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WOODWORKING
MAGAZINE

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"Adaptability is not imitation. It means power of resistance and assimilation."
— Mahatma Gandhi (1869 - 1948)
political and spiritual leader

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Highly Recommended

I'm always grateful for one less tool to sharpen. And that's why I appreciate my SuperKnife SK2 from A.G. Russell Knives (agrussell.com). This one-handed folding knife uses utility knife blades, so anytime I need a sharp edge, I can just fetch one from the drawer. It's a great shop knife, made in the United States and only $14.95.

— Christopher Schwarz

On the Level

The Great Experiment

It's now been almost five years since I built the Roubo-style workbench that you see in many of the photos in this magazine, and it's time to take stock of this form of workbench and probe its strengths and weaknesses.

Many other readers have taken this journey with me. They send me snapshots of their benches (which I keep like baby pictures) and offer commentary on what they like and dislike about this old-school design.

Let's first discuss the downsides – people love to read about failure. When I built the Roubo for the Autumn 2005 issue, I constructed it without an end vise. The original 18th-century version didn't have one, so I wanted to try that life.

I was fairly miserable. While working narrow boards was easy thanks to the adjustable planing stop, working on panels was a pain. I had to rig up time-consuming setups with battens to do what I wanted. Within a year I added a homemade wagon vise and later added a commercial one from Benchcrafted. Now I am happy when it comes to clamping panels.

> *"What I spent, is gone; what I kept, I lost; but what I gave away will be mine forever."*
>
> — Ethel Percy Andrus (1884 - 1967)
> first woman high school principal in California, founder of the AARP

The bench's crochet, or hook, is a feature that I don't use much. It does its job of pinching boards while working their edges quite well, but you do have to rig up a platform below to support the work from beneath. The crochet just isn't as easy to use as a face vise plus a sliding deadman.

And the crochet sometimes gets in the way. When I plane really long boards on edge (13' or so), the crochet interferes with the workholding – I have to hang a lot of wood off the tail end of the bench, which makes it unstable.

What else? If I could build the bench again, I'd make it narrower, probably 20" wide instead of 24". A narrower width allows you to sleeve assembled carcases over the ends of the bench to level joints. And the Roubo is just a whisker too wide to accomplish this for some of the casework I've built.

If I could make the Roubo longer or more massive, those also would be plusses, though I think the bench is long enough and chunky enough for 99 percent of my work.

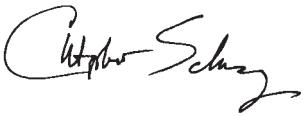
So what went right with the design? For starters, I really like the Southern yellow pine it's built from. It's heavy, stiff, stable and easy to work. I've trued the top twice in the last five years and have been grateful both times because it was easier to flatten than a maple benchtop.

The other success story here is the leg vise. When I built it, I assumed I'd rip it off the bench within a year and replace it with an Emmert patternmaker's vise or a massive Record vise. Now I couldn't imagine life without a leg vise. It is superior in every way to a quick-release face vise. It has far more clamping surface, there are no parallel bars to interfere with your work and it holds like a pit bull. I don't even mind the wooden parallel guide at the floor. Most of the time, the guide's pin stays in the first hole.

But the biggest lesson taught to me by the Roubo is that the legs and front edge of your benchtop should be flush with one another. An overhang on the front is just unacceptable for working edges (especially edges of big panels or doors). When I travel to another city and use someone else's bench I'm always amazed at how wobbly workpieces are without the legs to stabilize them.

And finally, the simplicity of the design is an incredible asset. Without lots of extra parts below the top, the benchtop is an incredibly stable clamping surface, whether I'm cutting a dado by hand or routing an edge profile.

Perhaps the best way to put it is this: You can clamp anything to this bench with so little fuss that you never ponder it. In other words, the Roubo is so excellent, that you hardly even know it is there. And when you think of it, that's the highest praise you can have for a bench. Vive Le Roubo. WM



BLOG

Christopher Schwarz
Editor

Letters

ILLUSTRATIONS BY MARY JANE FAVORITE

Oil/Varnish Blend Application

I read with great interest Glen Huey's article on substituting mineral spirits for turpentine (Autumn 2009, Issue 15). I personally like the smell and quicker drying time of turpentine. However there is one thing Mr. Huey neglected. How does one apply this finish – brush, rag or spray – or does it matter? And does it have to be buffed when dry?

