consequences that place some limits on its usefulness, which we'll touch on in a moment. But first, a little about its traditional role in furniture making.

I was introduced to the cabinet scraper during my apprenticeship in traditional cabinetmaking, as part of a general approach to preparing surfaces for finishing. This approach consisted of truing up a surface with a try plane, addressing any localized areas of tear-out and tool marks with a smooth (or smoothing) plane, then following that up with the cabinet scraper only if there were areas of tear-out that the smooth plane could not address. The idea was to eliminate any surface defects with cutting tools because they remove material efficiently.

Any noticeable differences in surface texture or minor marks left from the cutting tools were removed (some might say obscured) by subsequent hand sanding. The argument was that sanding was less tedious (more efficient) for removing the very small amounts of material necessary to produce a uniform surface texture for finishing.

Many hand-tool woodworkers today are drawn to finishing right after cutting – avoiding sanding altogether. But for them, the cabinet scraper may actually complicate things.

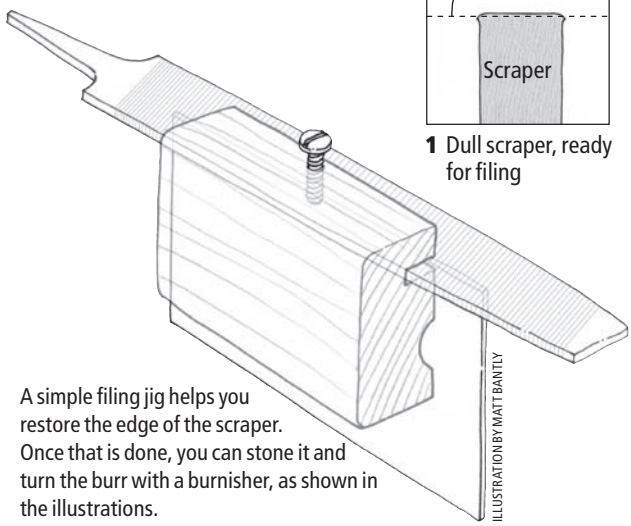
For one thing, if the surface texture from the scraper is different than from their smooth plane, they may not be able to use it on a small area of tear-out without having to scrape the entire surface. Also, because the tool performs as if it has an extremely short sole, it can be difficult to use over an entire surface without leaving obvious marks. This is particularly true at the ends of pieces (starting and stopping cuts) and in curly grain where it's possible to wind up with a "washboard" surface.

With enough skill and care, it may be possible to produce a scraped surface with nearly the same qualities you get with a finely tuned smooth plane, but it's going to be more tedious. In this instance, it may be more productive to lavish the same care and attention on a smooth plane to make it capable of handling the difficult woods – getting the mouth tight and learning to sharpen back bevels.

## Qualities of a Good Tool

So, what should you look for in a cabinet scraper? The choice of sizes and thickness depends to a large extent on each person's preferences and the type of work intended.

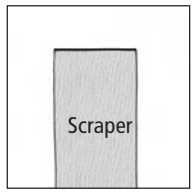
I think a good place to start is with a 3" x 5" scraper with a thickness between 3/64" and 1/16". It needs to be good quality steel so it will take a decent edge. It must be hardened and subsequently tempered so it's soft enough to be filed. And it must be ductile enough to allow you to form the burr with a burnisher, also called a ticketer. This hardness (about 53 to 55 on the Rockwell "C" scale) is in the same range that you find in good hand saws. In fact, many cabinet scrapers have been made from damaged saws.



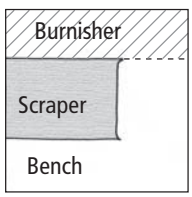

A simple filing jig helps you restore the edge of the scraper. Once that is done, you can stone it and turn the burr with a burnisher, as shown in the illustrations.



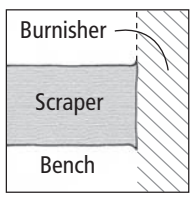

**1** Dull scraper, ready for filing



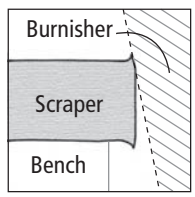

**2** Scraper filed and honed square




**3** Burnishing face of scraper




**4** Burnishing edge square




**5** Turning the hook; burnisher held at 8° to 10°

## Sharpening the Scraper

When new, the scraper may need to have at least a narrow strip at each edge of its faces honed and polished prior to any sharpening. Some commercial scrapers have been honed and may require only a bit of polishing on a fine stone. Others come straight from the final grinding used in producing the steel plate and will require more work.

First, file each of the long edges with a single-cut file to remove blemishes and produce a straight, square edge. This can be done by drawfiling freehand, or with a file held in a commercial or shop-made saw jointer. I've been successful with both methods, but I have come to appreciate the speed and predictability of using a file in a special jig, as shown in the illustration above.

Next is to hone and polish these filed edges on a sharpening stone. While a number of methods have been devised to hold the scraper square while honing (including resting it on the stone's box while honing on the stone's side and using a square block of wood as a guide on the surface of the stone), I've had good results by bowing the scraper slightly to widen the edge so it will register square on the stone. By skewing the bowed scraper in this fashion, I have found that I can hone all my cabinet scrapers on waterstones and avoid the localized wear that would otherwise occur.

After the edges are polished, it is customary to hone the adjacent faces on a stone, as shown in the photos on page 20. You want to arrive at four crisp, clean arrises at the juncture of two polished right-angle surfaces, as shown above. This largely determines the quality of your wire edge.

## Burnishing Turns the Burr

The last steps in forming the cutting/wire edge involve the use of a burnisher. The burnisher needs to be polished and harder than the scraper. New ones are relatively inexpensive, but my favorites are a couple of older ones I've found at flea markets.

The burnisher is used to deform, on a very small scale, the square arrises into a "burr," or wire edge. The standard approach is to first lay the scraper flat on your bench surface and run the burnisher along both faces near each edge, keeping the burnisher flat on the face with moderate pressure near the edge of the scraper.

Then, the burnisher is passed along the edge of the scraper to turn the wire edge. One way to do this is to hang an edge of the scraper off the edge of the bench and burnish in two steps as shown in the photos on the next page. The first stroke is kept perpendicular to the face to consolidate any small burr already in existence. Then, the burnisher is held at about 8° to 10° from vertical to form the burr – your cutting edge.

The amount of pressure you should use during burnishing is a matter of debate, and a real sense of this can be developed only through experience. I think the tendency of many beginners is to use too much pressure. After all, you are using a curved burnisher on a very narrow portion of the edge, so the pressure is very localized. I think it's better to start with a lighter touch and slowly increase pressure until you are satisfied with the results you're seeing. Too much pressure may pre-


Scrapers come in a variety of sizes and shapes to allow you to clean up mouldings and other curved work.

vent you from being able to renew your edge with just burnishing.

It would be logical to ask whether it is absolutely necessary to file the edge of the cabinet scraper at the beginning of each resharpening session. While theoretically it would be possible to remove burnished metal from the previous sharpening on a bench stone, it is simply easier and faster to do it with a file.

There are any number of methods to sharpen cabinet scrapers, including special commercial devices for burnishing the edges. I suggest that you explore the various options before settling on one because you should develop an approach you find both comfortable and predictable. Otherwise, the tendency is to wait too long to resharpen your scraper, resulting in a loss of efficiency (producing "dust" rather than shavings) and a poor surface quality on your work.

On the other hand, it is indeed possible to renew the cutting edge of the tool a couple of times by going back through the burnishing process before you get ready to begin the entire resharpening regimen. It's your call.

## Using the Scraper

Using a cabinet scraper takes a little practice. Each species of wood can require a slightly different angle of attack. When you're just starting out, you will want to flex the scraper a bit with your thumbs and hold the tool at about 60° to your work. Make minor adjustments in the angle and curvature until you produce fine shavings. After some practice, your hands will fall naturally into the correct position quickly.

When dealing with some of the more difficult grains, particularly in hardwoods, the cabinet scraper can be invaluable to a woodworker who has taken the time to learn how to sharpen and to use it correctly. It even can be useful for removing powered-planer marks in these difficult woods, without risking tear-out from a hand plane or needing to resort to some of the more heavy-handed power sanding techniques. **PW**

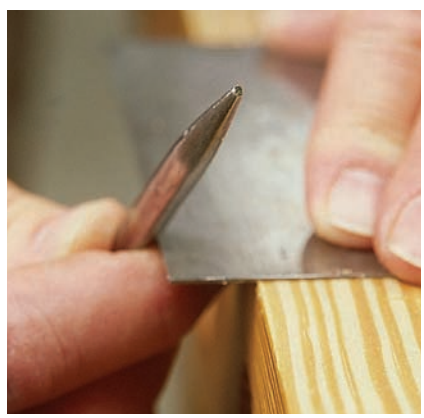
To drawfile a scraper edge, hold the file at an angle as shown and push it across the tool's edge. Cut only on the push stroke.

If you stone the edge freehand, bow the tool slightly to keep it flat on the sharpening stone.

After the edges are polished, you can hone the faces of the scraper, as shown.

The first step in burnishing is to consolidate the edge by running the burnisher flat on the face.

Next, hold the burnisher square – perpendicular to the face – and rub the edge.



Finally, to turn the hook, tilt the burnisher 8° to 10° and rub the edge with light pressure.

# SIDE-CLAMP Honing Guide

Ignore the naysayers. This jig produces square, sharp edges every single time.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

PHOTOS BY AL PARRISH

## Specifications

**Side-clamp Honing Guide**

Street price: $12 - $14

**For more information:** The jig is available through Woodcraft, Rockler, Lie-Nielsen and Lee Valley.

*Prices correct at time of publication.*

Many of my fellow hand-tool users give me a rash of grief about my simple side-clamp honing guide, which has been a fixture on my workbench since 1993.

"Isn't it time you learned to sharpen properly?" they ask. And then they rattle off a list of the advantages of sharpening freehand:

- Freehand is faster because you don't have to set up a jig every time you sharpen.
- You remove less metal with freehand sharpening so your hand tools will last longer before they're used up.
- Freehand sharpening produces edges just as sharp as those produced with a jig.
- The side-clamp jig won't work for odd-shaped or very short tools.
- Sharpening with a jig is just for beginners. Real hand-tool users can sharpen without this little one-wheeled crutch, they say.

To most of those criticisms I roll my eyes. I can sharpen freehand, and I'm pretty good at it. After all, some tools must be sharpened freehand because they won't fit in the jig properly (such as gouges and skew chisels), which is one of the few valid criticisms of the jig.

But most furniture makers spend more time sharpening bench chisels and plane irons than they do odd-shaped specialty tools. And when it comes to sharpening these basic and common tools, nothing beats this jig.

Here are the facts: Sharpening with the side-clamp honing guide is as fast or faster than sharpening freehand. Using a few well-placed marks on my bench, I can set a chisel or plane iron at the perfect sharpening angle in just a couple of seconds. After a few more seconds to secure the tool in the jig, I'm ready to roll.

Freehand sharpeners sometimes forget that it takes time to adjust the tool in their hands so its cutting edge contacts the stone at the right angle. And they have to make this adjustment every time they lift the tool from the stone.

As to the complaint that sharpening with a jig removes more metal and shortens the lifespan of the tool, I say "So what?" Few home woodworkers ever use up a chisel or plane iron in their lifetimes. If the jig does shorten the usable life of the tool, it's usually something that won't be a problem until our grandchildren use it decades in the future.

When it comes to producing a quality edge every time, sharpening with a jig is unbeatable. Beginners who have a jig can produce edges as good (sometimes better) than people who have been sharpening freehand their entire adult lives. This is because the jig takes all the guesswork out of the angle the tool must be held at during sharpening, and produces perfect and repeatable edges every time. Freehand sharpening is more prone to error. Even experienced sharpeners will occasionally round over an edge on a bad day.

As I stated earlier, one of the criticisms of the jig is indeed valid: You can't sharpen everything with it, but it does take care of 90 percent of my sharpening needs.

And as to the claim that the jig is a crutch for beginners, I disagree. This side-clamp honing guide is for anyone who wants square edges every time they sharpen so they can get back to woodworking. As a bonus it offers results that are easily repeated – that's good no matter how skilled you are.

Sharpening shouldn't take years for you to master the muscle memory. This jig gives you good edges the first day you use it, and that's reason enough to own one. **PW**

## INSTEAD OF SANDPAPER, USE A

# Smoothing Plane

Tune up a smoothing plane and you will greatly reduce the amount of sanding you do. Here's how to select, fine-tune and use this oft-neglected traditional tool.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

In the days before sandpaper was common, fine furniture was prepared for finishing using planes, scrapers and little else.

Smoothing wood surfaces with a handplane is a skill, and doing it well takes practice. But the rewards are substantial. With a well-tuned smoothing plane, you can quickly take a piece of flattened wood to a ready-to-finish state. In fact, I find that in many situations, using a smoothing plane can be faster than using a modern random-orbit sander.

Also, surfaces that have been smoothed are different than surfaces that have been sanded. The wood fibers have been sheared cleanly instead of abraded. So the wood looks – in my opinion – luminous after it has been smoothed.

And finally, smoothing is healthier. It's a mild upper-body workout, though nothing like running a 5K. But more important, smoothing is better for your lungs. You're not producing clouds of the unhealthy lung-clogging dust that power sanding kicks up.

But before you can start smoothing, there are three important hurdles: selecting the right plane, tuning your tool and learning the basic strokes.


Smoothing planes – when set up and used properly – can eliminate a lot of sanding. Here's a tip for planing doors: Don't assemble the door and then plane it; you'll have to plane around corners and that's tricky. Instead, before assembly, plane the rails down so the stiles will be a little proud when the door is assembled. Then glue up the door and plane the stiles flush to the rails.

## Picking a Plane

For some, choosing a smoothing plane is like picking a computer operating system, spouse or a religion. It's personal, and people tend to get worked up and argumentative about it.

So let me say this: All good-quality smoothing planes can be tuned to handle most workaday smoothing tasks. Each kind of plane has its strengths and weaknesses; and in the end, you'll probably end up owning several smoothers. But before we talk about the different varieties of smoothing planes, let's look at the factors that make smoothing planes work well.

**A Well-bedded Iron:** Without a doubt, the most important characteristic of any plane is that the iron be firmly fixed to the body of the plane and not rock or vibrate in use (even the tiniest bit). If the iron isn't seated well, it's going to chatter.

**The Angle of the Iron:** Garden-variety Stanley smoothing planes have the iron bedded at a 45° angle to the work. This angle allows the plane to be pushed without too much effort and handles most straight-grained domestic woods without tearing out the grain. Some smoothing planes have irons bedded at 47½°, 50°, 55° or 60°. The higher angle makes the plane harder to push, but it increases the plane's performance on some tricky woods such as curly maple and situations where the grain is interlocked or wild. You'll get less tear-out with a high angle.

Other smoothing planes have an angle of attack that's lower: usually 37°. These low-angle smoothing planes work great on end grain, pretty well on straight-grained species and have mixed utility on the wild stuff. Sometimes a low-angle plane is the only plane that will work on a weird piece of wood. So they're good to have in your arsenal.

**The Throat Size:** This is a matter of some debate in the world of handplanes, but many woodworkers contend that a tight throat (the opening between the cutting edge and the plane's sole) is another key to reducing tear-out. There are a lot of physics involved in the reason why. But the dime-store-novel explanation is that a tight throat keeps the wood fibers pressed down before they are sheared by the iron so tear-out is less likely to start and then progress along the grain. I've found that a tight throat seems to help sometimes; and other times it doesn't seem to make a difference at all. It depends on the wood.

For many of the planes on the market, the throat is adjustable so you can try it either way and decide for yourself.

There are basically four different kinds of smoothing planes available: wooden-bodied planes, Bailey-style planes, low-angle planes, and infill planes. See the story on page 30 "Choosing a Smoothing Plane" for a discussion of the strengths and weaknesses of each type of plane.

## Sharpening for Smoothing

Without a sharp iron, smoothing is impossible. You must learn to put a keen edge on your iron and shape the edge for smoothing.

For a basic lesson in sharpening, check out "Sharpening Plane Irons & Chisels" on page 10. For a complete education on the topic, read Leonard Lee's "The Complete Guide to Sharpening" (The Taunton Press).

Unlike a chisel or the iron for a block plane, the cutting edge of the iron for smoothing planes needs to be shaped differently. With a chisel, you want a straight edge that's perfectly perpendicular to the sides. With a smoothing plane, you want the edge to have an ever-so-slight curve.

Here's why: If you smooth a piece of wood with a perfectly straight iron, the corners of the iron cut a small shelf in the wood. These are called "plane tracks," and they are undesirable. They feel like small ridges to your fingers and they can be noticeable after you finish your project.

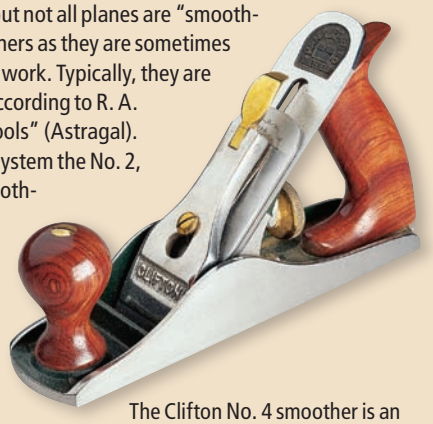
To reduce or eliminate the plane tracks, I like to do two things to the plane's iron. First, I clip the corners of the cutting edge. I usually do this on a belt sander or with a file. You only want to take off about 1/32" of the corner or so. And you want it to be a smooth curve – like the radius of the smallest roundover router bit you can imagine.

Then you need to sharpen the iron so it has a slightly cambered edge – so the iron actually scoops out the wood. The tooling marks left by an iron sharpened this way are far less noticeable.

Here you can see the different angles that smoothing planes commonly come in: a low-angle, a Norris 47½° pitch, 50° and 55°. The higher the pitch, the better the performance on tough-to-plane woods (but the harder the tool is to push).

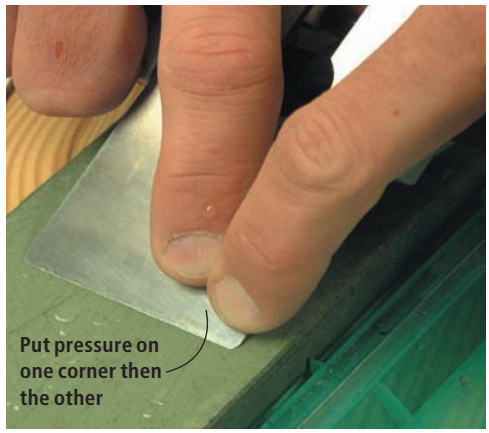
## What is a Smoothing Plane?

All planes smooth wood to some degree, but not all planes are "smoothing planes." Smoothing planes – or smoothers as they are sometimes called – put the final finishing cuts on your work. Typically, they are 6½" to 9" long and 2¼" to 3¼" wide, according to R. A. Salaman's "Dictionary of Woodworking Tools" (Astragal). In the common Stanley plane-numbering system the No. 2, No. 3 and No. 4 planes are considered smoothing planes. Wooden smoothing planes that have been made since 1700 are typically coffin shaped. Infill smoothing planes – which are based on Roman planes believe it or not – are usually the most expensive planes and are highly prized by collectors. *— CS*




The Clifton No. 4 smoother is an excellent modern-day handplane.


To avoid "plane tracks," clip the corners of your iron by filing a tight radius on the corners of your cutting edge.




To sharpen an iron for smoothing, work the corners on your sharpening stones. This will give your cutting edge a bit of a camber – which is perfect for smoothing.

Luckily, it's easier to sharpen an iron this way than it sounds, especially with a honing guide. As you sharpen your iron, most people start with a coarse grit, move up to a medium grit and finish on a fine grit.

At the coarse-grit stage, finish sharpening at that stone by moving your hands' downward pressure on the iron to one corner of the iron and then making about a dozen strokes. Then shift your pressure to the other corner for another dozen strokes. Sharpen at the medium and fine grits the same way. When you hold up the iron against a square, you should be able to see a curve or belly in the edge of just a couple thousandths of an inch.

For smoothing work, position your chipbreaker between 1/32" to 3/32" from the cutting edge.

Take a look at the throat on this Clark & Williams coffin smoother. See it? Neither can we. This is a tight mouth.

## Other Tune-ups

With your iron in good shape, make sure your chipbreaker (if your plane has one) is seated firmly on the back of the iron. Place it so its leading edge is 1/32" to 3/32" from the cutting edge. Placing it further back allows you to tighten up the throat more on planes that have adjustable frogs.

In general, the rest of the tuning is much like you would tune any plane. For smoothing, the sole of the plane should be as flat as you can make it. I flatten vintage plane soles on #120-grit sandpaper stuck to a flat piece of granite. Then I finish up on #220 grit.

The iron needs to fit perfectly on the plane and be secured as tightly as possible. For metal planes, this might involve tuning your frog: Flatten the face that contacts the iron, remove any burrs and make sure the frog attaches securely to the plane body.

With wooden planes and infills, this usually involves filing the wooden bed of the tool.

Then turn your attention to the device that holds the iron in place. On wooden planes, this is a wedge that might require a little sanding to seat just right. For infills and metal planes, the lever cap must be screwed down tight.

Now set your iron square to the sole. For planes with adjusters, set the iron so it projects a little from the sole. Turn the plane upside down and look down the sole from the front of the plane. Adjust the iron until it projects evenly from the sole, then retract the iron. Now advance the iron until it takes the lightest cut possible. Your wood should already be true – either from machining or earlier planing. Final smoothing removes just a few thousandths of an inch of wood.

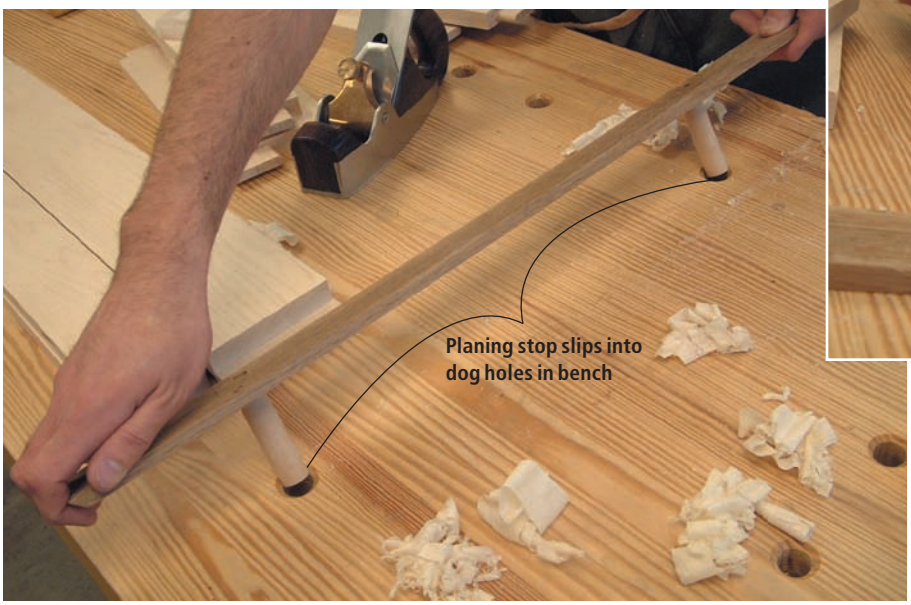
## A Stop Before you Start

The boards you plane need to be fixed on your bench so you can smooth them quickly. Some woodworkers use bench dogs and a tail vise equipped with a dog to secure the wood. This works, but it's a lot of trouble and should be reserved for times when your other efforts fail.

In my opinion, the best way to keep your boards in one place during planing is to use a "planing stop." This simple jig is a piece of hardwood that's 7/16" thick, about 2" wide and as long as your bench is deep. My planing stop has a couple dowels screwed to it that allow the whole thing to be slipped into two dog holes on my bench (see the photo at above right).

Place the far edge of the wood to be planed against the stop. The downward and forward pressure of your plane will keep most work pieces in place against the stop. Very narrow wood or irregular shapes require some thought to clamp. This little jig works for about 90 percent of my needs.

One more thing you should consider as you set up your area for planing: A lower benchtop height (34") is better for planing than a higher bench (36" or higher). With a lower bench you can use your weight to hold the plane against the work instead




A shop-made planing stop is a simple and effective way to hold your work for smoothing (left). The force you use to push your plane also holds your work down and against the stop (above).

of relying mostly on your arms. Old-time benches were 28" off the floor. People were shorter then, but you get the idea.

### Reading the Grain and Actually Planing

It's almost always best to plane with the grain. The illustrations at right show you what I mean better than words ever could.

Now rub some wax on the sole of your plane. I use squares of canning wax that I buy from the supermarket. It's cheap and effective. The wax cuts down on the effort required from your arms. Apply the wax again after a dozen or so planing strokes.

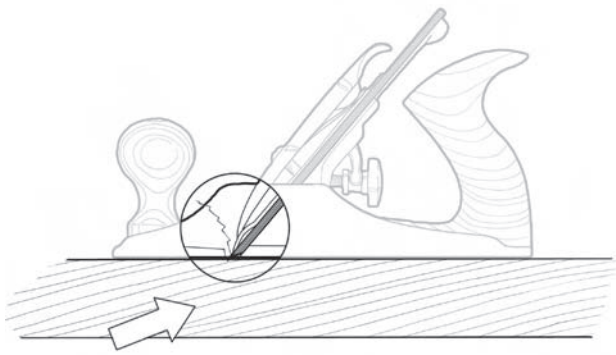
Grip the plane. Many smoothing planes require a three-finger grip on the rear handle. If your four fingers feel jammed in there, remove your index finger and wrap it on top of the iron.

The body mechanics you use when smoothing are the same as when you use a jack plane or other bench plane. Begin with the toe of the plane (the part below the front knob) on the wood with most of the downward force on that knob.

Start moving the plane forward. As you begin cutting, shift the downward pressure so it's evenly distributed between the front knob and rear handle (called the tote). At the end of the cut, shift your pressure to the rear handle or heel of the plane.

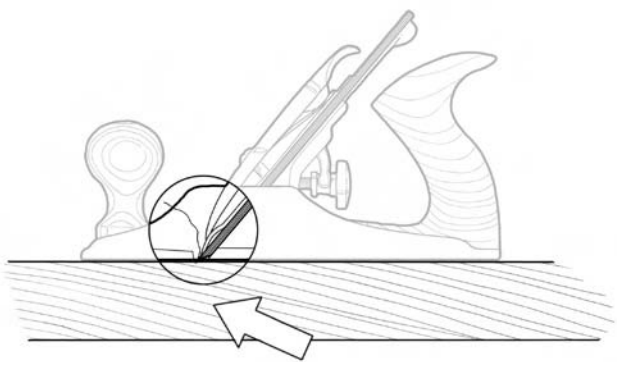
The shavings should emerge from the middle of the iron only. The edges shouldn't be cutting if you sharpened your iron correctly. To remedy this, you should tap the iron left or right to get it projecting squarely from the mouth.

Start planing at the edge of the board that's closest to you. After the first pass, make a second pass that slightly overlaps the first as you work your way to the other edge, and so on. Think of it like

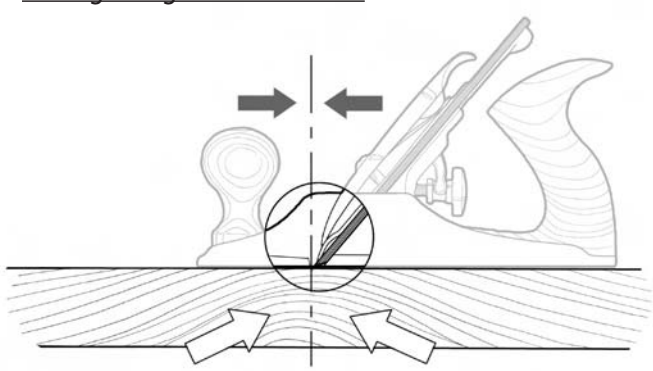


ILLUSTRATIONS BY MATT BANTLY

Planing against the grain – tear-out



Planing with grain – no tear-out



Reverse grain – plane both directions to avoid tear-out

A little canning wax on your sole makes the work easier and your cuts lighter. Some craftsmen prefer a little mineral oil.

See how the shaving emerges only in the middle of the iron? That's how you know your iron is sharpened and set correctly.

mowing a lawn. You want to avoid going over the same areas again and again.

I recommend that many beginning woodworkers start by planing Baltic birch plywood. I know that planing plywood sounds nuts, but it's good practice. The plywood has been sanded at the factory so it's easy to see where you are planing and where you aren't. Plus, the grain on this stuff is generally easy to plane.

When you have made it across your practice board, take a close look at the surface for tear-out and to make sure you're hitting everywhere on the face. A bright light at a raking angle helps this process. If the board looks good, run your fingers across its width to make sure you're not leaving plane tracks. If you are, it's probably one of three things:

- Your iron doesn't have enough (or perhaps any) curve at the cutting edge.
- You're taking too deep a cut.
- One corner of your iron is cutting deeper than the other; tweak the lateral adjuster.

## Problem Grain

Of course, wood is cantankerous. Sometimes the grain in a board will switch directions. Or sometimes you'll plane with the grain and get tear-out. Or – even more frustrating – a small section of the board will tear out but the rest of the board will be perfect.

Tear-out can happen with every wood: domestics, exotics, you name it. What do you do? The trick is to try different approaches until you find one that works. You might have to plane most of a board in one direction and reverse direction for a small part of the board. Here are the things I do to tame tear-out:

- Try skewing the plane. Sometimes by angling the plane's body (which effectively lowers the cutting angle) magical things happen. But sometimes things get worse, too (black magic?).
- Try a different plane or reconfigure yours. Depending on the length of the plane's body, the mouth, the angle of the iron and the wood, some planes work better on some woods than others. If you can tighten up the throat of the plane, try that. Or switch to a different tool with a higher angle of attack or a tighter throat.
- Sharpen the iron. A sharp tool is always less likely to tear out the grain than a slightly dull one. If you are planing a board that refuses to be tamed, try touching up your iron on a sharpening stone and then attacking your problem area immediately.
- Go against the grain of the board. Once in a great while I'll plane a problem board against the

This is what tear-out looks like. Avoid it. When a finish is applied, it looks terrible.

To tame difficult tear-out, I turn to my scraper plane, the Lie-Nielsen No. 85. This plane and the No. 80 cabinet scraper are the two easiest types to sharpen and use.

grain and it solves all or most of my problems. Wood, as I mentioned before, can be a vexing material.

• Shellac. Wipe on a spit coat of thin shellac to the problem area and let it dry for 10 minutes. Then give the area a try. This tip, which I picked up on the Internet, has worked for me. The shellac stiffens the fibers and allows you to shear them more easily. You only get a couple passes, though, before the shellac is gone.

• Scrape. My last resort is my scraper plane and my card scraper. The scraper plane handles the larger problem areas (half a board). The card scraper is for the small sections that refuse to behave.

Finally, just keep at it. Refuse to give up. Smoothing is one of those skills that seems to develop in fits and starts. Don't be ashamed if you have to resort to sandpaper or power sanding.

Another suggestion I give beginners is to begin developing their planing skills by smoothing the interior parts of their casework. If you botch things there, it generally won't show.

Then, when you think you've got that down, I encourage you to plane all the parts of a project and then power sand it with #220-grit paper. This will quickly point out where you planed too little or too much. Depending on how messed up things are you can continue with the sandpaper or go back to the plane.

Just remember: Sometimes a plane is the right tool for the job, and sometimes you need to resort to the random-orbit sander or the scraper. But as you get more experience with a smoother, I think you'll find your power-sanding equipment sitting dormant for longer periods of time. **PW**

Skewing the plane body during the cut can help in tricky grain situations.

A little shellac on a problem tear-out will stiffen the wood fibers and allow them to be sheared cleanly – sometimes.

# Choosing a Smoothing Plane

There are lots of brands of smoothing planes available, especially if you start adding in all the vintage flea-market specimens available.

I do have some old smoothing planes, but for budding hand-tool users, I usually recommend they buy a new, premium smoothing plane. Restoring a plane is a separate skill unto itself, and smoothers are tricky enough to tune anyway. Here are some of the smoothing planes I use in my shop, and their advantages and disadvantages.

## Veritas Bevel-up Smoothing Plane

Bevel-up (sometimes called "low-angle") smoothing planes are odd birds. Sometimes they are the only plane that will get the job done. Their advantages are that they have no chipbreaker to adjust, they work well on end grain (and miters) and you can adjust the throat as tight as you please – these tools have an adjustable throat like a block plane. The Veritas version is simple, well-made and costs only $169, a bargain in the premium-plane market. Veritas also makes a wider version of this tool that sells for $185.

One bonus is you can adjust the angle of attack simply by grinding a steeper bevel on the iron. That's because the bevel faces up in these planes. Grind the iron's bevel at 35° and you have a 47° smoother. Grind the iron at 48° and you have a 60° smoothing plane.

Lee Valley Tools: 800-871-8158 or leevalley.com.

## Ray Iles A5 Infill Smoothing Plane

I recently finished building an infill plane from Shepherd Tool Co. and produced an excellent tool. If you don't want to build your own infill, I recommend the Ray Iles A5 ($899.95). It's a reproduction of the legendary Norris A5. Iles has made many improvements to the Norris design, including the excellent blade adjustment mechanism. He also makes a Norris A6, which has straight sides instead of the coffin shape of the A5. And a large panel plane is in the works as of press time.

The iron is bedded at 47½°, making it a bit better than the standard Stanley 45° angle for tricky grain. The Ray Iles plane looks and performs beautifully. I recommend you check it out.

Tools for Working Wood: 800-426-4613 or toolsforworkingwood.com.

## Lie-Nielsen No. 4 With a High-angle Frog and a Lie-Nielsen No. 3

These Bailey-style planes are heavy, expertly made and easy to tune to a high level for beginners. I used to use the No. 3 ($270-$300) for about 80 percent of my smoothing. But since Lie-Nielsen has come out with a No. 4 plane with a 50° blade angle ($250-$325), I now turn to that for problem-grain boards, too.

The nice thing about Bailey-style planes is you can adjust the size of the throat so the planes can be used for rough and fine work. I am partial to the way you adjust the irons in this style of plane. The Bailey-style adjuster and separate lateral-adjustment controls are precise and hearty systems. These are world-class tools that you'll be glad you own for the rest of your years.

Lie-Nielsen Toolworks: 800-327-2520 or lie-nielsen.com.

## Clark & Williams 2¼" Coffin Smoother

Time for some honesty. I never liked wooden-bodied planes much until I tried those made by Steve Knight and Clark & Williams. Vintage wooden planes can be more difficult to tune than metal ones, in my opinion. These two plane makers have truly revived the art of wooden planes in this country. I'm partial to the Clark & Williams plane ($305, pictured) because of its particular ergonomics. The plane has no chipbreaker and a .005" throat. With the iron installed for a light cut, you can barely even see the throat. This is my plane of last resort. When I encounter grain that no other tool can tackle, the Clark & Williams with its 55° blade and tight throat has yet to let me down. Of course, because of the tight throat, it's good only for smoothing. These are beautifully made tools finished to a high degree. Other sizes are available.

Clark & Williams planes are available from Tools for Working Wood: 800-426-4613 or toolsforworkingwood.com. Knight's planes: Knight Toolworks: 503-421-6146 or knight-toolworks.com. —*CS*

# TRADITIONAL Wooden Planes

Hardly obsolete, these tools are capable of your finest work.

by Don McConnell

Don McConnell recently moved from Ohio to Arkansas to join the plane-making team at Clark & Williams. Most recently, he kept busy building custom furniture and creating ornamental carvings.

My heart sank as my master pointed to a 22"-long wooden try plane he suggested I use until I filled out my personal kit of tools. I was training as an apprentice at The Ohio Village, a "living history" site where visitors experience life in a typical 1860s Ohio town. Though I was intrigued by the wooden stock planes, the metal Bailey/Stanley-style planes were in regular use in the shop, and I felt I was going to be at a disadvantage using the more primitive wooden ones.

PHOTOS BY AL PARRISH

Wooden planes once were made for a dizzying array of woodworking operations, from dimensioning rough stock to cutting intricate joinery. Though there are only a few contemporary makers of wooden planes these days, vintage planes are still widely (and usually inexpensively) available at flea markets, garage sales and antique stores.

Deciding to make the best of it, and with my master's guidance, I ground and sharpened the iron (checking its fit to the bed, the cap iron and the wedge), and I jointed the sole. The mouth opening was pretty tight, so we decided to use it for a while before making a decision on re-mouthing it.

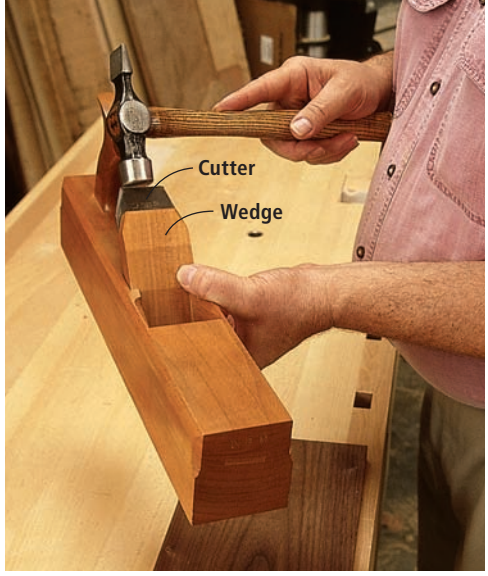
After some instruction on how to adjust and set the iron, as well as learning where to put my hands for face- and edge-planing, I took my first shavings with it.

To my relief and surprise it worked quite well. Further, I found that I liked the feel of the wood-on-wood action, the unique sound and the authority with which it took shavings the full length of the board. As a bonus, I found wooden planes less tiring to use during long planing sessions. I was hooked.

Clearly, my assessment of wooden planes had been off the mark. And the more I studied and used them (including making some for myself), the more convinced I became that their apparent simplicity belied a well-developed and sophisticated design, one that embodied the woodworking lore of generations of woodworkers, including specialized plane-makers from about 1650 on.

Historic evidence for the range and quality of work these planes can perform is found in the extraordinarily fine furniture made during the 18th century – furniture that is commonly accepted to be the zenith of American furniture-making.

Wooden planes were involved in the surfacing, thicknessing and dimensioning of nearly every element of that furniture. Indeed, the achievements of the cabinetmakers of that period were made possible, in part, by similar levels of craftsmanship the plane-makers of that century exhibited.




Adjusting a wooden plane's cutter isn't mysterious. To advance the cutter for a deeper cut, simply give it a light tap. Then, a quick hammer tap to the wedge will lock in your adjustment.

To make a lighter cut, tap the heel of the plane with your mallet and then tap the wedge. Some planes have a "strike button" on the top of the stock in front of the blade. You also can tap the strike to reduce the cut.

In this article I hope to give you a broader appreciation of these tools and to provide some clues regarding the desirable features and characteristics to look for in older planes.

## The Wood of Choice

Except for some early New England plane-makers who used yellow birch for a time, customarily, plane-makers have chosen beech. While beech is not a "perfect" wood for making planes, it combines a number of characteristics that make it the best overall choice for use in plane-making.

It is reasonably hard and dense, giving it decent strength and wear resistance. Yet it is relatively easy to shape compared to sugar maple, for example, rendering it more workable for day-to-day work by plane-makers. It is small-pored, not prone to splintering and has a relatively smooth, polished surface. Despite an unfortunate tendency to check while drying, it is not particularly "rivable," thus it resists complete failure. Also, beech is readily available in an appropriate form and size for plane-making, so it is relatively economical.

Other woods – such as apple, boxwood and rosewood – have some features suitable for making planes and sometimes were chosen for use in special planes. But none of these woods had the combination of characteristics and availability to unseat beech as the customary wood of choice.

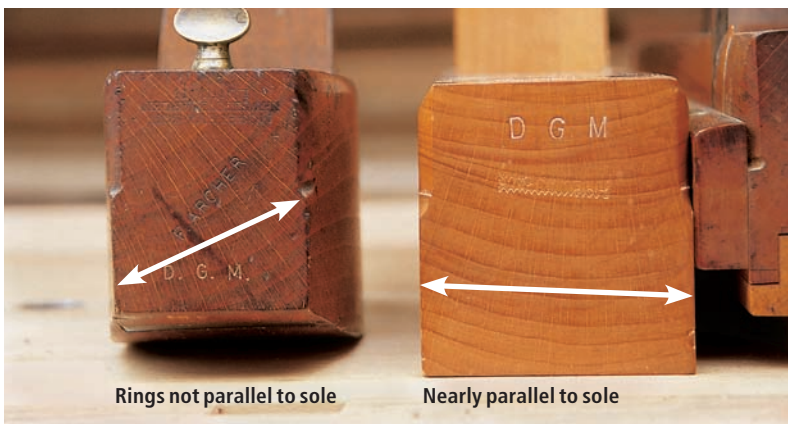
In addition to choosing beech, the best plane-makers exhibited their skill in the way they made use of it. For example, they selected straight-grained material that was relatively defect-free. This helped minimize any tendency of the tool to bow or distort through environmental changes.

Additionally, they almost invariably used quarter-sawn beech – orienting it so the annual rings of the stock were roughly parallel with the sole of the plane. One outcome of this is that the plane's body (commonly referred to as the stock) is much less likely to "cast," or go out of square, through seasonal changes.

Another result of the use of quarter-sawn stock in this orientation was that the overall dimensional movement of the stock was minimized. This brought about much less distortion of the plane's bed over time.

This orientation also resulted in a "plain-sawn," or tangential, surface serving as the sole of the plane. I believe this was done because plain-sawn surfaces are more resistant to wear. In my experience planing beech I have noticed that the plain-sawn surfaces are noticeably more recalcitrant – though I don't have technical data to back this up. Also, plane-makers used the "sap-side" surface as the sole. Some writers have claimed this surface was more wear-resistant than the "heart-side" surface, but I haven't seen any formal documentation of this.

Traditional wooden planes are made from quartersawn beech with the plain-sawn side acting as the sole, as seen at right. However, some exceptions do occasionally surface. In the compass plane at left, the plain-sawn side is not parallel to the sole.




Rings not parallel to sole  Nearly parallel to sole

Finally, if there was any noticeable grain runout in the plane blank, plane-makers customarily oriented the toe and heel of the plane so that any downward inclination of the grain was toward the heel. Thus, any abrasion of the sole would tend to smooth the grain rather than lift and roughen it.

### Adjusting the Cutter

There are several other aspects of traditional wooden planes that exhibit the same sense of refinement as the stock. But I thought it might be more useful to turn our attention to the perception that setting and adjusting the irons seems primitive and imprecise. This, in turn, gives rise to a common suspicion that wooden planes aren't intended for fine work.

While the means of adjustment seem mysterious, once understood they are both simple and capable of increasing the control and precision. Adjusting the plane can be a bit of an acquired skill, but in experienced hands, a wooden plane is capable of very fine work.

With wooden planes, it's important that the wedge, which secures the iron in the stock, fits well. If properly fit, this wedge will hold the iron with a surprisingly light tap of a mallet or hammer. (It's really best to watch someone with experience to get a clear idea of the amount of force involved.) This avoids distorting the plane stock, minimizes the chance of splitting the abutment cheeks and allows for more controlled adjustment.

Adjusting the iron is achieved through the simple physics of inertia. If you need to advance the set of the iron to take a deeper cut, use a hammer to tap the upper end of the iron. It then moves down relative to the stock.

If you wish to back off the set of the iron, you have a couple of choices. You can tap either the heel of the plane or the upper surface at the front of the plane (probably best if there is a "strike button," as shown in the illustration below) with a mallet.

Loosening the iron for sharpening is accomplished with somewhat sharper mallet raps in the same locations. Lateral adjustment is a simple matter of tapping the iron sideways as necessary. In each case, because the iron and wedge are both tapered along their lengths, you need to reset the wedge with another light tap before checking the set and putting the plane to use.

### Perfectly Simple

Perhaps it's fitting that these traditional wooden planes exhibit a certain elegance of design we normally think of as a modern industrial-design sensibility – a sensibility that stresses a straightforward and functional use of appropriate materials.

It's an elegance summed up by Antoine de Saint-Exupery (who was not only an aviator and author, but also an aircraft designer in the early 20th century): "A designer knows he has achieved perfection not when there is nothing left to add, but when there is nothing left to take away."