Frank Byrne
Calgary, Alberta

Frank,
First off, the finish is applied and worked the same way whether using turpentine or mineral spirits. You can brush, rag or spray the mixture onto your work. I've used all these methods. I apply the mixture most often with a brush. On the first coat only, I keep the piece wet with finish for about five minutes – let as much soak into the project as possible during that time frame. Then wipe away any excess.

On successive coats, brush on a coat, then allow the mixture to dry to the consistency of honey before wiping off any leftover finish.

After three layers, you'll have built a nice coating, but with four or more coats you begin to build a sheen. There is nothing to do between coats but let the finish dry – but that assumes you have completely wiped the piece clean after each coat. If you return to find an area that was missed when you wiped, sand that area with #320-grit sandpaper and simply apply another coat.

As always, I suggest that you experiment with the finish prior to using it on a completed project.

Glen D. Huey, senior editor

Can Case-hardened Wood be Corrected in the Shop?

First, let me compliment Glen Huey on an excellent article on wood movement (Summer 2009, Issue 14). I'm so glad he was able to pull together all the disparate tidbits of information I've read about wood movement into one simple and easy-to-understand article. I particularly enjoyed the practical advice on how to use this information in wood selection and planning for where each piece of wood should go on a project. I do believe my woodworking skills grew noticeably, thanks to the article.

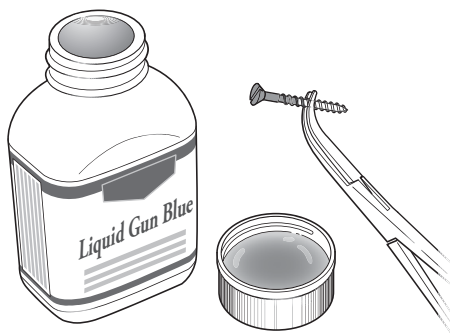
But I do have one question about dealing with case-hardened wood. Once a piece has been shown to have case-hardening (i.e. it failed the tuning fork test), is there anything that can be done to get it recover? Or is the piece of wood doomed to always exhibit case-hardening?

Nate Batson
Boise, Idaho

Nate,
That's a great question. Unfortunately, the answer I have is not one you'll want to hear if you do have case-hardened lumber. But here goes: If you are in the process of drying the lumber – the stock is still in the kiln – you can correct the issue by adding moisture back quickly into the kiln when the lumber is hot. However, if the material is out of the kiln, there is no method to reverse case-hardening.

My solution is to relieve the stress as best I can (ripping the material into narrow pieces) and use what I can, where I can. This is one (more) reason to purchase your lumber from a reliable, experienced dealer.

Glen D. Huey, senior editor



Treating Screws to Match Antiqued Hardware

Where did you find #4 screws to match the unequal strap hinges for the sea chest in the Summer 2008 issue (Issue 10)?

I'm having some troubles finding screws locally and was curious as to if you antiqued them somehow or bought them already antiqued.

Dan Chodur
Altoona, Iowa

Dan,
Finding screws that match the hardware perfectly is a task – I always wonder why many hinge suppliers don't include screws. For this project, order a bag of #4 antique brass screws from Lee Valley (leevalley.com). These would look close to the finish of the hinges.

If you have to use shiny brass screws from your local hardware store but want a close match, I recommend gun bluing to add age. Please follow the manufacturer's suggestions for that product.

Glen D. Huey, senior editor

Preparing Panels for Glue-up Using Hand Tools

I'm building the dry sink from the Spring 2009 *Woodworking Magazine* (Issue 13). I started with 4/4 pine and need three boards to make up the panels for the sides, top and bottom. When doing something like this with hand tools, how close to $^{3}/_{4}$" thick would you get the boards before you glue them up into the panels?

I'm not using any large sanders or power planers to true and finish them – just handplanes.

John Griffin-Wiesner
Minneapolis, Minnesota

John,
When working by hand, I am less concerned about the actual measurement of the thickness of the boards. Unless you are building a dozen and need interchangeable parts, nothing needs to be "on spec." It just has to fit tight and look right.

Plus, when working by hand, the less planing and sawing you do the better off you are. It's less work all-in-all.