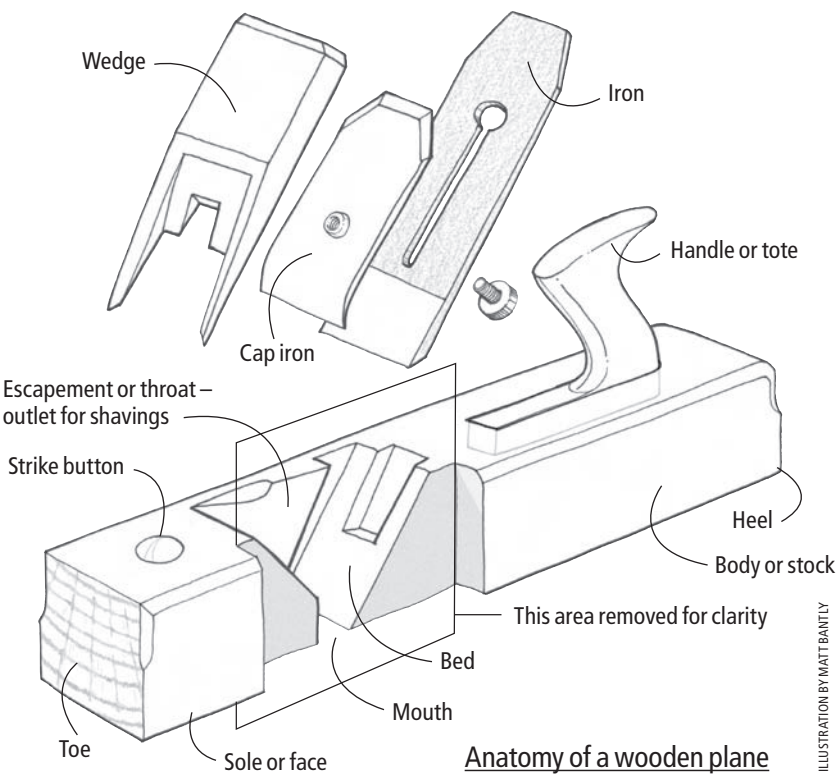
There are some long-term issues that arise because the stocks of these planes are wood, such as wear and dimensional changes caused by changes in environment. Also, because of the taper of the irons and the configuration of the throat of the escapement, the mouth opens as the iron gets shorter as it's sharpened and the sole is jointed.

While wearing of the sole is something of a reality, its significance is often exaggerated. Soles need to be jointed more often because of frequent changes in environment – not because of wear.

In any event, after the sole of the tool has been jointed many times, the mouth will open enough to degrade the performance of the plane. But that can be remedied with a wooden patch using simple woodworking skills.

One of the best reasons to consider using wooden planes is the wide variety of specialized planes available that can be useful for virtually any woodworking operation you can imagine. While they are not as easy to find as they once were, they continue to reappear for sale and can be very affordable. **PW**

A properly tuned wooden plane is a joy to use. Nearly every surface of traditional 18th-century furniture was shaped or smoothed with a wooden plane.




Anatomy of a wooden plane

ILLUSTRATION BY MATT BANTLY

# METAL-BODIED Jack Planes

A well-tuned jack plane can quickly trim doors, fit drawers and eliminate edge-sanding forever. If you've never successfully used a plane before, here's how to buy one, set it up and use it.

by Christopher Schwarz

Comments or questions? Contact Christopher at 513-531-2690 ext.1407 or chris.schwarz@fwpubs.com.

Let's be honest: Teaching yourself to use a hand plane without guidance is a challenge. It's like trying to teach yourself to drive an 18-wheeler. Don't let anyone tell yo different.

Back in the day – before the apprentice system was disbanded – journeymen cabinetmakers showed their apprentices how to properly sharpen the iron, how to adjust the tool and how to cut paper-thin shavings. Perhaps most important, the master was there to tell the apprentice what he was doing wrong when the plane stopped working well. "Your iron is dull; your frog is too far forward; your chipbreaker is set too far back. Here, this should fix things."

These days, unless you take a good class, you're on your own. So it should come as no surprise to you if you've had terrible luck using a hand plane. Unlike many power tools, there are myriad adjustments that must be made to adapt the tool to different planing situations. A plane set up to cut perfect shavings on sugar pine might not do so well on ash, white oak or hard maple.

Now before you give yourself up to a life of power sanding, let me tell you this: Learning to use a plane is worth every minute of agony and puzzlement. In fact, I personally couldn't imagine woodworking without hand planes – or without my table saw and jointer, for that matter.

The jack plane was once reserved for rough work in a shop with a full array of job-specific planes. But if you have just a few planes (or even just one) you should probably get a jack plane. With some tweaking, it can be used like a short jointer plane, or even as a longish smoothing plane.

Equipped with a fence, my jack plane cleans saw-blade marks off the edge of boards. I never worry about rounding over edges with a random-orbit sander. This isn't about "hand-tool heritage." It's simply a better and faster way to do things.

The same goes for trimming doors and drawers. The inset doors I fit with my jack plane fit better than those I've fit with a power jointer or table saw. Why? I have more control over where the cut stops and starts, so things are less likely to spiral out of control.

Finally, my jack plane excels at cleaning up band-sawn edges. I'll taper table legs on my band saw and clean up the tapers with a jack plane. Again, I have more control, and the tapers need no sanding when I'm done.

PHOTOS BY AL PARRISH

Some of the jack planes we've used in our shop. Inexpensive ones are OK (barely) for coarse work, but you generally get what you pay for.

### First, Learn to Sharpen

Before you'll have any luck with a jack plane, you need to get familiar with sharpening. The iron's edge must be keen, or the plane won't work. All the sharpening systems work; you need to find one that's right for you. Also key is choosing the shape of the cutting edge of your jack plane. You can sharpen it straight across for general work, or with a slight curve (just .002" at the edges) for fine smoothing work, or a large curve (an 8" radius) for coarse stock removal.

Once you learn to sharpen, you need to purchase a decent plane. Some years ago, I reviewed all of th jack planes then available on the market. Bottom line: the ones from the Far East had a lot of problems. If you want to buy a new tool that requires no tweaking, I recommend you buy a premium plane from Veritas, Lie-Nielsen or Clifton. If you're short on cash and have some free time, I recommend one of Stanley's classic 100-year-old planes, which you'll see at flea markets almost anywhere. See the story "The Venerable and Affordable Stanley Type 11 Jack Plane" on page 37.

### Set Up Your Jack Plane

All planes require some degree of "fettling," also called tuning. In general, the more money you pay up front for your plane, the less fettling you're in for. On average, expect to spend anywhere from one to six hours to fettle a plane.

If you've bought an old plane, you might need to work on the sole if you cannot get the tool to take a consistent shaving. But if you've bought a new plane and the sole isn't flat, send it back.

There are people out there who insist the sole must be lapped dead flat and be as shiny as a mirror. Others say that sole flatness is overrated and you need only to be worried about major warps.

It's been my experience that the truth is somewhere between. If you are going to use the tool for coarse work, the sole doesn't have to be even close to flat. If you're going to use this as a precision tool, sole flatness is a factor. In general I lap my soles so that the area in front of the mouth is flat. And I make sure that most of the sole (especially the edges) is flat behind the mouth. I don't worry much about the extreme front and rear of the sole. These are more likely to be out of kilter, especially if the plane has ever been dropped. And as to the required final sheen on the sole, I'm not much of a purist here, either. I've made a few soles look like a mirror, but it didn't seem to boost performance much. Lap until the tool works.

There are several ways to lap the sole, but the most important thing to remember is that the surface for lapping must be flat. Your choices include thick glass, a marble pastry slab or a metal casting – usually the wing on your table saw.

### Sandpaper or Silicon Carbide?

Next you have to choose an abrasive. Most people use either sandpaper or silicon carbide grit. In sandpaper, the choice product these days is called Alumina-Zirconia (and sometimes it's called Zirconia Alumina). This light blue-colored sanding belt is used for thicknessing wood in belt sanders and abrading stainless steel and titanium; so it's fine for a plane's sole. You can purchase it in belts from a home center ($6 for two belts; get some medium- and fine-grit belts to start), or order it from Klingspor (800-645-5555). Attach the belts to a flat surface using a spray adhesive.

The other option is silicon carbide powder. You sprinkle a few pinches of powder along with a light-bodied oil or kerosene on your flat surface and rub the sole until it's flat (see photo at right). You can buy a 4-ounce jar of #90-grit powder for $4.95 from

## The Jack of all Planes?

Many hand planes have nicknames that describe what they're used for: smoothing planes for smoothing, jointer planes for jointing, shoulder planes for trimming shoulders etc. But what does "jack" have to do with a "jack plane?"

Ever since I got into woodworking, people have told me that the "jack" refers to the expression "jack of all trades." The jack plane, it was explained, was a good all-around plane , so that's its nickname.

So I asked Graham Blackburn, the author of "Traditional Woodworking Handtools" (The Lyons Press) and a longtime hero of mine, about jack planes. According to Blackburn, "jack" is an expression used since the Middle Ages to describe something that is common, such as jack boots or a jack knife. The jack plane is indeed one of the most common sizes you'll find on the shelves of hardware stores. However, it could be argued that the "jack" refers instead to the most common sort of carpentry and construction work performed with this plane.

Indeed, Blackburn explained how carpenters called the plane a "jack plane" while cabinetmakers called the same instrument a "fore plane."And to make things even more complex, the premier English plane manufacturers of the day tried to separate their products from the common ones by calling the same-size plane a "panel plane."

But in the end, the people spoke, and in this country we call it a jack plane – no matter if the tool is used for the coarse surfacing of a piece of rough lumber, for fine furniture work or for trimming an interior door to fit its jamb on the job site. *— CS*

Lap the sole with the plane fully assembled (but with the iron retracted into the body). I start with #90-grit silicon carbide powder and kerosene. Rub the sole on your flat surface in a figure-8 pattern, being sure not to concentrate your efforts in one certain place on the sole or on the surface (above). It's like a big sharpening stone, and you don't want to dish the center.

Turn the plane over after a few minutes and check your progress. You can see the red marks at the toe and heel of the sole. This is the point where I'm ready to move up to a finer-grit powder or call it done.

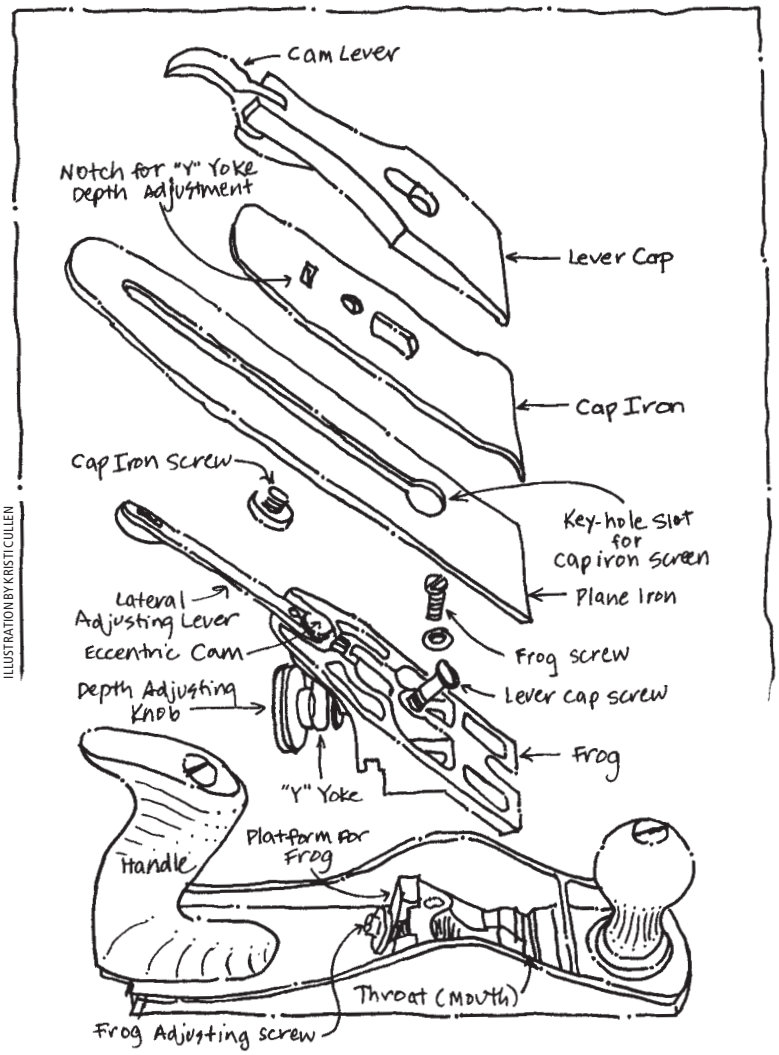



ILLUSTRATION BY KRISTI CULLEN

Lee Valley Tools (leevalley.com or 800-871-8158). Or you can buy a kit of five grits for $15.95. One thing worth mentioning is that if you use the powder on your table saw wing it will lower the sheen of the cast iron to a dull grey.

Usually, I prefer the sandpaper over the powder. It makes much less mess and leaves a shinier surface on the sole of your plane.

No matter which abrasive you choose, the method is essentially the same. Affix the sandpaper to or mix up a slurry on your flat surface using a few pinches of powder. Put your plane together as if you were going to plane wood, but retract the blade into the body. This is critical because the lever cap exerts pressure on the base casting and it can affect the shape of the sole slightly.

Now take a permanent magic marker and color the sole of the plane. I like red. Rub the plane for about 30 seconds on your abrasive surface and turn the plane over. The red spots are your low-lying areas. Continue rubbing the plane on the abrasive until you get as much red off as you can.

With the sandpaper, you will periodically have to use a brush to clean off the metal filings. With the silicon carbide, you will have to occasionally refresh the slurry with another pinch or two of the abrasive powder. When your sole looks good, move up a grit and continue your work. Keep doing this until you run out of finer grits or patience.

### Fixing Your Frog

The frog is the soul of your hand plane. It holds the iron steady so it won't chatter and hop across your work like, well, a frog. Essentially, you want your iron to seat firmly against the frog and the frog to screw firmly to the base casting.

First, fix up the face of the frog. On a medium-grit sharpening stone, rub the face of the frog to remove milling marks and high spots. As with your plane's sole, you can check your progress with a magic marker. Move up in grits as you did with the sole. Unlike the sole, this is quick work. I find that vintage planes usually benefit from this tweak – premium planes are always good to go.

Now screw the frog to the base casting. Notice the black rib between the two legs of the frog. Keep an eye on that rib. First position the frog about where you will keep it for general-purpose work. You want your mouth to be about 1/16" wide, perhaps smaller if you're going to use this occasionally as a smoothing plane.

Put the iron and cap iron in place and lock the lever cap. Check the mouth. If it's about the right size, remove the lever cap, cap iron and iron. Rub your finger over that rib. If it protrudes past the frog, you've got trouble. A protruding rib prevents your iron from seating against the frog. File the rib.

You also want to make sure that the base casting isn't interfering with the mating of the iron and frog. If your frog is set too far back, the blade will rest against the base casting and some point at the back of your frog. The result will be chatter. So move the frog forward a bit.

### Quick Cap Iron Fix

Another oft-neglected part of the plane is the cap iron, also called the chipbreaker. There are two common problems with this part. First, it doesn't mate tightly with the cutting face of the iron. And second, it doesn't have any "spring" to it. Luckily, both are simple fixes on new and vintage planes.

If you screw the cap iron to the iron and the cap iron doesn't have to bend even a little, that's usually a problem. If the cap iron bends so much that the iron bends, that's also a problem. Put the cap iron in a vise and bend it using your hands to increase or decrease the amount of spring in it. It's easy.

Now, screw the cap iron to the iron and hold the assembly up to a light. If you can see light between the cap iron and iron, you need to stone the edge of the cap iron. This is a quick fix, and I've found it necessary for all planes, regardless of the price tag. Put a scrap of wood next to your sharpening stone and stone the leading edge of the cap iron. It shouldn't take a lot of time; cap irons are made from soft metal. The scrap of wood keeps your cap iron at a consistent angle.

Reassemble the iron and cap iron and check your work. When the fit is tight, you're done.

Finally, while you're working on the cap iron, polish the top of the curved edge, too. Anything that reduces friction between the plane and the shavings will make your tool work better.

I use a DMT diamond stone to flatten the face of the frog, but any medium-grit stone will do. You'll have to work around the lateral adjustment lever, but you'll get most of the frog flattened this way.

Here you can see the difference a little stoning makes to your frog. Your iron is going to seat much more firmly against the frog once it's flat.

## The Venerable and Affordable Stanley Type 11 Jack Plane

I'm sorry to say it, but Stanley just doesn't make hand planes like it used to. Though the new English-made Stanleys can be tuned to perform adequately, you can easily purchase a plane from the Stanley Works' glory days for less. The only catch is that you might have to do a lot more tuning and cleaning than you would on a premium plane. But the results are worth it.

Without a doubt, the best bench planes that Stanley ever produced were the Bed Rock line of professional planes, which began production in 1902 and were discontinued after World War II. These planes are different than other Stanley planes in the way the frog mates with the base casting. Simply put, there's a lot more contact between the frog and base, so there's less opportunity for blade chatter. It's such a good idea that Lie-Nielsen Toolworks and Clifton use that same 100-year-old technology on their premium planes. But trust me, it's tough to afford a Bed Rock plane (unless you're prone to dumb luck at yard sales). They can be as expensive as a new Clifton or Lie-Nielsen.

In my opinion, the next best thing is a Stanley Type 11 plane. These planes, produced between 1910 and 1918, are common sights at flea markets. I've fixed up four of these planes and find them excellent. Here's why: The face of the frog of the Type 11s (and earlier planes) is a flat casting. Properly prepared, this frog will give rock-solid support to your iron and chipbreaker. Modern-day frogs have small ribs on the face of the frog that support the iron, so blade chatter is more likely.

So how do you know if you have a Type 11? It's pretty easy. Type 11 planes have three patent dates cast into the base behind the frog: March 25, 1902; Aug. 19, 1902; and April 19, 1910. As far as I know, it's the only Stanley bench plane with three patent dates. Additionally, the front knob is a low mushroom-shaped thing. Later planes have the same "high" knob as on planes today. There are some other trademarks of planes of that era, including the fact that the lever cap does not have "Stanley" cast into it, a feature found on planes made from 1925 until today.

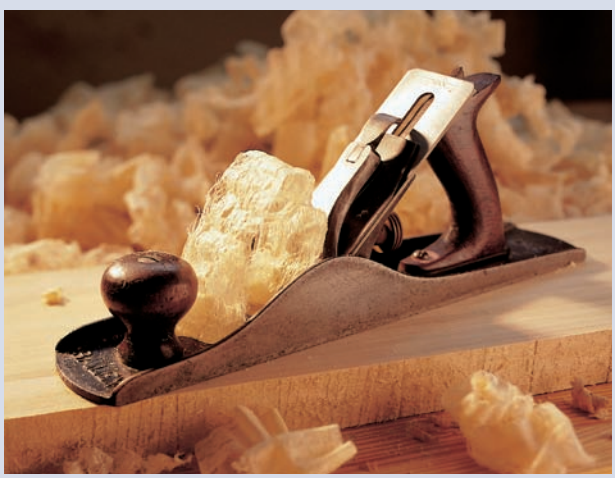
Sometimes you'll find a plane that has some Type 11 characteristics, but the plane might have a high knob or a lever cap with Stanley's logo cast into it. Likely you have a plane that has been assembled from parts from different eras. If the frog still has the solid cast face, it's worth considering. However, be sure to ask for a discount.

So how much should you pay for a Type 11? That depends on how pretty you like your tools. Nice examples fetch $30 to $40 on eBay. Planes with defects, such as a split in the handle or rust pitting on the iron, can be had for as little as $7.50. I've bought all mine for between $12 and $15, but each one needed a little work.

Many of these Type 11 planes have corrugated soles. The thought was that the corrugations would reduce friction while planing. The corrugations do make it easier to flatten the sole of the plane. You have to remove only about half the metal as you would on a sole without the corrugations.

Finally, I recommend you purchase a new iron for your Type 11. Hock Tools (hocktools.com or 888-282-5233), Lee Valley Tools and Woodcraft (woodcraft.com or 800-225-1153) all manufacture or sell aftermarket irons that are thicker and better made than stock irons. You'll be glad you did. — *CS*

The low knob is an immediate clue that the plane you're looking at may be a Type 11, a desirable and inexpensive option to many modern-day planes.



Take a few minutes to polish the top hump of the cap iron. Anytime you can reduce friction you'll improve planing performance.

You can stone the edge of your cap iron freehand, but a scrap piece of wood will make the operation foolproof and quick. Stone this edge until it seats tightly against the iron. A well-seated cap iron will save you from disassembling your plane every few strokes to clean out the shavings choking the mouth.

Here you can see the rib between the two legs of the frog. If this protrudes past the face of the frog, your iron isn't going to seat properly. File it down or adjust your frog forward.

Hold the plane upside down and look at it head on as you tweak the lateral adjustment lever. When the cutting edge and sole are parallel, back the iron out and go to work.

This is what your shavings should look like when your plane is properly set up for smoothing. This is the perfect setting for removing saw marks from the edge of a board or smoothing a board before finishing. If you want to hog off more wood in a hurry, advance the blade just a little more.

### Tricks for a Perfect Setup

The hard part is over; now it's time for a test run. Attach the cap iron to the iron. Set the cap iron so it's a little less than 1/16" back from the edge of the iron. This is a good, all-purpose setting. For rough work, set the cap iron back a little more. For fine work, move the cap iron forward slightly.

Put the iron assembly in place on the frog and put the lever cap in place. Now is a good time to check the setting of that screw in the middle that holds everything together. The screw should be tight against the lever cap but you should still be able to smoothly adjust the iron's cutting depth by turning the wheel behind the frog.

Turn that wheel until the iron protrudes from the mouth just a bit. Now hold the plane as shown in the photo at left and move the lateral adjustment lever until you can see that the cutting edge and sole are parallel. Now, without touching the lateral adjustment lever, retract the iron so it's almost protruding from the sole.

Get a piece of scrap. Try something easy at first, like poplar. Just like with your woodworking machines, you need to read the grain direction on a board when deciding which direction to plane. You want to plane with the grain. The wood fibers will likely tear out if you plane against the grain.

Turn the iron adjustment knob just a bit to advance the iron. It's important to note that you should always adjust the iron by increasing the depth of cut. This avoids what is called "backlash." If you retract the blade and then start cutting, the blade can back up during use because there is slack in the adjustment mechanism.

Push the plane over the board and see what happens. How you hold and push the plane is impor-

tant. Skew the body of the plane about 5° left or right as you push it forward; this will almost always improve your cut. When you begin the cut, keep most of the downward pressure on the front knob. In the middle of the cut, keep the downward pressure even on both the front knob and rear handle. As you finish the cut, most of the downward pressure should be on the rear handle. This takes a bit of practice, but it's worth it because your boards will remain true as a result.

After your first stroke, advance the iron in tiny increments until the plane starts to cut. If the plane seems to be cutting on one side only, tweak the lateral adjustment lever left or right. Just like with a ham radio, it's all about small adjustments. In a perfect world, shavings for a highly tuned smoothing plane should be the width of the blade (2"), about .001" to .002" thick and fluffy.

You'll also know if you're in the ballpark by the sound the plane makes. When things are going well, it sounds like "swish." When your cut is too heavy, the sound will have a grinding quality.

### Troubleshooting

Lots of things can go wrong for the beginner, so here are some things to think about. If the plane chatters or skips across the work, look for something loose. Is the frog screwed tightly to the base? How about the iron? Is it seated correctly on the frog? Is the screw that comes up through the iron assembly tight enough to keep everything in place? Have you checked for backlash?

Another common problem is shavings choking the mouth. Check the location of the frog. If it's too far forward for the cut you're making, the shavings will bunch up in the mouth. Next, check the fit between the cap iron and the iron. If it's not airtight, chips will bunch up there.

If the plane seems to cut inconsistently – that is, it cuts in some places on a board but not in others, you need to check two things. First, the board might be twisted, so you're only able to plane the high spots. Second, your lateral adjustment might be out of wack. Try adjusting the lever this way and that a bit.

Finally, just keep at it. Start working with some pine 2 x 4s, which is a forgiving wood that begs to be planed. Then try some poplar, which gives up wispy shavings easily. Then move on to oak, maple and cherry. With practice, all your common cabinet woods will do as you please.

And when you're ready to be humbled again, move on to the exotic woods. That's a bit like teaching yourself to steer the QE II, and that's another story. **PW**

With your jack plane set up for smoothing, you can easily trim fitted drawers to a perfect flush fit. If you have to plane the end grain of the drawer front and the grain direction of the sides dictates that the drawer front is at the end of your cut, be sure to clamp a back-up block to the drawer front (not shown). This will help prevent you from blowing chunks out of your drawer front.

Using machinery to trim inset doors so you have a perfect 1/16" gap all around is a real skill because it's easy to go too far. With a jack plane and the Veritas jointer fence, you can sneak up on the perfect fit. This method also removes any milling marks from your doors' edges, so you don't have to sand the edges once the door fits.

The Veritas jointer fence is a great accessory. It really shines when it comes to removing machinery marks from the edges of your boards. With the fence attached to a well-tuned plane, you'll produce shimmering straight edges that are ready for finishing. No more edges rounded by your sander, and no more toiling over the edges with a sanding block.

## Supplies

**Lee Valley Tools**
800-871-8158 or leevalley.com

1 • Veritas Jointer Fence
#05P30.01, $34.50

• Silicon carbide grit, 90x
#05M24.01, $4.95

• Silicon carbide grit,
set of five grits
#05M01.01, $15.95

1 • Glass lapping plate
#05M20.12, $10.50

*Prices correct at time of publication.*

# THE VERSATILE Block Plane

Get the most out of this common hand tool through proper tuning and good technique.

by Lonnie Bird

Lonnie is the author of "The Complete Illustrated Guide to Shaping Wood" (The Taunton Press) and teaches woodworking. You can learn more about his classes online at lonniebird.com.

My tool cabinet contains a number of planes – bench planes for smoothing, shoulder planes for trimming and even a full set of hollows and rounds. But the planes I use most often are block planes. I own a number of block planes and I reach for them several times a day to smooth away saw marks, level intersections at joints, trim miters and even create simple shapes such as chamfers.

What makes the block plane so versatile? Well, it has several features that distinguish it from other planes, such as its small size, adjustable mouth, low bed angle and a unique bevel-up blade. Let's take a closer look at each of these features.

### Small and Adjustable

Most block planes are compact so they can easily plane small parts or maneuver in areas that are too tight for a bench plane to reach. This is a great advantage when leveling joints in frames and casework. Additionally, the short length, dimpled sides and domed lever cap make the block plane fit easily in the hand and ensure a firm grip and good control in the cut.

For tear-out free cuts, the mouth of a plane must be as small as possible. It works like this: As the edge lifts a shaving, the sole of the plane directly in front of the edge presses the shaving down. This helps break the shaving and prevent tear-out. If the mouth of the plane is adjustable, it can be set for either a coarse or a fine shaving.

To adjust the mouth, bench planes use a movable frog – the casting that supports the iron. Adjusting the frog of a bench plane is a bit tedious. However, the toe of the sole on most block planes is a separate casting that slides in a machined recess in the front of the plane. This design makes mouth adjustments quick, easy and precise.

PHOTOS BY AL PARRISH

### Standard or Low-angle?

Another feature that distinguishes block planes is that they're available in standard and low-angle versions. This allows you to select a plane for the type of cut you want – face grain or end grain.

The angle refers to the bed angle. Standard-angle block planes are typically 20°, while the low-angle planes feature a bed angle of 12°. Realize, though, that the bed angle is not the cutting angle. Because the blade of a block plane is bedded bevel-up, the cutting angle is the sum of the bed angle and the grind angle. On a standard block plane, the cutting angle is typically 45°, the same as most bench planes. Low-angle block planes have a cutting angle of 37°. Which one is best for you depends upon the planing you plan to do. You'll probably want both. Here's why:

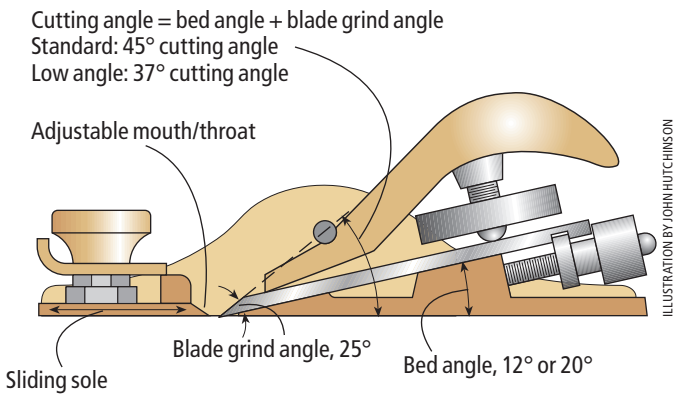
When planing end grain, a low cutting angle works best. End grain is tough, and a low cutting angle shears the fibers. But face grain requires a different approach. Although a low cutting angle will give good results on face grain much of the time, especially when the wood is moderately soft and straight-grained, it has a tendency to lift and tear out hard and highly figured wood such as curly maple. Here's where you need a higher cutting angle. In fact, the higher the better. The steep bevel of a higher cutting angle breaks and curls the shaving, which limits its tendency to splinter and tear.

That's where a block plane's bevel-up design is an advantage. The cutting angle can be altered simply by changing the grind angle on the blade. You can't do that with a bench plane; because a bench plane's iron is bedded bevel down, the cutting angle is determined by the bed angle of the frog.

On my standard block plane with a 20° bed angle, I've ground the iron to 30°, which yields a cutting angle of 50°. This steeper cutting angle, sometimes referred to as a York pitch, is quite effective at smoothing highly figured, difficult woods such as tiger maple.

When I need to trim the end grain on a miter, I use my low-angle block plane. The sum of the 12° bed angle and a 25° bevel angle yields a low 37° cutting angle – just what's needed for shearing tough, fibrous end grain. In fact, you can lower the grind angle another 2° for a 35° cutting angle. Any lower, however, and the edge becomes too fragile.

Finally, the bevel-up blade also means that the bed of the plane can support the blade much closer to the edge. This stiffens the blade where it needs it most and virtually eliminates chatter.




Anatomy of a block plane

There are many different styles of block planes. Some are new, others are vintage. Some are small, others are large. From left: Lie-Nielsen 60½ low-angle block, Lie-Nielsen 62 low-angle jack (essentially an oversized block plane), Stanley 60½ low-angle block, Lie-Nielsen standard-angle block and Lie-Nielsen 102 low-angle block.

### Other Block-plane Styles

Although the 6"-long block planes are most common, there are other styles you may want to add to your tool kit. Remember: Any plane with the iron bedded bevel-up is, technically, a block plane.

For example, take a look at a low-angle jack plane (page 41). At first glance it resembles another bench plane. It even features a wooden handle and knob like a bench plane. But the iron is bedded bevel-up at a low, 12° angle. Mouth adjustments are made with a movable toe piece. Although it resembles a bench plane, it functions as a low-angle block plane. And its large size gives it lots of mass for clean slicing through tough end grain.

Some plane makers feature a small, 5"-long block plane. Although the throat isn't adjustable and it is somewhat large for fine work, the tool's small size and comfortable shape make this plane feel like an extension of the hand. This plane is one of my favorites for light trimming and other less-demanding tasks during a project.

The sole of a block plane can be trued on sandpaper (#100 to #320 grit) supported on a granite reference plate.

A small mill file can rescue the bed of an inexpensive plane by ridding it of any defects. However, a light touch is key. You can easily overdo it.

### Tuning Your Block Plane

New planes vary widely in quality of workmanship and design. All new block planes require tuning, although the best ones require only honing the blade and adjusting the mouth. But many less-expensive planes require reworking to function. If you've been frustrated by your new (or old) block plane, you may find that it just needs a tune-up.

Start by examining the sole of the plane. It must be flat to provide support to the blade. A warped sole or one that was sloppily ground can be flattened by rubbing it on coarse sandpaper. The sandpaper must be supported by a flat, stiff surface such as a granite plate or the cast-iron top of a machine. I start with #100 grit and finish with #320.

The next step is to flatten the bed. On a quality plane the bed is large and dead flat. But less expensive block planes feature a small bed just behind the mouth and the surface often has burrs or a glob or two of paint. Although you can't increase the bed size, you can use a small, flat mill file to smooth away any defects. Be careful, however, and don't be overzealous with the file.

Next, turn your attention to the lever cap. The lever cap applies pressure to the iron just behind the cutting edge. To perform properly it must also be flat and free of leftover burrs or traces of excess paint. You can easily flatten the cap with a coarse, flat bench stone.

The next step is to sharpen the iron. Like all sharpening, it involves polishing the back and the bevel. Most new plane irons have coarse scratches in the back that remain from the manufacturing process. As each scratch intersects the edge, it forms a tiny serration that resists cutting and will tear out fibers. Start with a coarse bench stone and work through to the finest stone until the back of the plane iron is absolutely flat and reflects like a mirror. Then hone the bevel to the angle you have decided is best for your work.

Finally, install the iron in the plane and adjust it for a very fine cut. Then close the mouth of the plane so that a thin shaving can barely pass through. A tight mouth is critical, especially on face grain when planing.

## Proper Technique

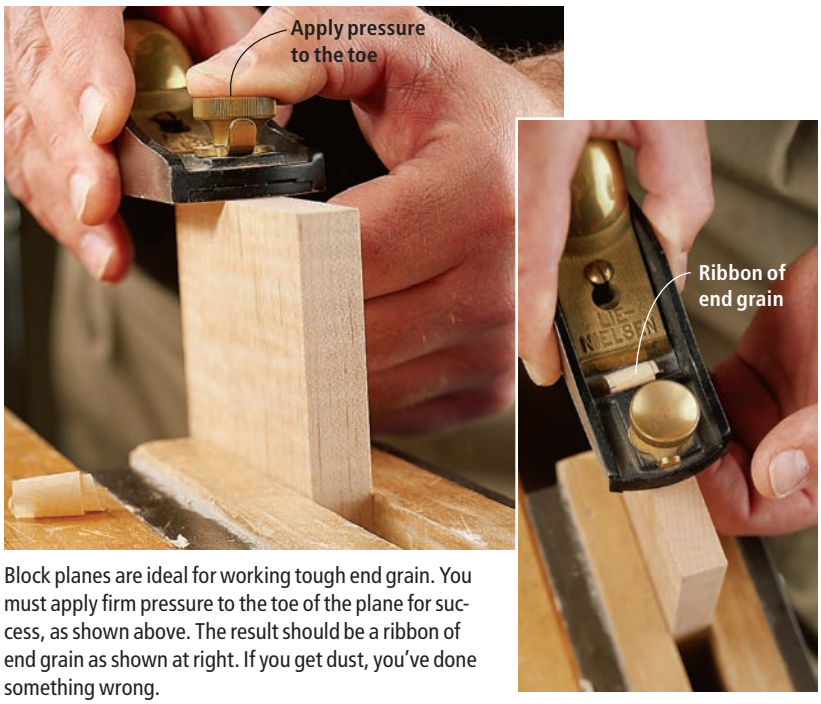
A sharp, finely tuned low-angle block plane can remove ultra-thin shavings from tough end grain. I often use a plane to skim the mitered surface of mouldings; the plane will smooth away all saw marks, ensuring a tight, gap-free fit. With the workpiece secure in a vise, I grasp the plane with one hand and apply firm pressure to the toe with the thumb of my other hand. A sharp plane iron and a light cut are the key to a clean cut here, along with smooth, positive strokes.

When planing the end grain of a board, you'll need to take steps to avoid splintering the grain along the edge. One approach is to clamp a backup board to the trailing edge of the workpiece. The backup board will apply pressure to support the grain and avoid splintering. Another method is to plane from both edges and allow your cuts to meet somewhere near the middle. I especially like this method when planing the end of a wide board such as a tabletop.

When fitting small drawers, such as those in a spice cabinet, the block plane is my favorite choice. I position the drawer against the bench stop and steady it with one hand while planing with the other. As I approach the intersection, I turn the plane 45° as I push the plane around the corner. This avoids planing across the grain and tearing the grain on either of the two pieces.

Chamfering can also be done one-handed. I usually chamfer the ends of chair legs, table legs and bed posts; this prevents them from inadvertently splintering as they're dragged across a floor. As with a drawer, you can position the leg against a stop while you steady it with one hand and plane with the other.

Although you can pencil in layout lines to guide you as you plane, I never do. The intersections at the corners will show you where you need to adjust the chamfer. Besides, I like a small amount of irregularity that's often associated with hand planing. It gives the work a classic look that says, "handmade." **PW**




Block planes are ideal for working tough end grain. You must apply firm pressure to the toe of the plane for success, as shown above. The result should be a ribbon of end grain as shown at right. If you get dust, you've done something wrong.

When planing a drawer, be careful not to plane across the grain when turning a corner. To avoid this, just turn the plane 45° as you round the corner.

Chamfering is done easily with one hand. Simply follow the intersections at the corners.

# THE ESSENTIAL Shoulder Plane

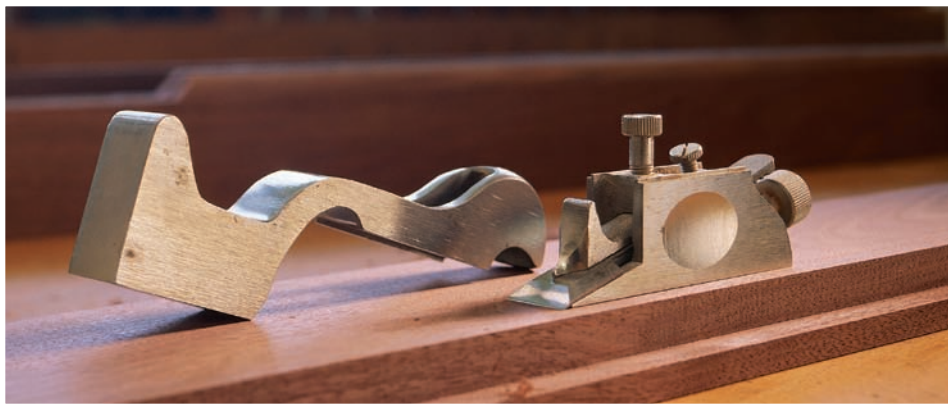
Learn to set up and use this great joint-fitting tool.

by Lonnie Bird

Lonnie Bird is the author of "The Complete Illustrated Guide to Shaping Wood" (The Taunton Press) and teaches woodworking. You can learn more about his woodworking classes at lonniebird.com.

For fine-tuning joints, the versatile shoulder plane is a must-have tool in your shop.

PHOTOS BY AL PARRISH



Some shoulder planes, such as the Stanley No. 92 shown here, feature a removable front piece, which transforms the tool into a useful chisel plane.

Because the sides of a shoulder plane are open, it's easy to trim into corners of rabbets.

It's hard to imagine woodworking without planes; I use a variety of planes on almost every job for smoothing, shaping and fitting. A sharp, finely tuned bench plane will smooth away the mill marks left behind by machines and create a distinctive surface that says "handmade." A set of hollow and round planes will shape a large crown moulding that would otherwise require a heavy-duty industrial shaper and a power feeder. And when carefully fitting tenons to their respective mortises, I reach for a shoulder plane.

The shoulder plane is the only tool that will take thin, delicate shavings from the tough end-grain shoulders of tenons. But it's not limited to trimming shoulders. The shoulder plane's open sides, fine mouth and low bed angle make it useful for a variety of tasks – essentially anytime you might want to take fine, controlled cuts into a corner. Whether it's shaving the cheek of a tenon for a snug fit within a mortise or fine-tuning a drawer runner deep inside a case, a shoulder plane is up to the task and will give you good results every time.

## It's Not a Rabbet Plane

I'm not one to get stuck on terminology, but it's pretty easy to get confused when shopping for a shoulder plane because many woodworking catalogs label these tools as rabbet planes. While rabbet and shoulder planes both have open sides for cutting into corners, there are some distinct differences between the two that affect how they are used in the workshop.

Basically, rabbet planes are designed for cutting rabbets while shoulder planes are designed for trimming. Rabbet planes usually come equipped with a fence and a depth stop to guide the plane and control the dimensions of the rabbet. Embedded in the sides of most rabbet planes is a "nicker" or spur that severs the fibers ahead of the iron when cutting across the grain. Shoulder planes lack these accessories. Because they are used for trimming, shoulder planes are guided by surfaces previously created by other tools.

However, the shoulder plane is a much more refined tool than its coarser cutting cousin. Don't forget: These finely tuned planes excel at trimming and refining surfaces. To perform these functions well, a quality shoulder plane has features that most other types of planes lack. First, the sole of shoulder planes are ground exactly 90° to the sides. This helps ensure square, accurate cuts. The iron is usually bedded at about 20° and ground between 20° and 25°. This yields a cutting angle of 40° to 45°, effective for thin cuts on end grain.

Of course, like a rabbet plane, the sides of a shoulder plane are open. This unique feature allows the plane to trim into corners of rabbets, tenon faces, shoulders and practically anywhere else a fine, controlled cut is required. Some shoulder planes, such as the Stanley No. 92, also feature a removable front piece that quickly transforms the tool into a chisel plane, another useful tool.

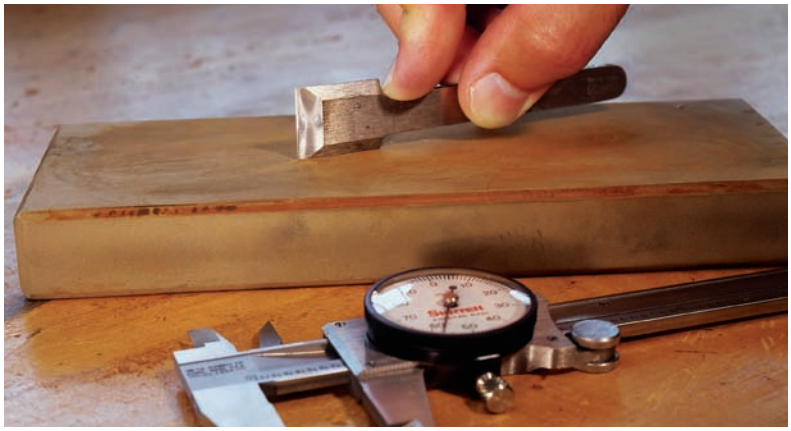
To eliminate chatter, the bed of a shoulder plane supports the iron almost to the cutting edge. This feature, combined with the extremely narrow mouth, allows the plane to remove thin, delicate shavings – just what is needed when fine-tuning joinery.

## Tuning a Shoulder Plane

For any plane to perform as expected it must be tuned properly and the shoulder plane is no exception. However, because a shoulder plane doesn't have nearly as many working parts as a bench plane, it's not quite as time-consuming to tune. Also, most shoulder planes are manufactured to more precise tolerances than bench planes, so they don't require the extensive reworking that many new bench planes do.

To begin tuning a new shoulder plane, first check the body of the plane to see that the sides are 90° to the sole. Fortunately most are, but if yours isn't, return it and request a new one. As you might imagine, reworking the sides to correct any deviancy from 90° is extremely difficult and labor intensive. Let the plane manufacturer correct this problem.

Next, check the sole for flatness. If the plane has an adjustable nose piece (which allows for adjust-



Your iron should be .006" to .010" wider than the sole. To get your iron to this width, carefully work the sides of the iron with a coarse stone. Check your progress with a dial caliper.

When planing end grain, as I'm doing here, be careful of splintering the grain at the trailing corner of the stock. To avoid this, simply plane from both directions and allow the cuts to meet near the middle.

## Sources

**Lie-Nielsen Toolworks**
800-327-2520 or
lie-nielsen.com

- Large shoulder plane No. 073, $225

**Highland Hardware**
800-241-6748 or
tools-for-woodworking.com

- Stanley No. 92 shoulder plane #031804, $99.99

*Prices correct at time of publication.*

Once your iron is ready for cutting, install it in the plane and adjust it for a very light cut. Simply sight down the plane and slowly advance the iron until you can see just the cutting edge of the iron.

ments to the mouth of the plane) make certain that the screw that fastens this piece is secure before checking the sole. If the sole of the shoulder plane is slightly out of true, you can correct the problem by lapping it on a diamond plate.

The next step is to sharpen the iron. It may be necessary to grind the iron; check to see that the edge is 90° to the sides. Unlike bench planes, shoulder planes don't come equipped with a lateral adjustment lever so there is little you can do to compensate for an edge that is out of square.

Although you can loosen the lever cap and pivot the iron slightly, this technique will allow for only a small adjustment. You're better off grinding the iron square to begin with. Grind the edge to a 25° primary bevel and, as always, make sure you don't let the steel overheat.

Before honing the edge, compare the width of the iron to the body of the plane. The iron should be slightly wider than the sole, at the most .006" to .010" wider (.003" to .005" on each side). If the iron is too wide (as it sometimes is) it will gouge the face adjacent to the one you're planing. If necessary, slowly and carefully work the sides of the iron with a coarse sharpening stone. Be careful and don't overdo it. Otherwise the iron will not cut into the corners. A dial caliper works well to check your progress as you work.

After honing, install the iron and adjust it for a very light cut. Next, sight down the sole of the plane and slowly advance the iron until you can see only the edge. Finally, adjust the mouth of the plane so that only the thinnest of shavings can pass through. Your shoulder plane is tuned.

### Using Your Shoulder Plane

Most shoulder planes, small or large, can be used one-handed. I use my other hand to grip the workpiece and position it against a bench stop. When planing long grain, such as when fitting the face of a tenon to a mortise, you can effectively plane all the way across the stock. However, when planing end grain, such as the shoulder of a tenon, planing all the way across risks splintering the grain at the trailing corner of the stock. Instead, plane from both directions and allow the cuts to meet near the middle.

When planing a wide shoulder, such as the end of a tabletop to receive a breadboard end, I reach for a large shoulder plane. Clamp the work to the benchtop and grasp the plane with both hands for the best control.

After a short time, you'll find the controlled, precise cuts from your shoulder plane to be addictive – and you'll find yourself using it often. **PW**

# PRECISION Edge Jointing

Even if you own a powered jointer, you can get a superior fit with a long hand plane.

by Don McConnell

Don McConnell recently moved from Ohio to Arkansas to join the plane-making team at Clark & Williams. He's been a demonstrater at the cabinetmaker's shop at The Ohio Village, and most recently kept busy building custom furniture and creating ornamental carvings.