So what I do is plane all the boards for a panel until they are flat and close to the same thickness, perhaps $^{1}/_{16}$" over-thick. Then I glue them up and finish the flattening job.

Christopher Schwarz, editor

Plastic Feet Can Quickly Cause Damages to Furniture Finishes

As a furniture repair professional, I regularly see something that most people don't know about until they experience it – plasticizer migration. The chemicals in rubber and plastic items that keep them soft and flexible can migrate into finish and do the same there. The result is a permanently softened or removed finish.

The usual culprits are soft plastic feet on radios, clocks, lamp bases or the little spacers on the bottom of glass toppers. All of these can damage

finishes in short order. But anything from rubber balls to shoe soles can cause this damage. Once softened, the finish needs to be removed.

Examples that aren't too bad can be fixed by rubbing with a light abrasive; severe cases need a spot touch up or a complete strip and refinish.

A couple other materials that can cause severe finish damage are nail polish remover, potpourri oils and drips from perfumes and colognes.

Keith Mealy
Cincinnati, Ohio

"Creativity is allowing yourself to make mistakes. Art is knowing which ones to keep."

— Scott Adams (1957 -)
creator of "Dilbert"

Plow Plane Sharpening

I have a few questions regarding the sharpening of plow planes. I have a Record 044 and was getting ready to sharpen the blades and discovered that all of them have a bevel of 35°. Is this the right angle for this type of plane blade? Is there a need for a secondary bevel – and if so what is the right one? I guess my question is, what is the best way to sharpen plow plane irons?

Roberto Bravo
via e-mail

Roberto,
A 30° to 35° grind is standard on most joinery planes. It makes the edge more robust. You can sharpen it with a secondary bevel if you like. No more than 5° would be best.

As to the "best way" to sharpen plow irons, you can do it by hand fairly easily. I generally use a small Kell honing guide to ensure the edge is dead straight (but I'm a bit nuts about that point).

Plow plane irons really are no harder to sharpen than chisels.

Christopher Schwarz, editor

Planing Long Boards by Hand

When handplaning long boards, would you walk with the plane to make the stroke along the entire length of the board you are planing, or do you make strokes as long as your body permits, then keep going along the length of the board?

If you walk with the stroke, how you do keep the pressure on the plane equal in the front and back? What you do when the board is longer than your bench?

If, however, you make a series of shorter strokes, would you overlap them?

Pedro Massabié
Oakville, Ontario

Pedro,
This is an excellent question, and you'll find a technique video on the Woodworking Magazine *weblog that we recorded as I worked the 13'-long plank for the Shaker bench for the White Water Village, featured in this issue on page 20.*

If the piece is 5' long or shorter, I can walk the plane down the board and make it the entire length with one stroke and one step. I do this by starting the plane with the plane directly at my side and one foot in the air ready to take a step. That big step forward begins the stroke. Keeping pressure on the plane is a matter of leaning forward as you work. Keep your arms close to your body. That way, if you stumble, you can advance the plane to keep your stroke smooth.

For longer boards I take several steps and one stroke. The other option is to use shorter strokes and work the board in sections that you can manage without stepping forward. Then it's like a "touch-and-go" landing with an airplane. Land on the board, plane it and take off again. Surface one section across its width, then move to the next section and repeat.

Securing boards that are longer than your benchtop can require additional outboard support (a table saw outfeed roller works), and clamping the area of the board that you aren't planing to the benchtop while planing the faces of boards. When planing edges, you rarely need outboard support.

Christopher Schwarz, editor

Dealing with Layout Lines

In the final cleanup stage of a Union Village blanket chest, my layout lines are still visible after I've gotten the piece smooth. However, the lines do not uniformly show on all surfaces.

What to do: Get rid of them all, re-establish lines consistently around the piece, or just leave it as-is with faint lines of inconsistent depth?

Rick Bowles
Erwinna, Pennsylvania

Rick,
The question of leaving tool marks behind seems thorny at first. There are those who say that removing marks, such as your layout lines, is what a pre-industrial joiner or cabinetmaker would consider "neat and workmanlike." And there are those who say that leaving tool marks is what separates your work from CNC-made work.

Here's how I approach it. (My opinion is only that, but you asked for it.)

Unless you roll a stump into your living room and call it a coffee table, every aspect of furniture is a tool mark. Sandpaper, for example, is a tool and leaves a distinctive surface. A router-cut moulding is almost always different than one cut with moulding planes.