I imagine a good percentage of you are wondering why in the world you should learn to joint a board's edge with a hand plane. After all, most woodworkers own a machine jointer and have gotten by without this hand skill.

However, having jointed edges by both hand and machine, I've found it requires a good deal of care to tune a machine jointer for precision edge-jointing. And it's almost always possible to improve the jointed edge by planing it by hand – even those edges from well-maintained machines.

Additionally, there are circumstances where a hand plane is the only way to achieve a true edge. A particularly long or heavy board can be too cumbersome to pass over a machine jointer. In this instance, the most effective method would be to hold the board stationary and shoot the edge by hand – if you have the planes and you know how to use them.

PHOTOS BY AL PARRISH

Learning how to joint a board by hand pays great dividends when you need a perfect fit or you are dealing with boards that are too long for your powered jointer. With a little practice, almost anyone can do it.

Some of you may already know the value of this skill, but you are not sure how to proceed and think it might be a bit too tricky to learn this technique. Or you may have already taken a stab at it and met with some frustration.

This article will show you an approach to edge-jointing by hand that is clear and basic enough to help anyone with average hand-eye coordination to begin mastering this fundamental skill. Specifically, the focus will be on the planes and edge-planing techniques involved, as I believe this to be the keystone to edge-jointing by hand.

## Getting Straight and Square

At its most basic level, this is the goal when shooting the edges of boards: Create two surfaces that will mate well enough so the glue will create a joint that will not fail under normal circumstances.

It's not accidental that the effort to gain this desirable proximity in edge-jointing involves the quest for straight, square edges. Rather, it flows directly from the critical functional characteristic of the planes woodworkers have used for millennia: The cutting action of the plane iron is regulated by the flat sole of the plane that's in contact with the surface of the wood.

If it were possible for the cutting edge to lie at the same height as the flat sole of the plane, every bench plane would cut in a straight line. However, things are not that simple. Because the cutting edge projects below the sole to take a shaving, bench planes tend to cut in a shallow, concave arc.

Many factors enter into the magnitude of this arc, but it's roughly a function of the length of the plane and the depth of the iron. The shorter the

Even if you don't have a jack on your bench for supporting long boards, you can use handscrews. Clamp one end in your face vise and the other end in handscrews that you rest on your benchtop.

plane and deeper the cut, the more pronounced the arc. Conversely, the longer the plane and finer the set of the iron, the more closely its cutting action will approximate a straight line.

That's why longer bench planes (20" to 24" try planes, 26" to 30" jointers) are typically used for final truing of surfaces and edges. Their length, in combination with irons set to take a light shaving, regulates the cutting action to closely approximate a straight line.

## Properly Applied Pressure

Throughout history, woodworkers have developed the following simple strategy for taking advantage of the cutting characteristics of these long hand planes.

The technique involves concentrating downward pressure on the toe of the plane as the cut commences and transferring that downward pressure toward the heel of the plane as the cut continues. The pressure is concentrated toward the heel as the cut ends. This helps ensure that the weight of the plane hanging off either end of the board doesn't interfere with the sole maintaining uniform contact with the material.

When edge-jointing, the principle of maintaining uniform contact between the sole of the plane and the edge is sometimes lost sight of. Often that's because some people think the plane needs to be tipped, laterally left or right, to correct an edge that is out of square. The unwanted consequence of this tipping is that it tends to defeat the self-regulating nature of the plane, causing your edge to have several surfaces, or facets, none of which are straight or square.

To plane straight edges, I recommend taking advantage of the inherent control of the plane by maintaining that uniform contact. By shifting your hand pressure as I describe in the photos below, you get a great deal of control, especially on boards that are ¾" thick or more. (For thinner stock, you can use an appliance known as a shooting board to great advantage.)

Surprisingly, when using this technique to shoot an edge with my try plane, if a straightedge indicates that the plane has left it very slightly hollow in the middle of the board I take it as a sign that the plane is functioning properly and my technique is sound. Though this idea may seem at first at odds with the purpose of edge jointing, that

When preparing a board for edge-jointing, I typically take a couple of strokes in the middle of the edge – starting and stopping before the ends. This slightly hollow edge is actually easier to put the final edge on.

When edge-jointing, it's important to pay attention to your body mechanics. At the beginning of your pass, apply considerable pressure to the toe (front) of the jointer plane and push forward with your other hand.

In the middle of the pass, the pressure should be equal fore and aft on the plane's body. At the end of the pass, as seen here, all of your downward pressure should be applied to the heel of the tool.

Use your fingers as a fence when edge-jointing. With your hand wrapped around the plane as shown, you can keep the plane registered on the edge and positioned laterally where you want the cut to occur.

A slight hollow in the middle is preferable. A hump in the middle of the board will likely result in joint failure.

largely proves not to be the case. We'll get back to this point in just a moment.

### Fix a Crooked Edge

First let's deal with the question of how to correct an edge that is out of square if we're not going to tip the plane laterally. The key is using a plane iron with a cutting edge that is slightly cambered. In other words, the cutting edge has a slight convexity.

A slightly cambered iron (only a few thousandths of camber is necessary) will take a slightly thicker shaving where the curvature is at its maximum, namely the middle of the cutting edge. We take advantage of this feature to correct an edge that is out of square by shifting the plane sideways (but keeping the sole in contact with the surface of the edge) so that the middle of the cutting edge is taking a heavier shaving at the high side – or arris. This allows you to bring an edge into square one shaving at a time.

Controlling the lateral position of the plane to correct for square is the main aspect of edge planing that differs from face planing. Rather than gripping across the top of the stock of a wooden plane, or the knob of a Bailey/Stanley plane, place your thumb on the top of the plane and curl your fingers under to grip the sole of the plane (as shown in the photo at left).

This technique allows you to use your fingers as a fence to control and influence the lateral position of the plane, while still using your thumb for downward pressure at the beginning of the stroke.

### Begin With a Slightly Hollow Edge

Edge-jointing generally takes place after at least one face of a board has been trued up. It's a good idea to mark the true face to ensure it is consistently used as the reference surface when checking the edge for square.

If an edge is in the rough or has a significant fault, a jack plane with a significantly cambered cutting edge can be used at the outset. A heavier shaving and more pronounced camber allow it to remove saw marks and major faults quickly. This will need to be followed up with a try plane or jointer, depending on the length of the edge.

In either case, the approach is the same. In my experience, it's desirable to remove any convex bow by beginning and ending a couple of strokes short of each end. Next, full-length strokes can be taken, following the basic techniques already described, continuing until full-length shavings are produced. This can be followed by, or combined with, manipulating the lateral position of the plane to square the edge up. Finish by taking one full-length shaving while keeping the plane centered on the edge.

After a pass or two, check your edge to see if it is square to the faces of the board. You can use the cambered iron of your plane to adjust an edge that is out of square, as shown in the illustration at right.

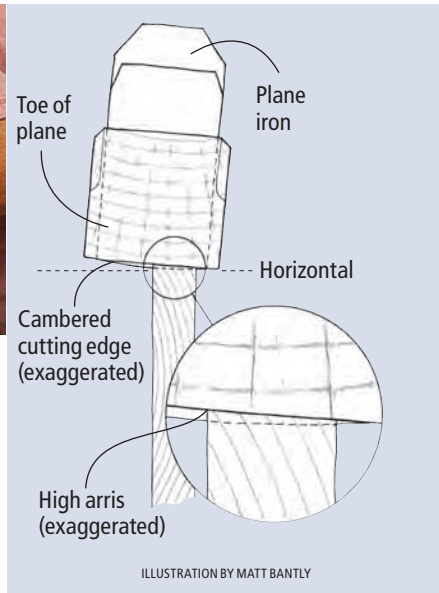



ILLUSTRATION BY MATT BANTLY

When both edges are to your satisfaction, one edge can be offered up to the other to test the fit. If it rocks, swivels in the middle or if the reference faces don't create a flat panel, adjustments will need to be made.

On shorter pieces, the slow arc of the cut of the longer try plane or jointer so closely approximates a straight line that it is possible to directly achieve a "perfect" fit. In fact, woodworkers have traditionally made use of the rapid adhesion of hot hide glue to do "rubbed joints" in these circumstances. In other words, the two pieces were rubbed together momentarily until the hide glue began to congeal and grab, eliminating the need for any clamps. I've successfully done this with aliphatic resin glue, but I feel safer using at least one clamp.

On longer pieces, woodworkers traditionally have made use of the slight concave arc produced by their planes to execute a "sprung joint." The rationale for leaving this slight hollow in the middle of the joint (to be pulled together with clamps) rests on the observation that the ends are subject to more stress through dimensional changes because of the more rapid moisture movement in the exposed end grain at the ends.

This rationale seems to have some merit, and generations of woodworkers have successfully used sprung joints. However, I am unaware of any research testing this rationale and it seems safest to minimize the clamping pressure required to pull any joint closed.

Edge-jointing by hand is not as difficult or mysterious as many might believe. While it takes some experience to feel comfortable with it, and every situation is slightly different, anyone can have early success at this task by making use of the control inherent in their planes. **PW**

The final test is to lay the board's mate on the edge you just planed. The top board should not pivot easily or rock on the board. If it does, you have a convex edge that needs to be removed.

# THE CASE FOR Handsaws

Why you should learn to sharpen and use these oft-neglected hand tools.

by Graham Blackburn

Graham is a furniture maker, author and illustrator. Look for his three-volume set of books on hand tools and traditional woodworking techniques at blackburnbooks.com.

PHOTO BY AL PARRISH

Far from being quaint anachronisms or symbols of outdated and inefficient technology, handsaws are precision instruments that deserve a place in every contemporary shop.

There are several reasons for such a claim, including safety, convenience and economy, but of ultimate importance for most woodworkers – whether professionals or hobbyists – is the fact that there are things you can do with handsaws that you can't do any other way. Including handsaws in your tool kit gives you more choices and can produce better woodworking.

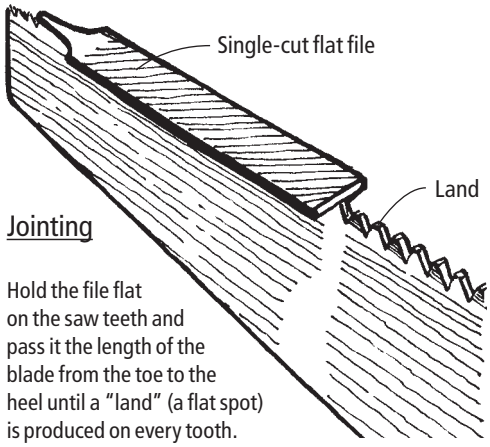
The most common and most useful handsaws are a dovetail saw, a backsaw (also known as a tenon saw), a rip saw and a crosscut saw.

The dovetail saw is your secret weapon for perfect joinery that lasts lifetimes.

The backsaw is an all-purpose saw for safe cuts on small workpieces – no one wants to push a small piece of wood (2" or less) through the table saw without all sorts of jigs and protection.

And crosscut and rip saws can be efficient alternatives to table saws and band saws when you don't want to change any of your jigs, blades or fences for a single cut. Plus, it's often easier to take the saw to the wood than vice versa.

Similar to all other tools, any handsaw must be properly tuned and skillfully used to be truly useful. But how can you tell a good handsaw from a bad one? How do you make sure it's in top condition? And what are the techniques to use it effortlessly and accurately in your shop?

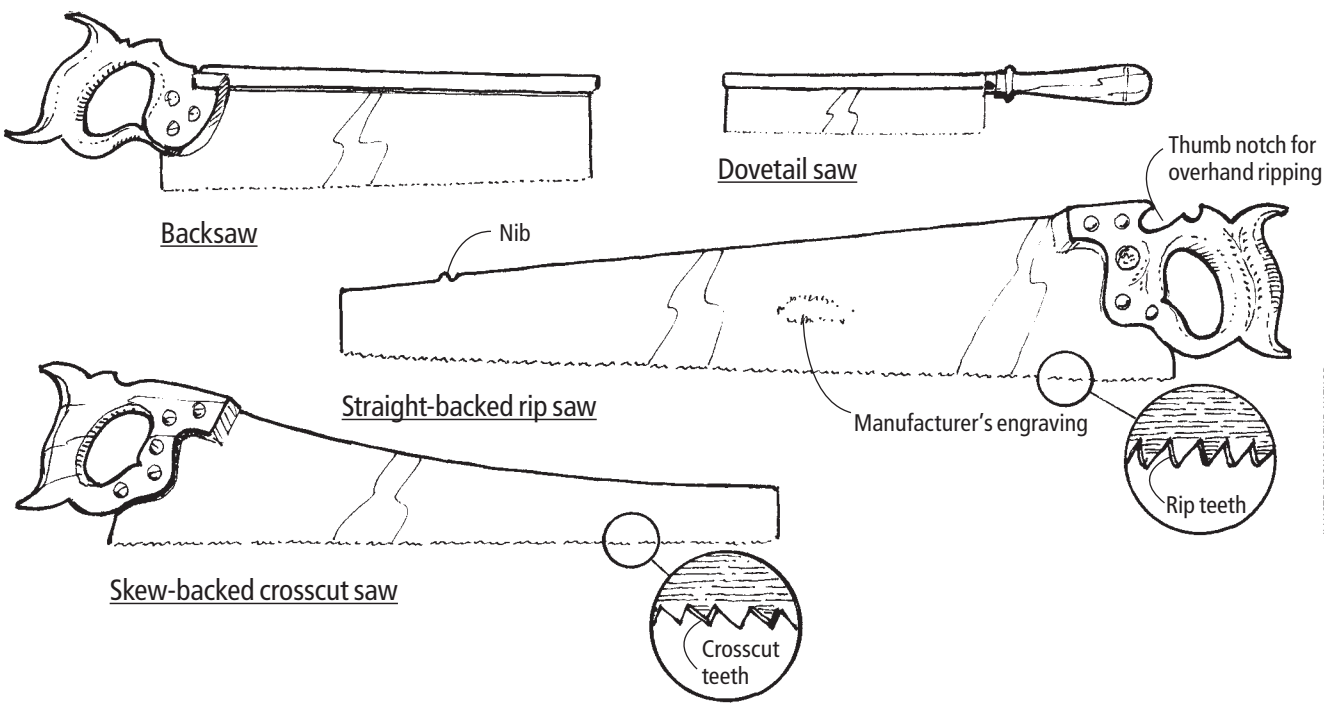



There is very little that is inherently difficult about handsaw use, yet the answers to these questions – for people raised on tools that must be plugged in before anything happens – have become virtual secrets. What was once common knowledge has been largely forgotten.

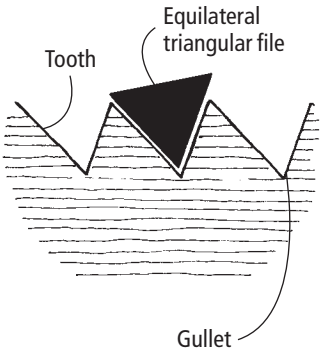
### The Tune-up

The first requirement is a sharp and well-set tool. There are three components to tuning up a saw: jointing, filing and setting. And none of these tasks requires a time-consuming or costly trip to the old guy who sharpens saws on the other side of town.

• Jointing simply means running a flat file along the top of the saw's teeth. This ensures that all the teeth will be the same height (so they cut evenly) and provides a clear guide for the next step.




ILLUSTRATIONS BY THE AUTHOR




How a saw file should fit

• Filing usually consists of no more than a couple of strokes with a triangular-shaped file placed between every tooth – in a particular manner and order. Three things make this process easy: understanding the particular shape of a given saw's teeth, using the right size file, and using a saw vise or an improvised wooden substitute.

Saws designed to cut along the grain, such as rip saws, dovetail saws and many backsaws, have teeth formed like a row of little chisels, as shown in the illustration below. Saws used for cutting across the grain, such as crosscut saws, have teeth filed to look like a series of little knives.

The files used to sharpen Western saws (as opposed to Japanese-style saws) should be equilateral triangle files, because no matter how aggressive the rake of any given saw's teeth may be, the angles formed between the teeth and the angles formed by the teeth themselves are always 60°. The right-sized file is one that is small enough to fit into the gullet between two teeth and large enough to file the entire slope of a tooth.

When you file a saw, you need to clamp the saw in a saw vise (or between two pieces of wood held in a vise) so that the teeth of the tool are just visible above the vise. To position the file correctly, you need to pay attention to three things (which are shown in the illustration at right):

First, hold the file perfectly horizontal.

Second, tilt the file so it fits down into the gullet and preserves the particular rake of the tooth. (This angle can be checked by dropping the file into a gullet at the extreme toe or heel of the blade where the teeth are unlikely to have been worn out of their original shape.)

Third, if you are filing a rip saw, hold the file perpendicular to the side of the blade. If you are filing crosscut teeth, angle the file back about 15°.

Now you are ready to file. If you abide by the following rules you'll never become confused when filing: Always start by clamping the saw so that the handle is to the right, then place the file to the left of the first tooth that is pointing towards you, at the toe of the saw. Hold the file as described above and take as many strokes as necessary to remove half the flat spot formed on the tip of the tooth when you jointed the saw. Remove the file and replace it to the left of the next tooth pointing towards you (this will involve skipping one gullet) and repeat the process until you reach the handle end. Then turn the saw around so the handle is to the left and place the file to the right of the first tooth pointing towards you at the toe of the saw. File until the remainder of the flat spot is gone from the tip of the tooth, then move the file towards the handle, skipping every other gullet. The whole process should take no more than a couple of minutes.

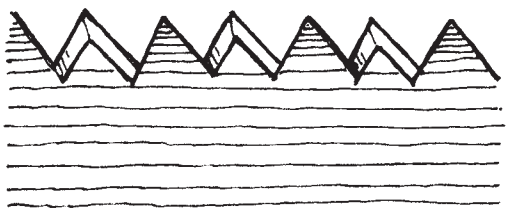
• Setting, the last operation, involves bending alternate teeth sideways so they cut a kerf slightly wider than the thickness of the saw blade. With no set, the friction caused by sawing heats up the moisture in the wood, causing the wood to bind on the saw. The wetter or softer the wood, the greater the set needed.

The tool used to bend the teeth, a sawset, is a small hand-held vise. Place the sawset on a tooth, squeeze the handle and it bends the tooth.

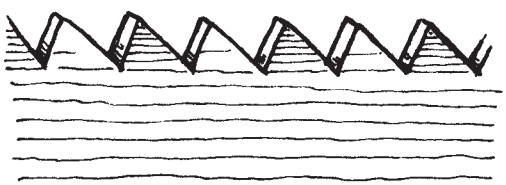
Modern sawsets can be adjusted easily to bend any size tooth correctly. Small saws with many teeth, such as dovetail saws, which are used for relatively small cuts in dry wood, need very little set. Large rip saws need considerably more set. However great the set, you should bend no more than half the height of the tooth – any more and the tooth may break off. This is not fatal, but like eating, the more teeth you have the easier the process.

More important than the amount of set is the evenness of the job you do. If the teeth on one side of the saw are set out more than the other, they will cut faster and cause the saw to "lead" – a term used to describe the tendency of the saw to wander from the line you're trying to follow.

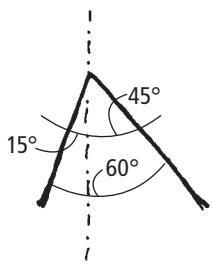
Sufficient and even set is therefore almost more important than actual sharpness. For this reason, set the teeth in the same way that you file the teeth: First set all the teeth that bend to one side, then turn the saw around and set the other teeth. This will tend to even out any differences.

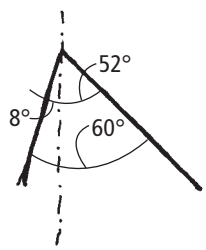


Crosscut teeth are filed with two bevels on alternate sides.



Rip teeth are filed straight across, producing a single bevel.




Filing Crosscut and Rip Teeth

If, after setting, the saw still leads, simply dress down the teeth on the side to which the saw is curving by running a flat file along the side of the teeth. Then check your saw to see if it still leads by making a test cut.

### Quality Tips

Even cheap saws can be tuned so they perform well, but quality saws will have more comfortable handles, better balance and superior blades that will stay sharp longer. Clues to finding a superior saw, old or new, include:

- Nicely formed wood handles (the more screws that hold the blade to the handle the better).
- A skewed back, rather than a straight back. This indicates a hollow-ground blade, which means the blade is thinner as you move further away from the teeth, thereby necessitating less set and a smaller kerf.
- Manufacturer's pride, which can be seen in items such as a brass back instead of a steel back on a backsaw, or fancier engraving (sometimes called the "etch") on the face of the blade.

### The Basic Technique

Also essential for efficient handsaw use is learning correct technique. Even the best saw will prove disappointing if you don't understand how it should be used. A lot of this is common sense, but to avoid reinventing the wheel, you need to know the basics.

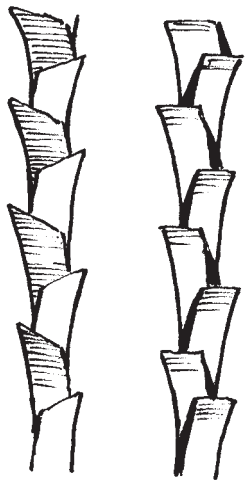
First, understand that handles are not designed to accommodate your entire hand. The idea is to insert only the lower three fingers of your hand into any saw with a closed handle; the index finger should be held alongside the handle, pointing forward.

Second, if you hold the saw like this while aligning yourself with the cut so that your eye is directly above the back of the blade, favoring neither side, you will take advantage of your natural ability to recognize verticality. Unless we are sick or drunk, most of us can tell more easily what is straight up and down than we can judge any other angle.

This basic positioning remains true whether you're sawing down an 8'-long oak board on sawhorses or making a 2" cut in a small workpiece held on your benchtop.

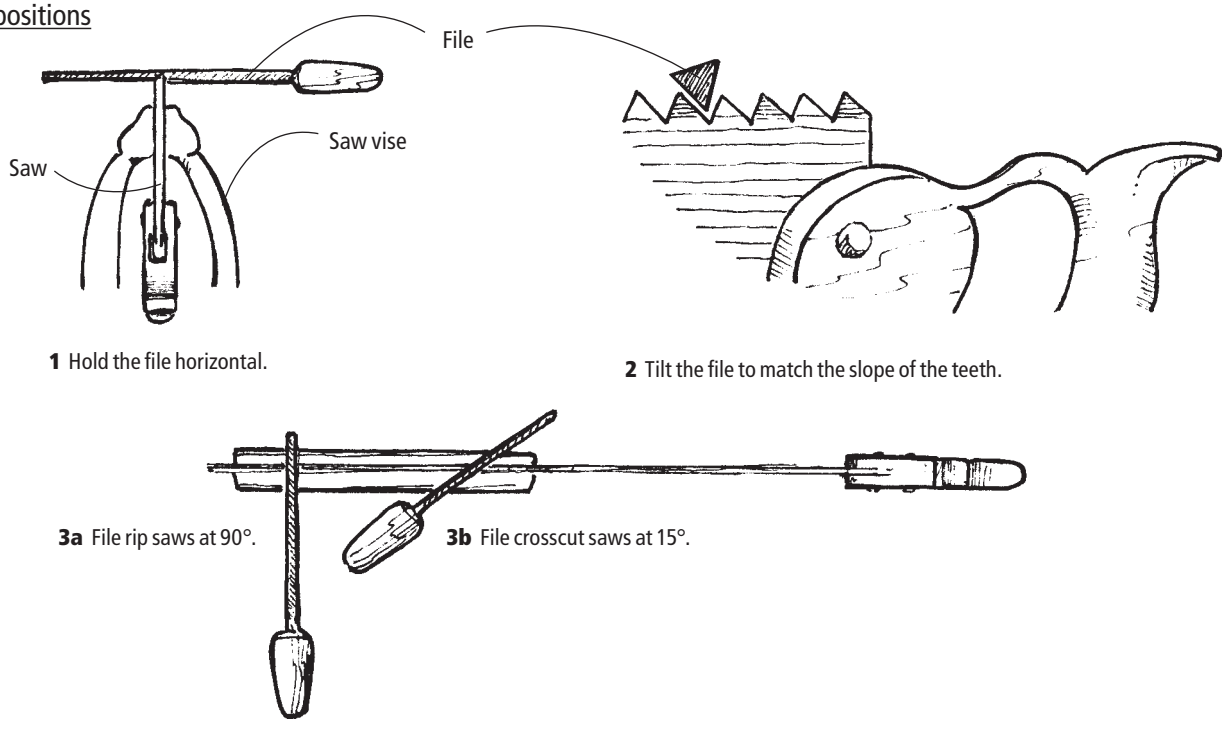
Next you need to know how to start a cut and at what angle the saw teeth should be presented to the work. Whether you're using a small dovetail saw or a full-size, 26"-long rip saw with four teeth per inch, start the kerf by placing the saw on the work near the heel of the blade (the end nearest the handle) and drawing backward for a few strokes. Resist the temptation to push until the kerf has been cut sufficiently deep for the saw not to jump out of it.

Guide the saw for these first few backward strokes by holding the work near the blade so the side of the blade rests against your extended thumb, as shown in the illustration on the next page. It's




Tooth set

Filing positions




**1** Hold the file horizontal.

**2** Tilt the file to match the slope of the teeth.

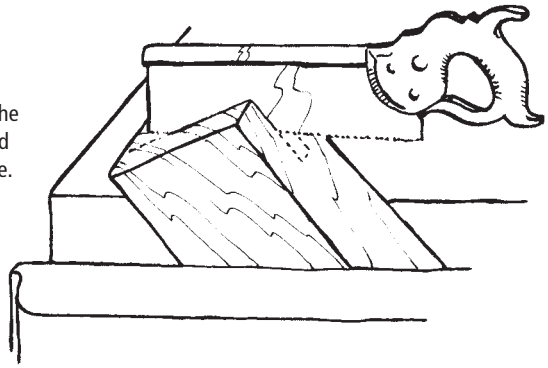
**3a** File rip saws at 90°.

**3b** File crosscut saws at 15°.

## Keeping the line visible

**1** Tilt the workpiece so that the layout lines across the top and down the front side are visible.

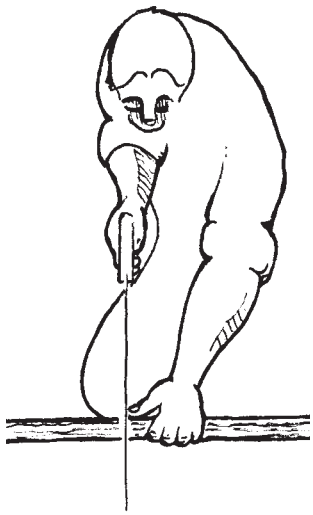
**2** Then turn the workpiece around so the layout line on the back side is visible – the previous kerfs will guide the saw.



very difficult to cut yourself as long as you're pulling the saw backward, but when you start to push forward you must move your thumb.

The initial back cuts and the first few forward cuts should be made with the saw at a fairly low angle to the work, about 20° or so. Once the kerf is well established you'll work faster if you raise the angle. Especially long cuts may require you to insert a wedge or screwdriver into the kerf to prevent it from closing up and binding on the saw if the board has been cut from wood that has grown under compression. When using a dovetail saw or a backsaw, the situation may demand a more horizontal stroke, especially if the workpiece is small and you're using a holding device such as a bench hook.

Remember to use the whole length of the blade instead of short strokes. This is a more efficient use of the entire saw and will demand less effort. In any event, you shouldn't have to push the saw with a great deal of force – if the saw is properly sharpened and set it should be able to cut through the wood under its own weight – if held at a steep enough angle.



## Hand and eye position

**1** Hold the saw vertically.

**2** Position your eye above the blade.

**3** Use your thumb to guide the saw for the first few backward strokes.

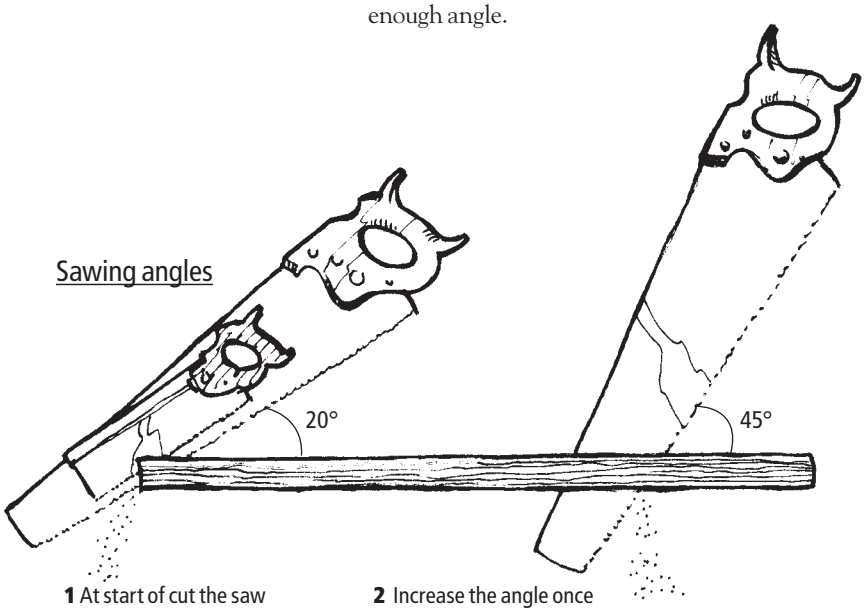
Also, always saw on the waste side of the layout line. This sounds obvious, but it implies that you position yourself and the workpiece so that you can always see the line you're attempting to saw on through the entire cut. It's easy to secure a piece of wood in the vise, align yourself carefully with the cut, then saw past the point where you can see the line.

### Guaranteeing Accuracy

In addition to the above techniques, remember that in traditional high-end woodworking, the use of hand tools is rarely synonymous with freehand hand-tool use. In the same way that you would be ill-advised to attempt to push something through your table saw without the aid of fences, miter gauges, hold-downs or sleds, it also is risky to use a handsaw without taking advantage of the shop-made jigs and guides that have been developed over the centuries to guarantee accuracy.

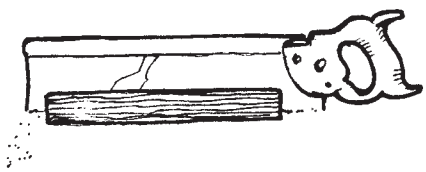
The most useful sawing aid for small workpieces is undoubtedly the bench hook. Easily made in a

## Sawing angles

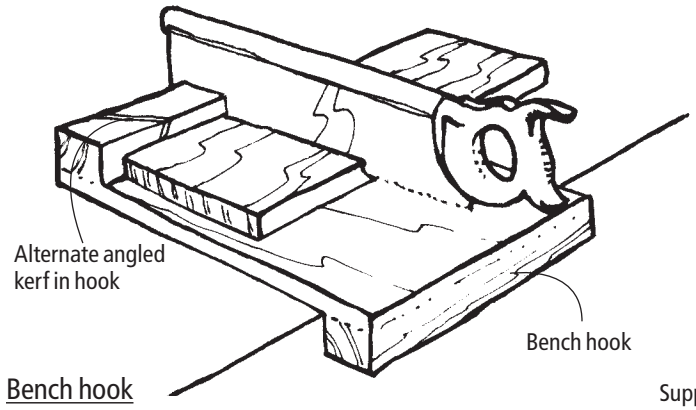



**1** At start of cut the saw should be at a low angle.

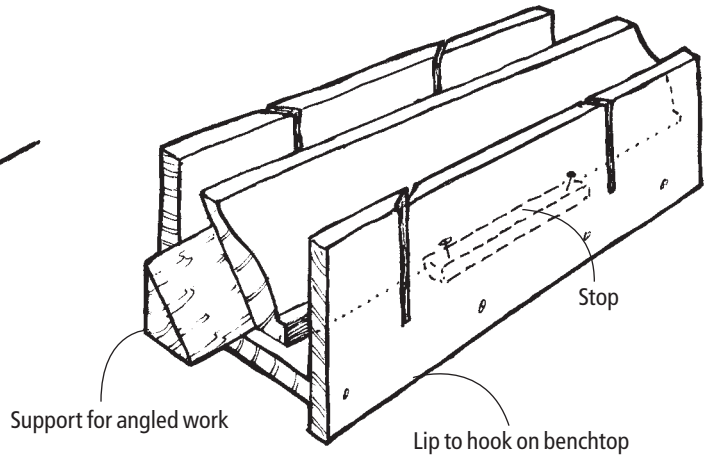
**2** Increase the angle once the cut is established …



**3** … unless you're using a backsaw for joinery cuts.




Bench hook




Shop-made miter box

variety of sizes (sometimes in pairs), the bench hook functions as a third hand for holding a workpiece securely. Also, if the hooks are affixed and kerfed accurately, it works as an accurate miter block.

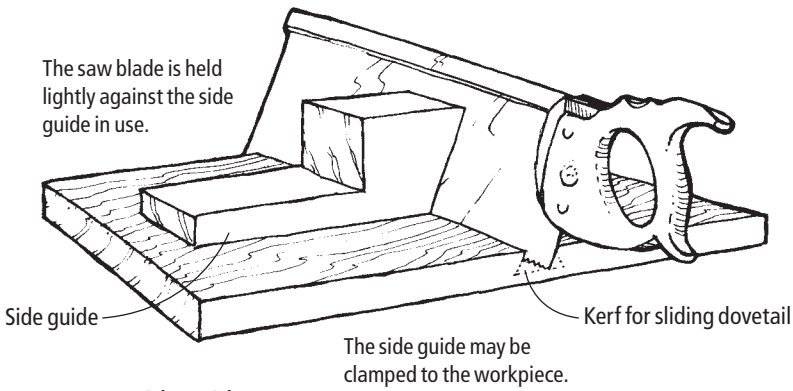
A metal miter box is useful but typically requires an especially large backsaw. You can use a dovetail saw or a regular backsaw with similar accuracy if you make your own wooden miter box, providing it has stops and wedges for complicated angled cuts.

When using either of the above devices, how you position the work determines if you'll get tear-out on the workpiece. If you position the work so that the shaped part of the moulding faces you as you work, the tear-out will be on the backside of the cut and then hidden from view. This is called "sawing into the cut."

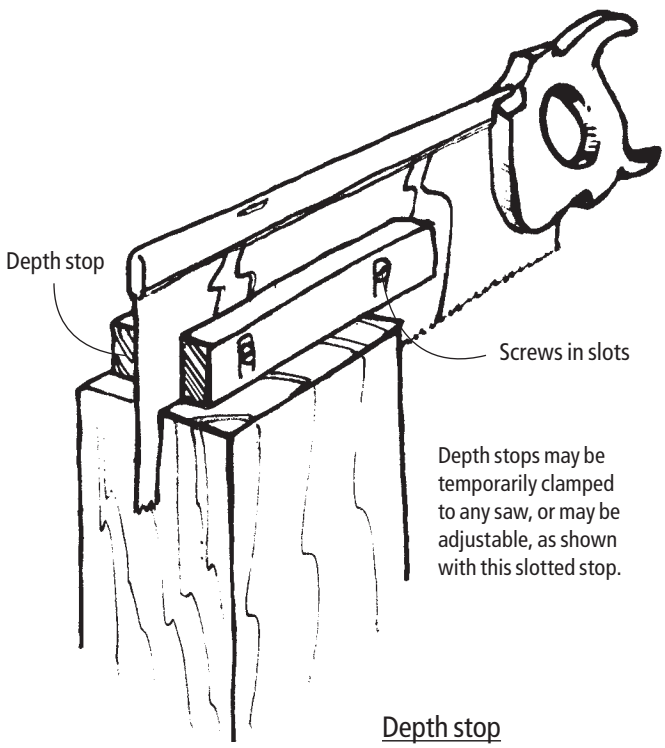
While bench hooks and miter boxes can quickly become standard equipment in many shops, there are numerous other jigs and guides that can be made easily as the specific need arises. A side guide, for example, can be cut with a face at any angle to provide a foolproof method for you to make wide, angled cuts in your work.

One of the easiest mistakes to make when using a handsaw is to saw deeper than intended. This kind of mistake can ruin tenon shoulders, dovetails, housed joints and many other cuts. Metal miter boxes usually are fitted with depth stops, but there is no reason not to clamp your own depth stop to the side of whatever saw you may be using, thereby guaranteeing a consistent depth of cut. You will frequently find old saws with a pair of holes bored through the blade – these once held screws that were used to attach a strip of wood that functioned as an adjustable depth stop.

Also, you should take advantage of quickly made auxiliary vise jaws to hold unusually shaped workpieces, such as round or curved sections, and remember whenever possible to position the workpiece so the cut you make is vertical. **PW**




Side guide




Depth stop

# HANDSAWS: East vs. West

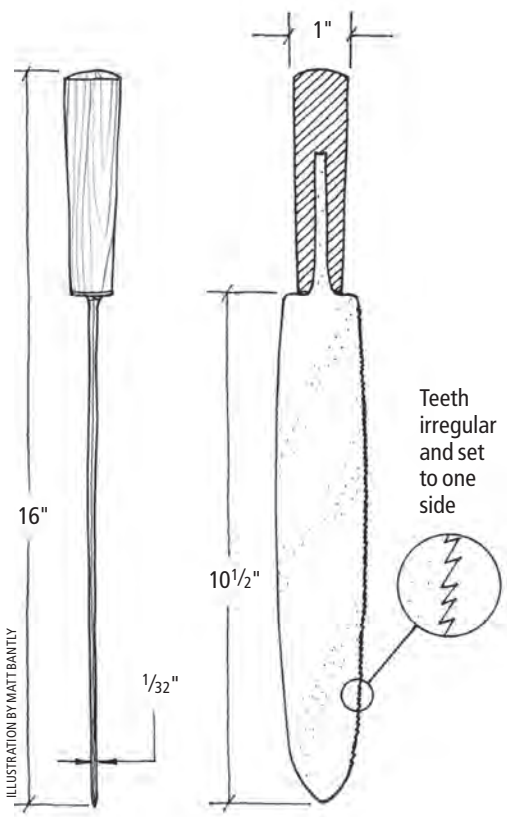
When comparing Japanese saws to Western saws, the difference is more than just pushing or pulling.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

It might shock you to hear this, but in the last decade or so more than three centuries of a Western tool-making tradition has been almost completely undone.

The Western handsaw, a tool that cuts on the push stroke and was the pride of the English-speaking world, isn't the tool most woodworkers now reach for when they need a handsaw.




Egyptian handsaw

It has been replaced by the Japanese saw, which cuts on the pull stroke and once was mocked by Westerners as "backwards."

The numbers tell the story best:

- Sixty percent of the saws sold by Lee Valley Tools are Japanese style, says Rob Lee, president of Lee Valley, one of the world's largest hand-tool catalogs, which sells both styles of tools.
- Woodcraft Supply Corp. sells 100 Japanese saws for every Western saw, says Peter Collins, a product manager for this large catalog, Internet and retail company.
- And Japan Woodworker, which sold many Western saws 30 years ago, now sells 1,000 Japanese saws for every Western saw, says Fred Damsen, the owner of the catalog company.

What caused this shift to Japanese saws? While some say it's because sawing on the pull stroke is superior to sawing on the push stroke, the issue actually is more complex.

And which saw is best? The prevailing wisdom says Japanese saws are superior and easier for beginners to learn. But if you've ever worked with a sharp, well-tuned Western saw, you know this can't be entirely true.

To answer these questions, we decided to scrutinize the two types of saws to learn their true differences, beyond the information in catalogs. Armed with this knowledge, you can choose a saw that's right for your woodworking and your budget. Our journey begins in ancient Egypt.

## The First Handsaws

Modern woodworkers would almost immediately recognize the first known metal saws, which were excavated in Egypt.


A Japanese-style dozuki


A Western-style dovetail saw

They had a long, knife-like blade, a straight grip and cut on the pull stroke, like a Japanese saw. Why the pull stroke?

Early Egyptian saws were made with a thin sheet of copper (as thin as 0.03") and had no rigid spine like the modern backsaw.

"(If they had been used) on the push stroke, the saw would have buckled and bent," according to Geoffrey Killen, author of numerous books and articles on Egyptian woodworking and the head of faculty at the Design and Technology Department of the Stratton Upper School and Community College in England.

One unusual aspect of these early saws is that all the teeth were set (meaning they were bent) to only one side of the blade. This makes the saw quite difficult to steer, and the Egyptians had to come up with ingenious ways of wedging the saw kerf open during each cut, according to Killen.

The advent of bronze tools brought some refinements, as did the iron saws developed by the Romans. But the form of the tool itself was still a pull saw with a thin blade.

It was the invention of the frame saw (which put the thin blade under high tension in a wooden framework) that finally allowed these thin metal blades to be used on either the push stroke or the pull stroke – much like a modern coping saw or bowsaw, according to "The History of Woodworking Tools" by W.L. Goodman (G. Bell & Sons). The frame saw might not have been invented by the Romans, but they certainly refined the form and produced a wide variety of them.

This is an important fork in the road in saw history that affects us to this day. The Japanese culture developed pull saws like the Egyptians, but they never seem to have developed frame saws, according to several students of Japanese history (although a Chinese frame saw did come into use in 15th century Japan).

So the Japanese, with their scarce metal resources and their traditions of working low to the ground, stuck with the pull saw and refined it to a high art.

In the West, most of the European continent stuck with the bowsaw. But the Dutch and English took a different path. In the mid-17th century, wider steel blades became possible thanks to water-driven mills, and the modern handsaw that cuts on the push stroke was born.

## The West Stumbles

The 19th and early 20th centuries were the golden age of Western handsaws. There were hundreds of saw manufacturers, fierce competition, high-quality tools and a very hungry market.

But as the demand for quality hand tools declined, so did the number of manufacturers. And quality slipped dramatically.

"Western manufacturers thought it was OK to ship a saw that was poorly set, dull and had a handle that looked like it was made by a third-grade art student," says Thomas Lie-Nielsen, owner of Lie-Nielsen Toolworks. "You couldn't use the saws

PHOTOS BY AL PARRISH

The Western handsaw, shown here being used by Don McConnell with an overhand rip grip, cuts on the push stroke.

right out of the box. It's no wonder the Japanese ate their lunch."

When Western saws suitable for cabinetmaking disappeared off the shelves, the Japanese saws quickly picked up the slack.

"In Japan, the product lines have not been cheapened," says Lee of Lee Valley Tools. "Even products that have been mass produced have not been cheapened."

So while it was tough to find a decent new Western saw at almost any price, the Japanese exported saws to the West that were sharp, straight, perfectly set and inexpensive. A good Japanese backsaw still costs only about $40. So it's little wonder that the Japanese saw now is in many North American workshops. It was, in many ways, a simple matter of economics.

Instead of benches, Japanese craftsmen use low trestles. Sawing a tenon with a Japanese saw this way is efficient and requires sawing at a less awkward angle than at a high Western bench. However, you need to be in good shape to work this way.

### Facts About Japanese Saws

Japanese craftsmen would be quite curious about the way Westerners use their saws. For one, we work on a high bench and clamp our work when sawing. The Japanese furniture maker works on a low sawhorse (6" high or so) and does not generally have a vise.

"(Westerners) tend to clamp everything," says Harrelson Stanley of JapaneseTools.com. "The Japanese don't clamp unless they have to. They do some wedging. Mostly they saw in toward a

## Advantages Of Japanese Saws

- Thinner kerf removes less wood, which means less effort.
- The inexpensive saws are of high quality and work very well right out of the box.
- The teeth are generally harder and can go longer between sharpenings. The best Western saws are 52-54 on the Rockwell "C" scale. Japanese saws are 51-58 for the handmade saws, and 61 and higher for the machine-made impulse-hardened saws. While the harder teeth stay sharp longer, they also are more brittle and prone to break.
- There are many manufacturers who sell a wide variety of saws with different teeth configurations (more than 100 kinds, by Harrelson Stanley's count) for every woodworking task and every type of wood.

## Disadvantages

- It's almost impossible for a woodworker to sharpen a Japanese saw. The teeth are too complex on handmade saws and too hard on the impulse-hardened ones. Handmade saws usually go to Japan for sharpening. Impulse-hardened saws become scrapers or go in the garbage.
- The crosscut teeth are more delicate. If you hit a knot or cut quickly into particularly tough wood, you could lose a tooth or two.
- The saws are easier to ruin by the inexperienced sawyer. Because the blade is thin, you can bend it on the return stroke if you push too hard and the saw isn't aligned properly in the kerf.
- Japanese saws pull sawdust toward you, obscuring your line.
- Japanese saws made for dimensioning lumber (not joinery) have shorter blades than full-size Western handsaws. Depending on the saw, the pull saw might require more strokes to do the same amount of work.
- Japanese saws are designed to be used in traditional Japanese fashion on low benches. When used in Western fashion, some Japanese saws are not always as effective as they should be.

*— CS*

solid object," such as the work, which is secured by their foot, he says.

A second difference is that many Westerners use the crosscut dozuki saw (a saw with a rigid spine) for cutting dovetails, which is primarily a ripping operation.

The Japanese woodworker instead uses a rip-tooth dozuki (which is less common in the West) or a rip saw without a back, says Damsen of Japan Woodworker. That's because the Japanese philosophy on dovetails and tenons is, at times, different than the Western approach.