So the question of tool marks is which ones you choose to leave behind. When I build a piece that is a reproduction or is in the spirit of a past style, I try to get a feel for the marks that were typical.

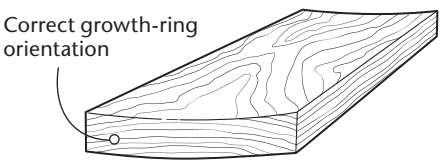
So what is appropriate for a Union Village blanket chest? In pictures I have of a period Union Village chest, the dovetail baselines on the back of the chest near the top were planed off of a surface that was likely never meant to be seen. At the base of the chest at the same corner, you can see toolmarks everywhere.

The front of the chest features half-blind dovetails, and the tails are on the ends. There are faint baselines visible up and down the end pieces.

My conclusion: This maker wasn't really concerned with the baselines. When they were removed (such as at the back), that was OK. When they were left behind, that was OK, too.

So Rick, I think you are done. If the piece looks good to your eye and the toolmarks are neither sloppy nor distracting, then I think you can call it a day and start finishing the piece.

Christopher Schwarz, editor



Warping Illustration Mistake

In "Why Wood Warps," (Summer 2009, Issue 14), the author states "… boards cup toward the bark side." In the illustration "Types of Warp" on page 8, wee se a board clearly cupping away from the bark and toward the center. There are always exceptions, of course, but generally, is this illustration accurate?

David Benefiel
via e-mail

David,
You are correct; the illustration should have had the growth rings going the other way to reinforce the text of the story. The artist took some license and we didn't catch it. However, do not be surprised if you see a board cup on the heart side on occasion. WM

Christopher Schwarz, editor

HOW TO CONTACT US

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Shortcuts

ILLUSTRATIONS BY MARY JANE FAVORITE

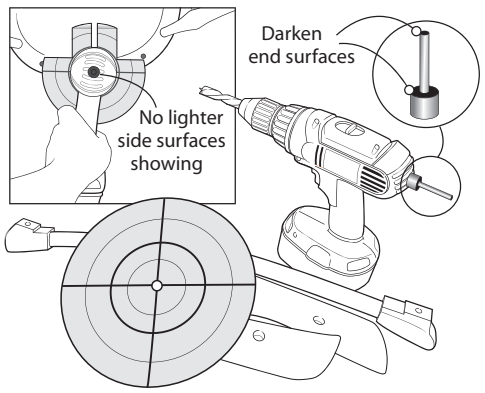
Drilling on Target

Anyone who has ever made a chair or even more so, taught chairmaking, can tell you that drilling the chair's crest so that its mortises line up with the spindles can be a trying experience. I have a method for teaching the technique using a target on the floor. A student at The North Bennet Street School asked me, "Why don't we use the target technique in the actual drilling?" When I returned home, I started thinking about resolving the drill end of things and came up with this solution.

This trick is nothing more than a small rod stuck on the back of a disk that I epoxied to the back of my drill. The critical point here is that the rod and disk are perfectly aligned with the drill bit so that when you look down the rod, you are essentially sighting down the bit.

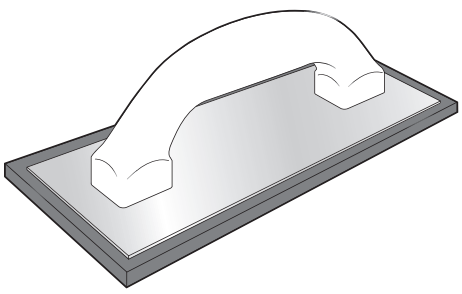
When looking down the rod, if you can see anything but black (meaning the side of the rod), you are not sighting correctly.

To align the drill with the target (which would be set around a seat's spindle hole), the body of the drill should be on center with the target and the back of the drill should read all black.



Perhaps the only tough part of using this technique is getting used to moving your head with the drill to keep the rod centered. To make it easier, split the process into two steps. First, center the rod by moving your head. Second, move the drill into the center of the target while moving your head as well to keep the rod centered.

Peter Galbert
Jeffersonville, New York



Super-grippy Push Pads

I use several unmodified grout floats to feed stock at the router table, jointer and table saw. The closed cell foam pad on the float grips the stock firmly and the handle provides a comfortable, sure hold. Should a blade hit the foam, or even the aluminum plate, it does not damage the cutting edge. The floats are usually pretty inexpensive (less than $10), and the ones in my shop have held up to several years of use with little wear.