"When (Japanese woodworkers) cut dovetails they don't want the cut too smooth," he says. "They compress the joint before assembly and let it expand and lock the joint."

Westerners want a smoother cut and are willing to sacrifice the speed of a rip tooth. Many Japanese dovetail saws for the Western market have some sort of combination tooth, in some cases a tooth that was designed to cut plywood that also works quite well for dovetails, Damsen says.

### Types of Japanese Saws

But one thing Japanese and Western craftsmen share is having to choose what type of Japanese saw to buy: a machine-made saw or a craftsman-made saw. There are important differences:

• A good-quality machine-made Japanese saw costs about $20-$50. The price of a craftsman-made saw averages $150, and the premium tools are about $250 or more.

• Generally, craftsman-made saws have softer teeth than the machine-made saws, which are typically impulse-hardened. Impulse hardening is a fast, high-voltage process that hardens only the teeth. While the machine-made saws stay sharp longer, they cannot be resharpened without totally retoothing the blade.

Craftsman-made saws can be resharpened and even customized to the way you work. But this is meaningless to Western woodworkers, says Frank Tashiro, owner of Tashiro Hardware, which sells the line of impulse-hardended ZETA Saws.

"(The sharpener) doesn't know your work so he does the best he can, so it doesn't work out," says Tashiro, who adds that the best value and performance come from a Japanese saw with replaceable impulse-hardened blades.

For crosscutting in joinery, the Japanese will use a dozuki saw (which means "shoulder of a tenon"). There are various ways to grip the saw.

## Advantages Of Western Saws

• The teeth are more durable than those on Japanese saws and are highly unlikely to break, even under the worst conditions. The blades themselves are thicker and less likely to buckle in use.

• They will last you a lifetime. The teeth can be resharpened many times. Saws can even be refiled by the user to a different tooth configuration if their needs change.

• With a little practice, you can sharpen a Western saw with inexpensive and easy-to-obtain tools.

• Western dovetail saws that are properly filed for a rip cut will cut more aggressively than the crosscut-filed dozuki that's commonly used for dovetails in the United States.

• They push the sawdust away from your cut line.

• High-quality secondhand Western saws are both plentiful and inexpensive in most areas.

## Disadvantages

• High-quality new or restored Western saws are more expensive than their Japanese counterparts. Japanese joinery saws average about $45; the equivalent quality Western saw costs $125.

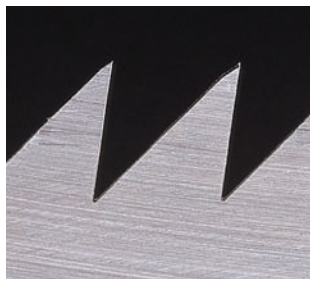
• Inexpensive new Western saws are – in general – dull and poorly set compared to similarly priced Japanese saws. Learning to saw with these less-expensive tools frustrates many beginners, causing them to swear off Western saws.

• While vintage Western saws are plentiful in most parts of the United States, you must first learn to restore them before putting them to work: straightening the blades, fixing the teeth and sharpening.

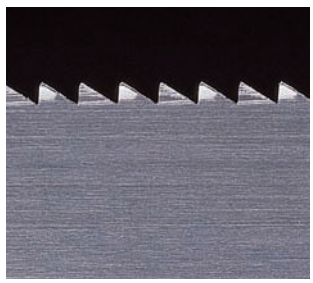
• The teeth are softer and require more frequent sharpening, although it is a task you can do yourself after a little education and practice.

• In general, the saws are heavier and have a thicker kerf, so they require more effort to use.

*— CS*



**Japanese Rip Teeth** • The length of the rip teeth are graduated on Japanese saws. They start small near the handle and get larger.



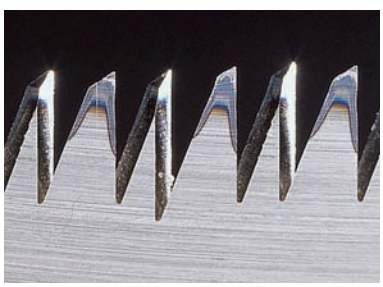
**Western Rip Teeth** • Rip teeth work like chisels, levering out the grain. Crosscut teeth work like knives, severing the fibers on either side.

But replaceable blades rankle woodworkers who don't believe in disposable tools.

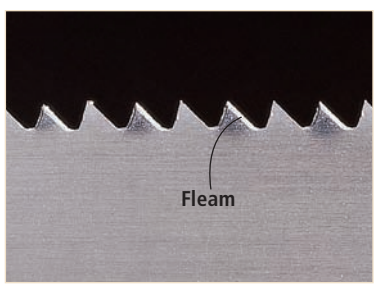
To counter that, Japanese saw manufacturers say that once your impulse-hardened saw becomes too dull for woodworking, it is still plenty sharp for work in the garden as a pruning saw.

"You can make a nice scraper out of the blade, too," Damsen says of the saws.

Some students of woodworking history think the push stroke was developed in the West because we work on high benches, unlike Japanese craftsmen who work near the floor on low trestles or beams.



**Japanese Crosscut Teeth** • Note the long slender teeth and three bevels filed on each tooth. The tips are discolored from impulse-hardening.




**Western Crosscut Teeth** • You can see the simpler secondary bevels (called the "fleam") filed on every other tooth.

• Another difference is that many craftsman-made saws are more delicate because of their thinner blades. Even the most robust craftsman-made saw should not fall into the hands of a beginning woodworker.

"Just because you have a $200 saw doesn't mean you will saw better," says Stanley. "It's important to practice the technique. Start with impulse-hardened saws. Don't get a $250 saw and break it. As your skills improve you can use thinner saws."

When using Japanese joinery saws, most everyone agrees that you shouldn't be aggressive or saw at a radical angle. Just a bit of downward pressure on the pull stroke is all it takes, and you shouldn't apply any downward pressure on the return push.

## Facts About Western Saws

No one can deny that Japanese saws cut very well, but so do Western saws that are sharp and properly set. The problem is finding Western saws suitable for woodworking. There are still some manufacturers of full-size Western saws that do a decent job for woodworking, including E. Garlick & Son, Pax, Paragon, Sandvik/ Bahco, Lynx and Augusta. Some of them also make joinery saws – backsaws with a rigid spine on the blade. And companies such as Lie-Nielsen and Adria now make premium joinery saws that are the equal of the outstanding saws of the 19th century.

But by far, the biggest sources of quality Western saws are flea markets and auctions. Top-of-the-line Disston, Simonds and E.C. Atkins saws can be purchased for $5-$25. These, however, can be rusty, dull and bent. If you have no desire to restore one of these old saws, there is an alternative.

Pete Taran runs the web site VintageSaws.com, which is a sawyer's paradise. He takes classic handsaws and backsaws and returns them to their former glory by making them sharp, properly set and ready to cut. A vintage highly tuned handsaw or backsaw will cost between $85 and $200 at Vintage Saws.

The site also is a treasure trove of good historical information on saws. One of Taran's primary goals is to teach woodworkers how to sharpen their Western saws, which is easier than you might think.

He sells the files and saw sets you need, plus there is a fantastic tutorial on his web site that explains the process from start to finish. And if you just want to get your feet wet, Taran even offers a saw-filing kit to get you started. The kit comes with a user-grade saw with freshly cut teeth, a file, a file handle and complete instructions. When you're done, you'll have some more confidence and a saw that cuts very well.

This $18 Disston No. 4 backsaw cuts incredibly well now that it has been properly sharpened. The handle on vintage Western saws will fit your hand like a glove. Later handles are uncomfortable to use and look crude by comparison.

Sharpening a Western saw is probably one of the biggest stumbling blocks for woodworkers.

"No one knows how to sharpen Western saws," says Graham Blackburn, author of "Traditional Woodworking Handtools" (available with his other books at blackburnbooks.com) and an instructor at Marc Adams Woodworking School. "I ask the students to bring in their worst plane and their worst saw. Once they sharpen their saws they never go back to Japanese saws."

But if you don't want to learn to sharpen, you still can get a flea-market saw professionally tuned.

We recommend Daryl Weir of Knoxville, Ill. Weir has tuned up a few handsaws and backsaws for us over the years and does a nice job, and his prices are reasonable. (See the "Saw Sources" box for contact information.)

### Western Saw Tips

Once sharpened, a Western saw is easier to use than you might think. Here are a few tips:

- Though it sounds obvious, use a rip saw for rip cuts, such as dovetailing. Some dovetail saws are filed for crosscut. They work OK, but not as well as a rip saw.
- Let the saw do the work. Don't use a lot of downward pressure on the kerf – this is surely the No. 1 problem faced by beginners. The saw will wander and you'll never cut straight.
- Don't clench the handle tightly. Hold the saw with just enough pressure to keep it under control. And use only three fingers – your index finger should point down the blade.

### Worst of Both Worlds?

All this has to make you wonder why someone hasn't built a saw that merges the best qualities of both traditions. Well, a few companies have tried, though nothing has been able to challenge the dominance of the pure Japanese-style saw.

And the reason might be illustrated by the experience of one veteran woodworker.

A few years ago, Blackburn was poking around a flea market and discovered a beautiful old Spear & Jackson backsaw.

The saw had a perfectly shaped handle, much like the one on the outstanding Lie-Nielsen dovetail saw. But the blade of this Spear & Jackson was horribly bent. So Blackburn hung it on his wall.

One day a friend noticed the saw and offered to send it to Japan to see if they could straighten it out. Blackburn agreed. The saw came back a few months later straight as an arrow but with one major and shocking change.

They had filed Japanese-style teeth on the blade. Trying to keep an open mind, Blackburn gave it a try. "It cuts well," he says, "but it feels wrong to me. So it still hangs on the wall."

Chalk it up to this: When it comes to traditional hand-tool skills, it's hard to defy tradition. Now you just have to decide which tradition is best for you. **PW**

## Saw Sources

**Adria Woodworking Tools**
604-710-5748 or adriatools.com
- Premium Western joinery saws

**BlackburnBooks.com**
- Books and videos on traditional Western woodworking

**DisstonianInstitute.com**
- Detailed information on Disstons

**EuropeanHandTools.com**
888-222-8331
- E. Garlick and Lynx saws

**Geoffrey Killen's Egyptian Site**
geocities.com/gpkillen
- Information on Egyptian woodworking tools and furniture

**Hida Tool**
800-443-5512 or hidatool.com
- Range of Japanese saws

**Japan Woodworker**
800-537-7820 or japanwoodworker.com
- Full range of Japanese saws and some Western saws

**JapaneseTools.com**
877-692-3684
- Range of Japanese tools, including some hard-to-find types

**Lee Valley Tools**
800-871-8158 or leevalley.com
- Impulse-hardened Japanese saws
- Wide range of Western saws

**Lie-Nielsen Toolworks**
800-327-2520 or lie-nielsen.com
- Premium Western joinery saws

**Tashiro Hardware**
206-328-7641 or tashirohardware.com
- Impulse-hardened Japanese saws

**Daryl Weir**
weir@gallatinriver.net or
781 S. Market St.,
Knoxville, Il. 61448
- Western saw sharpening

**VintageSaws.com**
- Restored vintage Western handsaws and sharpening supplies

**Woodcraft Supply Corp.**
800-225-1153 or woodcraft.com
- Impulse-hardened Japanese saws and some Western saws

# THE GENIUS OF MITER Shooting Boards

Sawing miters so they are 'just right' is a problem faced by all woodworkers. Here's how to sneak up on the perfect miter with scrap wood and a plane.

by Don McConnell

Don McConnell recently moved from Ohio to Arkansas to join the plane-making team at Clark & Williams. He's been a demonstrater at the cabinetmaker's shop at The Ohio Village, and was most recently kept busy building custom furniture and creating ornamental carvings.

You find yourself in a quandary. To ensure that you don't cut a miter too short, you end up cutting it just a bit too long to fit. You wish you could trim it shorter by just a shaving or two, but the moulding is too small to plane, reliably, freehand.

If you're working with a powered miter saw, you might be able to correct this cut if the moulding is held in place perfectly, but it is easy to cut too much off and the blade might deflect during the cut, spoiling the angle. If you're working with a hand miter saw and miter box, it's difficult to get an accurate cut that's thinner than the width of the saw's kerf. This is when you should turn to a shop appliance known as a miter shooting board.

PHOTOS BY AL PARRISH

A shop appliance, you ask? Like a washing machine? No, I'm using the term "appliance" here in the more general sense: "A piece of equipment for adapting a tool or machine to a special purpose" (Merriam-Webster dictionary). In the world of hand tools, what some people might call "jigs" usually are called appliances.

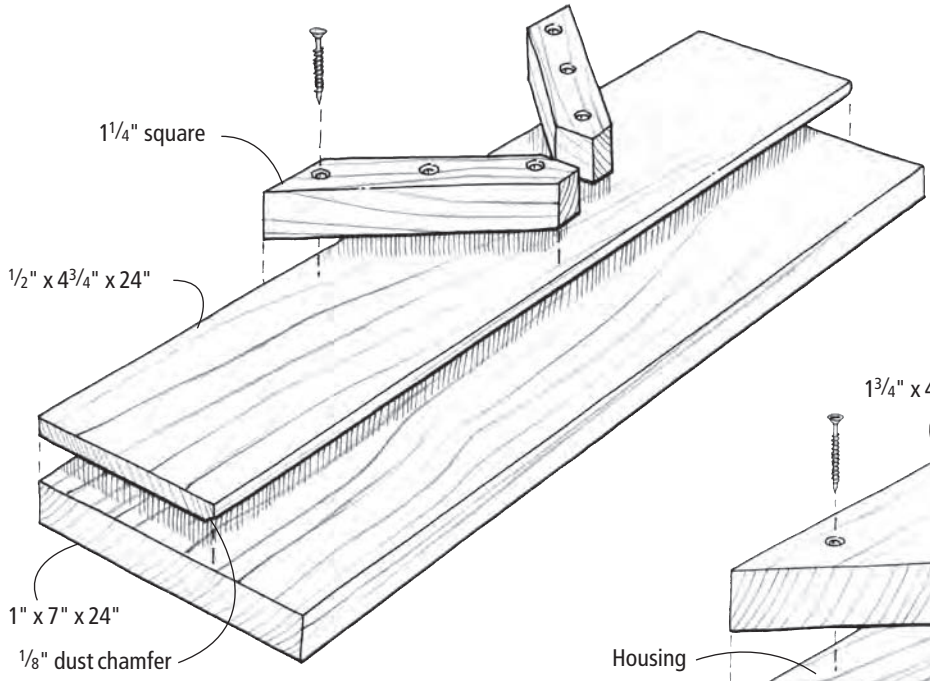
In this case, the special purpose of the miter shooting board is to enable you to plane a miter in an accurate and controlled manner. Indeed, with this appliance you can quite literally correct the length and/or angle of a miter one shaving at a time.

Shop appliances have great value. If you are already working with hand tools, you may be encountering unnecessary difficulties without the right appliance for the job. If you are not generally interested in hand tools, that may be due, in part, to not realizing their capabilities when used with appropriate and time-tested appliances.

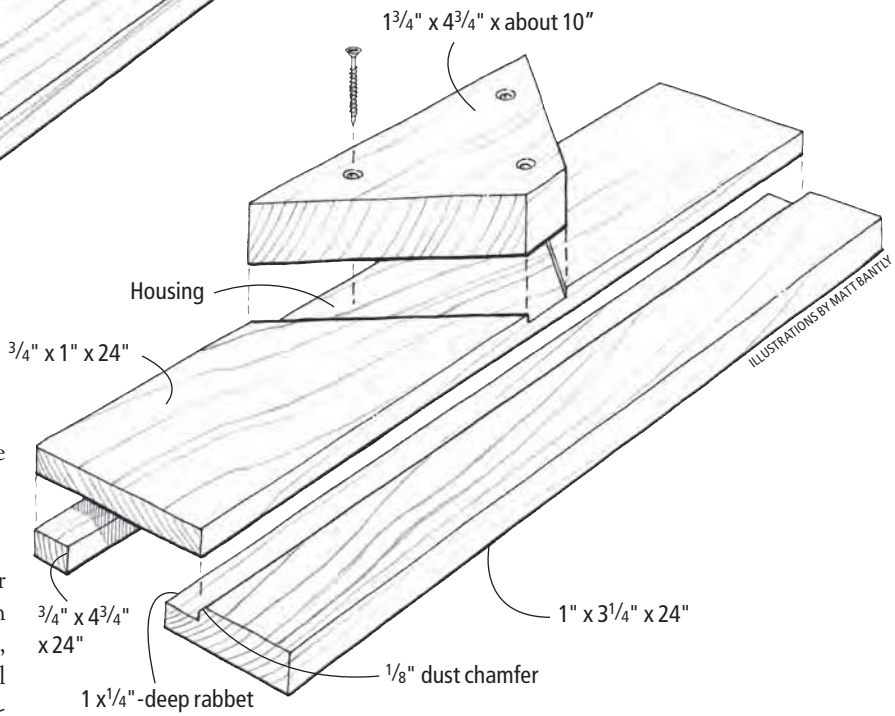
I've chosen to focus on the miter shooting board here because it is an appliance that could be useful to almost every woodworker – even those who have little interest in hand tools.

## Simple Jig; Easy to Use

The basic idea of a miter shooting board is simple. At one edge is a wide, shallow rabbet in which a plane (block, miter, etc.) rides. The bed of the rabbet supports the plane's cheek (sometimes called the "side wing"), and the shoulder of the rabbet guides the sole of the plane. A stop, or stops, set at 45° are affixed to the upper surface of the board. The material being planed is held against the stop while the mitered end is planed. The height of the rabbet's shoulder needs to be fairly minimal




Simple miter shooting board




Improved miter shooting board

in order to make use of most of the cutting edge of the plane iron.

### Build a Simple Miter Shooting Board

There are a number of ways to construct a miter shooting board. The simple version that is shown above takes only a minimal amount of material, skill and time to build. However it contains all the basic features needed to experience its potential usefulness.

The construction is self-evident, though a few aspects deserve comment. It's important that the stop pieces be positioned at a true 45° angle. This needs to be laid out and checked carefully with a miter square or sliding bevel you know is accurate. Using a pair of stops allows planing from both directions (a useful feature), and the placement shown allows the stops to reinforce each other against the planing stresses.

While this version can be satisfactory, there are drawbacks in the long term. First, the manner in which the two base elements are assembled provides for unequal moisture movement from the opposite faces of each piece. This can lead to the appliance going out of true. Careful material selection (quartersawn and straight-grain) can minimize this. And, within reason, it can be disassembled and the pieces re-trued, from time to time. There are other alternative forms of construction that address these issues.

Second, the means of attaching the stops to the shooting board doesn't anchor them securely. Though this can largely be overcome by installing them in housings such as dados, the problem of cross-grain construction remains.

### An Improved Shooting Board

As always, there is a better way. The stop block of the improved miter shooting board is more secure and avoids the difficulties of cross-grain construction. It consists of a single piece of wood that's mitered on both ends so that its grain orientation is identical to that of the board it's attached to.

The stop block can be planted on the face of the guide piece, but is better secured by installing it in a housing cut into the bed.

Using hand tools to obtain the accuracy required to create this housing and the guide block might seem difficult or mysterious to some woodworkers. So I thought it would be worthwhile to touch on the critical aspects of this process.

Mark your 45° angles using a knife. Clamp a steel straightedge against the knife line and chisel away your waste. Or pare to the line freehand.

Cut your stop block as close as you dare and then plane it to a perfect fit in the triangular housing you just chopped out.

Test your stop block against your housing; plane until you have a perfect fit.

Start by cutting the housing. It does not need to be deep (1/4" at most), but the shoulders need to be accurate. This begins with accurate layout, knifing the shoulders with a reliable miter square. The space between the shoulders at the narrow end isn't critical. Primarily, it needs to be wide enough to allow passage for your tools during construction.

Establishing the shoulders could be done straightaway with a saw. But in such a critical situation and with relatively long shoulders, I prefer to saw, freehand, slightly to the waste side of the knife line. Then, after the balance of the waste is removed, clean up the shoulder through vertical paring with a sharp and wide chisel.

You could clamp a straight batten or metal straightedge to the board to guide your chisel, but I can better see my progress relative to the knife line if I do it freehand.

By assuming a relaxed and balanced stance, you can usually get a pretty good sense as to when you are holding the chisel vertical for this paring operation. You can check this with a small square if you are uncertain.

The shoulders need to finish accurately at 45° and with nothing to obstruct the stop block from registering solidly against them when in place. While it's good practice to aim for achieving the required accuracy the first time, in this instance you have the luxury that you can, within limits, simply knife a new line and try again.

## Stop Block has Critical Angles

The material for the stop block needs to be somewhat wider than its finished width to allow you to do final trimming after arriving at an accurate fit of the critical miters.

First, mark out one of the mitered ends and saw it as close as you feel comfortable. Then, with a sharp and finely set block or miter plane, clean it up. You want to keep it fairly close to 45° (for the sake of grain orientation), but the critical factors are that it be flat and square to the face that will attach to the shooting board. Then, allowing enough space to have some width for final trimming, lay out the other miter at a right angle to the miter you've just established on the stop block.

Again, saw as close as possible and true the second miter up with your plane. This miter needs to be not only square to the lower face and flat, but at a true right angle to the first one. So, it's a little more critical. But there is some forgiveness in that you can continue to plane to arrive at the necessary accuracy as long as you have sufficient width.

Finally, test the block's fit in the housing (make sure it reads accurately) and trim so its nose is in line with the guide shoulders and perpendicular to the bed. Install the stop block with screws (no glue) and you have a very accurate and serviceable miter shooting board.

## Take it for a Test Drive

A miter shooting board is simple to use. You hold the work in place against the stop block with one hand, and push or pull the plane with the other. Always work so that the plane pushes the work against the stop block.

The miter shooting board is most obviously useful when doing inside mitering. In this case, the far edge of the miter is fully supported by the stop block. While it's easy to assume that it wouldn't be as useful for planing outside miters, I believe that to be a mistaken assumption. A sharp iron set to a fine cut will minimize any tear-out when shooting outside miters.

I had been building furniture for a few years before I finally built my first miter shooting board. Though I occasionally considered it before, there was always a question as to whether it would be worth taking the time. After just a few passes with my plane in fitting up the first miter, I was amazed at the control and accuracy provided by this simple appliance. My only regret was that I hadn't made one years earlier. **PW**

In use, the miter shooting board is used with the plane always pointed toward the stop block.

# THE BASIC Bench Hook

Three pieces of wood make crosscutting and planing easier – no matter where you work.

by Don McConnell

Don McConnell recently moved from Ohio to Eureka Springs, Ark., to join the plane-making team at Clark & Williams. He's most recently kept busy with the creation of custom furniture and ornamental carvings.

It's difficult to imagine the wooden bench hook without its almost constant companion, the backsaw. Indeed, this association is so strong that an alternative name for this useful hand-tool appliance is "saw rest."

For lighter sawing in the shop, the bench hook excels in effectiveness and convenience. The lower extension, or stop, "hooks" against the edge of the bench, and the material being sawn is held against the upper stop, as shown in the photo below. Because Western saws cut on the push stroke, the thrust of the saw helps hold the material in place. As a result, the bench hook and the material can be moved around at will, without any need for clamping or fastening.

PHOTOS BY AL PARRISH

Typically, the bench hook has a notch at the end of the upper stop (or a kerf is sawn into the stop) to allow the material to be fully supported while it is being cut. This arrangement also protects the benchtop from being damaged as the saw blade breaks through the work. The notch (or kerf) is located to the right of the stop for right-handers and to the left for left-handers.

The squared end of the stop can serve as a guide for the saw. For example, with the addition of a secondary "length stop" (which can be as simple as a strategically placed handscrew clamp), you can make repeated cuts of uniform length by using the squared end of the stop as a guide. This is a safe and effective way to cut short lengths of dowel stock, as shown on page 68.

However, I tend not to use the end of the stop as a saw guide. Rather, I work to knife lines on the material itself and use the notch as a "safe" area where saw cuts can be made without damaging the stop or the saw.

## Building a Bench Hook

As with all shop-made appliances, bench hooks can be constructed in any number of ways, depending on their intended usage and available materials.

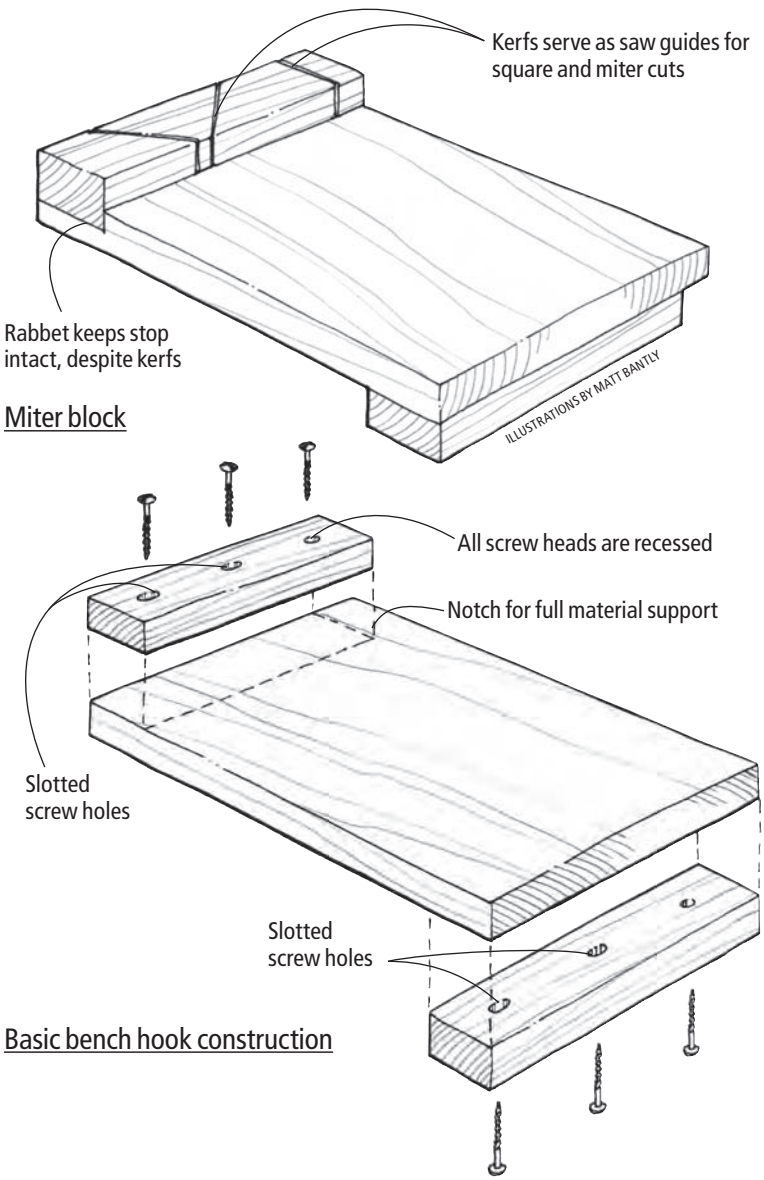
The simplest, and possibly earliest, type of bench hook can be cut from a single piece of 4/4 material by drawing the shape of the two stops and the bed on the face grain and sawing them out. The hook will be quite narrow (the 1" thickness of the stock it was cut from) and you will need a pair of them

to adequately support your work. Although this type of bench hook doesn't provide the same protection for the benchtop when cutting and isn't as adaptable, it is compact and portable.

The bench hook most commonly encountered today is constructed using three pieces of wood – a main bed piece of some length and width (10"-12" long and 7"-8" wide, typically), and two narrow projections, also known as "stops." These pieces are attached in various ways to the bed of the bench hook, depending on circumstances, available materials and intended use.

Because bench hooks are often used in a somewhat sacrificial manner, they often are made without regard for the long-term effects of cross-grain construction. Indeed, a perfectly usable bench hook can be temporarily constructed simply by nailing the stops to the bed piece. A more common method is to affix the stops to the bed using glue and wooden pegs. If it isn't too wide and the bench hook isn't subjected to extreme environmental changes, a hook made this way will remain viable for a long time.

If you have suitable material and want a wider bed piece for your bench hook, it is possible to use slotted screw hole construction to attach the stops, as shown in the illustration above. The actual construction method can vary, but it is best to recess the screw heads to eliminate the possibility of running the teeth of your saw into them. The location of the fixed screw on the upper stop isn't important, but it can be critical on the lower stop if you are planning to use the bench hook as a shooting board and need the end of the stop to remain flush with the edge of the bed. This form of construction is secure enough for most uses, while the slotted holes for the screws allow for the cross-grain movement of the wider bed piece.




## Miter Block for Precision Sawing

Though usually treated as a separate subject, the miter block (left) can be seen as a specialized form of bench hook. This has both square and miter kerfs sawn into one of the stops that serve as effective guides for a backsaw.

Each kerf can be made with the aid of an accurately placed guide block, being sure to use the saw (preferably with minimal set) that will be in service for the subsequent work. When kerfs are made in a stop in this manner, it's desirable to glue the stop into a shallow rabbet in the end of the bed. This allows the stop to retain its lengthwise dimensional stability, and the integrity of the kerfs, despite the cross-grain construction.

The miter block is a useful alternative to a miter


Cutting short pieces to accurate length is a tricky operation with a miter saw. The bench hook, backsaw and a handscrew clamp make the job safe and efficient.

box when working with small pieces. If maintained and used with care, it is capable of precise work because it fully supports the material being sawn and the location of the cut can be precisely predicted. Its utility is especially apparent with short pieces, which can be difficult or dangerous when being cut with a power miter saw.

Particularly when making miter cuts, it's often best to quickly secure the lower stop of the miter block in your bench vise to keep it from sliding sideways during use.

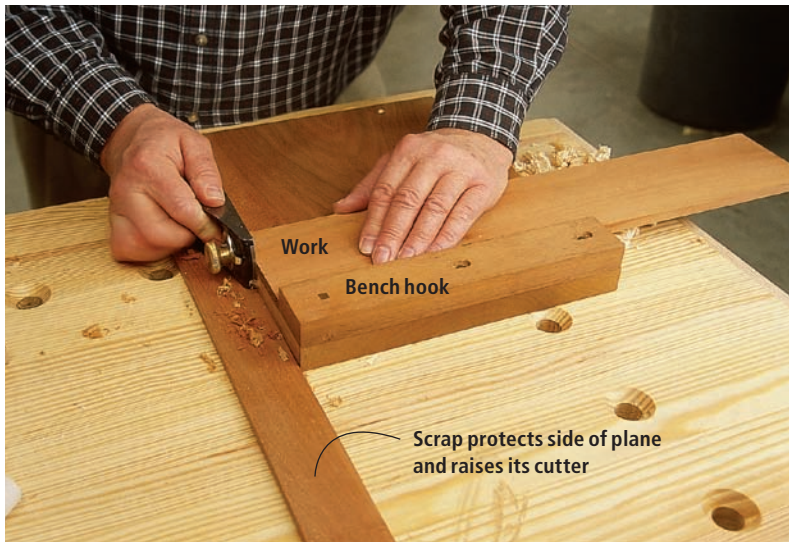
### Bench Hooks and Planing

As already mentioned, a bench hook can be used in conjunction with a hand plane. For example, it can be turned over lengthwise so that the full length stop is at the top. In this orientation, it serves as a short shooting board to true the ends of smaller pieces. Sometimes it's desirable to place a thin scrap below the plane for it to run on, which protects the plane and adjusts its height so the cut takes place near the center of the iron.

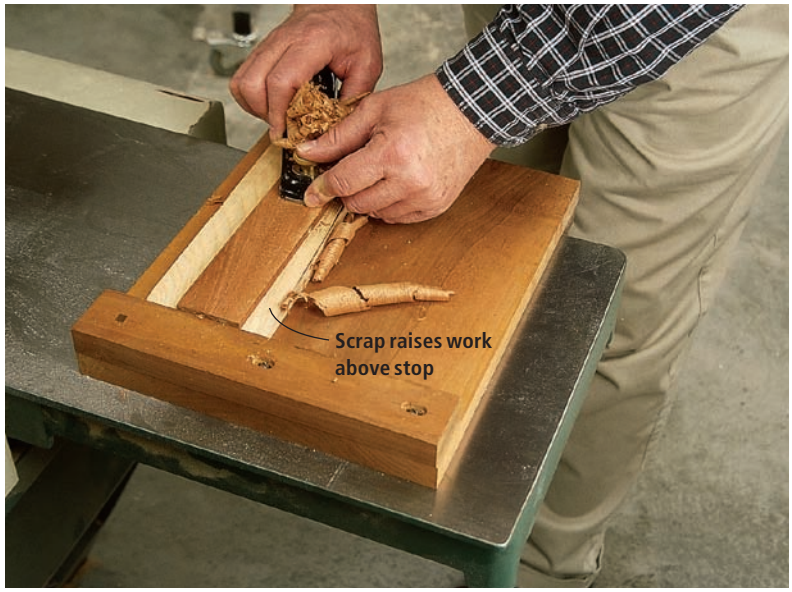
Also, if you add a secondary "bed" that is slightly thinner than the stop, the bench hook can be used to plane thin stock of short lengths. Most of the time, this secondary bed can simply lie on the main bed with its end against the stop. In this usage, the bench hook serves as a small planing board.

The versatility of the bench hook also makes it a prime candidate for various kinds of on-site work. As long as there is a surface to place the bench hook on, plus an edge that you can rest the lower stop against, it can be used for all of the above-mentioned functions – all while protecting the saw or plane and the surface on which the bench hook rests. I've used bench hooks on the top tread of a staircase, the edge of a porch and on the tops of table saws and jointers.

Especially for shorter, thinner, narrower or awkward pieces, a bench hook and backsaw can provide a safe and versatile option for any woodworker, either at the bench or out on the work site. **PW**




The bench hook makes an effective shooting board for truing the ends of small pieces. The piece of scrap below the plane protects the side of the tool and centers the tool's cutter on the work.




Bench hooks can be used almost anywhere (such as on the bed of this jointer) and can do some surprising tasks. Here it is being used as a small planing board. The light-colored scrap below the work raises the work above the bench hook's stop.

## Bench Hook History

Some readers might be surprised to learn that Joseph Moxon, in his "Mechanick Exercises or the Doctrine of Handy-Works" (published serially between 1678-1680), uses the term "bench hook" to describe a device we know today as a bench stop or a bench dog. In other words, a device that is installed in a recess in the benchtop, that projects just above the surface and that prevents material from moving forward while being planed. The type of "bench hook" illustrated by Moxon has a lateral projection at its upper end that gives it the appearance of a hook. This usage is largely obsolete now, though it continued until at least the middle of the 19th century.

Because the wooden shop appliance we now know as the bench hook is closely associated with backsaws, it is tempting to hypothesize that it arose as a common shop accessory in conjunction with the emergence of backsaws. Because backsaws first appeared about Moxon's time, it seems likely that the wooden bench hook first emerged not long after. However, the first illustration of a wooden bench hook that I'm aware of isn't until in Peter Nicholson's "Mechanical Exercises," published in 1812.

*— DM*

# FOR ROUGH WORK, Try a Bench Gouge

These sometimes-forgotten cabinetmaking tools let you hog material out of tight spaces.

by Don McConnell

Don McConnell recently moved from Ohio to Arkansas to join the plane-making team at Clark & Williams. He's most recently kept busy building custom furniture and creating ornamental carvings.

The task was simple, but I was not satisfied with any of the methods that came immediately to mind.

I'd agreed to make repairs on a cherry secretary. Though it was a factory reproduction "in the style of" Chippendale, it was a decent piece that had been passed down to the owner from her grandmother. It had suffered minor fire damage during transport, so most of the repairs involved cutting out charred areas and patching thing up with pieces of sound cherry.

In this instance, the location and adjacent obstructions were going to make any direct means of isolating and removing the bulk of the damaged material difficult. There wasn't room to use a saw, drilling would have been awkward, and I was concerned that heavy chopping with a chisel could have undesirable consequences. But there was a fair amount of material to remove.

While continuing to do other work and turning this over in my mind, I had a nagging feeling that I was overlooking the most obvious solution. Suddenly, it came to me – I realized I could borrow a low-relief carving technique, commonly known as "grounding," and use a bench gouge and mallet to quickly and safely remove the bulk of the material along the cross grain. Final cleanup then could be achieved with chisels.

In musing over why it had taken me so long to arrive at such an obvious solution, I realized that I had been, in effect, wearing blinders regarding the full range of possible uses for bench gouges.

PHOTOS BY AL PARRISH

Many modern woodworkers consider the bench gouge a tool solely for turning or carving. But the bench gouge shown here (called a firmer gouge) is designed for furniture making. Here the author uses a gouge and a mallet to rough out a walnut breadboard tongue (traditionally called a "mitered clamping").

## Not Just for Carving

I'd been in the habit of thinking of bench gouges as specialized tools held in reserve for special occasions, such as those involving decorative treatments or some form of shaped work. While gouges are indispensable in those situations, I had overlooked their potential usefulness as roughing tools in a variety of more mundane situations.

Since then, my bench gouges have seen much more use. Which, in turn, has given me a better understanding as to why bench gouges were such a vital part of the working kits of our predecessors. And I know that they can be useful for many woodworkers today.

A bench gouge is seldom the only tool that will accomplish a given task. But surprisingly it is often the simplest and most direct, especially when access is restricted or using other tools is problematic. This can be particularly helpful in situations where the production of noise and fine sawdust are an issue. A few examples:

• As already discussed, roughing out where access is restricted or awkward.

• Roughing in a stopped dado or housing. A gouge can establish most of the width and depth directly, allowing for minimal cleanup with chisels and a router plane.

• Roughing out the tongue of a mitered clamping, or breadboard end, as shown in the photo at left. A gouge of appropriate depth can be used in a self-gauging manner, a surprisingly direct and efficient process.

The three types of gouges for cabinetmaking are, from top to bottom, the cranked gouge, the paring gouge and the firmer gouge. The paring gouge is in socket form, while the other two are in tang forms.

Bench gouges are available in three sweeps: (from left) flat, middle and regular. The regular sweep is the most useful for general work.

### Finding the Right Gouge

The variety of bench gouges that are available in catalogs, auctions and flea markets can be confusing, so I thought it might be good to outline the basic types and their uses.

The most common bench gouge has traditionally been referred to as a firmer gouge. While the specific meaning of this term is a matter of some discussion, I think the word "firmer" was meant to indicate a gouge for general woodworking. This is distinct from more specialized and more common carving or turning gouges.

Most often, these tools have the primary cutting bevel on the outside, which is useful for the roughing type work already discussed. These either can be driven with a mallet or pushed by hand.

Some firmer gouges, though, have bevels on the inside of the blade. These are often referred to as incannel gouges or scribing gouges. More difficult to maintain and sharpen, these also can be driven, carefully, with a mallet or pushed by hand. Scribing gouges are used in situations where the specific curvature of the cutting edge is used to accurately define a feature. An example of this would be to scribe or cope a joint in sash work where two mouldings meet (hence the name, scribing gouge).

Paring gouges are similar to firmers, except that they tend to be longer – generally, 8" to 10" blades, compared with 5" to 7" blades more typical of firmers. They also tend to be more delicate at the cutting edge. These can have outside or inside bevels, although the more common configuration is the inside bevel. Intended to be pushed by hand, these can be useful for cleaning up surfaces of curved or shaped woodwork.

A special type of paring gouge is the cranked, or bent-shank, gouge. The bent shank provides extra clearance for the handle off the surface of the material and always has an inside bevel. These are particularly useful for the kind of shaped work undertaken by patternmakers.

With the exception of the cranked gouge, all these gouges come in either the tang (shank) or socket forms. For general bench work, the choice between these two forms is a matter of personal preference. Both the tang form and the socket form have ancient origins, and it might be surprising to learn that, historically, the socket form was more expensive because it required more manufacturing steps.

Yet one more variable is that, at least in the United States, gouges have often been available in three different "sweeps." Typically, they were regular, middle and flat sweeps.

The term sweep refers to the depth of the curvature of the cutting edge in proportion to its width. The greater the curvature of the edge, the "quicker" the gouge.

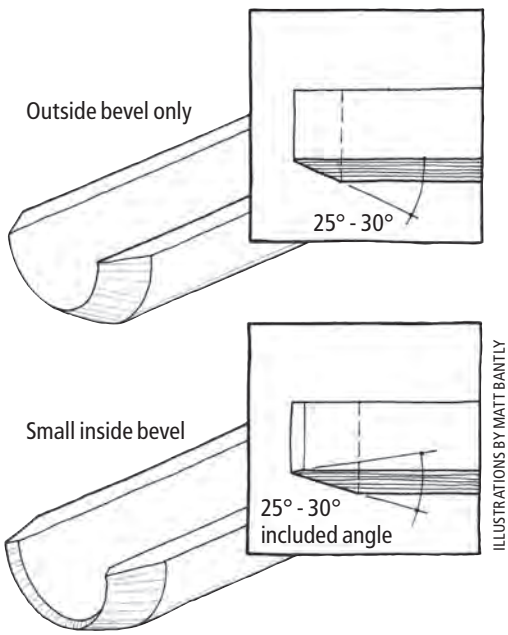
Of the bench gouges, the regular sweep is the quickest and, as the name implies, is the sweep we think of when considering gouges in a generic sense. This sweep also is the most useful, although the middle and flat sweeps have their place. Older bench gouges at flea markets and auctions seem to remain overlooked and undervalued, so, with a little patience, it is still possible to acquire a variety of them at reasonable prices.

To establish a new edge (or repair a badly damaged one) hone a clean edge while holding your gouge on end on the stone.

### Sharpening: No Fingernail Grinds

Sharpening a gouge isn't as straightforward as sharpening a chisel, and this can become another deterrent to their use.

For general usage, the cutting edge of an outside bevel gouge needs to be a straight line when viewed from directly above. Further, the cutting edge should be at an approximate right angle to the axis of the tool. A convex-shaped cutting edge (sometimes referred to as a "fingernail edge") will tend to stick in the work because it is attempting to lift the chip before it is severed at the surface. I don't suggest this shape for general usage. A slightly concave-shaped cutting edge won't hurt anything, but nothing is gained from it, either.




ILLUSTRATIONS BY MATT BANTLY

Outside & inside bevels

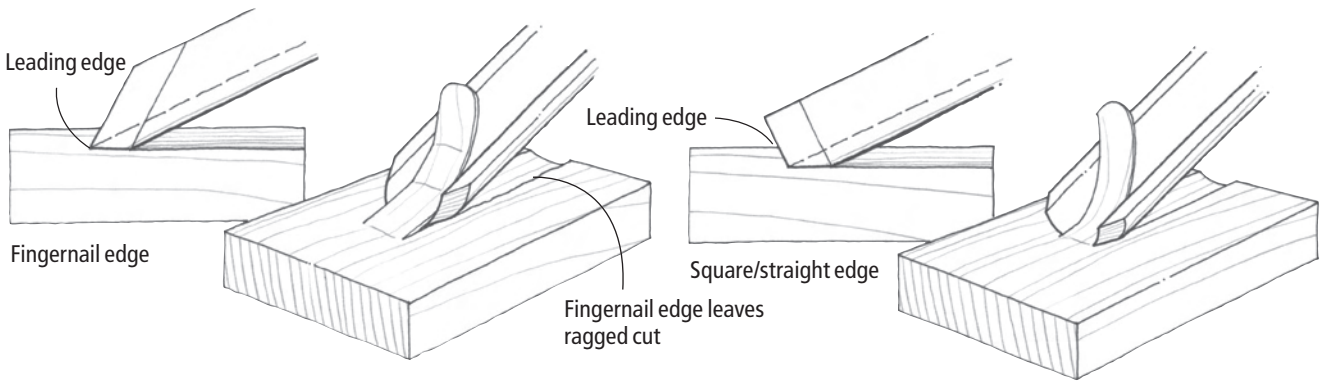
If there are any flaws with the edge, or if you are starting with an older gouge that needs reconditioning, you will need to first establish a new edge. Assuming the flaws aren't too bad, you can do this by holding the gouge upright, vertical to the flat face of your sharpening stone, and abrading the end until you have produced a straight and clean (shiny) edge, as shown in the photo at left. (If the flaws are severe enough, you may have to use a grinding wheel first.)

The most common advice regarding sharpening bench gouges is to polish the inside with your slip stone, or abrasive stick, resting on the surface. My preference, to borrow an idea from carvers, is to put a small bevel on the inside of the gouge. One consequence of this practice, though, is that you may need to slightly lengthen the outside bevel to maintain an appropriate cutting geometry. See the illustration at left.

As to the main, outside bevel, there are special honing jigs that can be useful for obtaining consistency. However, I find that with some care I can maintain suitable consistency by rolling the gouge in a side-to-side stroke over the stone. Freehand honing can also be accomplished by honing along the axis of the gouge, rolling the gouge through each stroke. I find it a little more difficult to obtain consistent results this way.

If I need to grind a new bevel, I find it useful to carefully use an appropriate grinder (hand-cranked in my case) and allow the resulting hollow grind to aid the forming of the new bevel. Inside bevel gouges are more difficult to maintain.

Any number of strategies have been devised for dealing with these difficulties, but I have taken the course of avoiding incannel gouges that require drastic reconditioning and relying on honing the inside bevels with slip stones as each gouge is needed. **PW**




Gouge ground with fingernail edge

Gouge ground with straight edge