Clarke Green
via the Internet

Use a Router Mat for Quickly Holding Panels for Planing

While working on a small project for my dog (an elevated platform for bowls, of spalted pine with a walnut racing stripe) I needed to level a panel with my handplane. The only problem was, my bench was a disaster from other projects and most of my bench was already covered with a sanding/routing mat.

Rather than moving everything off the bench to remove the mat, I just dropped a bench dog in front of it and went about leveling the joints, including some traversing to knock down the really high spots. I was in instant planing nirvana. The downward pressure from the planing kept the board firmly in place on the mat and on the bench without any lateral planing stops – even though the board had a slight twist in it and was pretty short at 16".

I don't think this will replace my tail vise in any way but it was quick, and it worked much better than I thought it would.

Barry Johnson
Ewing, New Jersey

Variable-grit Abrasive

I really can't call this a variable-grit sandpaper because it is not sand and it is not paper – but it is similar. Shagreen (stingray skin) can be used as a burnisher in its polished condition and it can be altered into other grits by abrading it with equivalent abrasives.

I selected a piece of quartersawn white oak (*Quercus alba*) and cut it to a size that was comfortable in my hand, 1" x 2⅛" x 4½". The wood will be stable even if I get it wet.

I cut a piece of shagreen to the size of the oak block including a wax pencil's width larger than the block. I then used large shears to cut out the material. This stuff is tough; the little tubercules of mineral deposits are very hard.

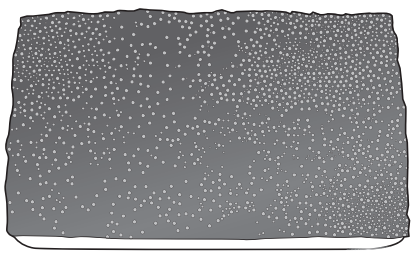
To attach the shagreen to the wood, I used liquid hide glue and just kept working it flat and smooth every few minutes over about a 30-minute period to make sure I got good adhesion. I put a bit of glycerin in the hide glue to keep it flexible as there may be some small movement. I also treated the edges of the block with a mixture of distilled water and alum to make the edges waterproof.

After about 20 minutes of work with sharp shears and a coarse file, I was able to shape the abrasive block so that the stingray skin was even with the edges of the block and smoothed to a burnished finish.

I can use sandpaper to make this abrasive block into any grit I want and the grit will correspond roughly to the grit of paper I use. Because these mineral deposits are so hard they will hold their edge for quite some time. This is an old material and technique that I find fascinating.

Stephen Shepherd
Salt Lake City, Utah
fullchisel.com

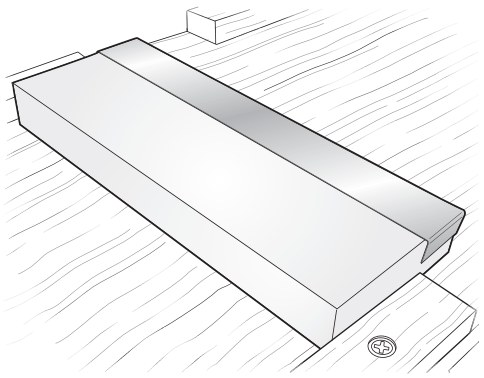
Editor's note: Shagreen is available from Galart International Trade (galartintl.com).



Make the Ruler Stay Put When Using the 'Ruler Trick'

When polishing the back of a plane iron it is much faster to use David Charlesworth's ruler trick. The ruler raises the iron up on one side of the stone and creates a micro bevel or a thin back bevel on the back of the iron. When I tried to use a small steel ruler, however, it would sometimes move around on the stone. To prevent this I made a "ruler" out of thin steel flashing available at any home center. I took the flashing, removed all the paint, then bent the last 3/8" on either end to create hooks. It clips over the stone and does not move.

Clay Hanna
Mammoth Lakes, California
corwoodwork.blogspot.com



"Every act of conscious learning requires the willingness to suffer an injury to one's self-esteem. That is why young children, before they are aware of their own self-importance, learn so easily."

— Thomas Szasz (1920 -)
psychiatrist and professor

Make Your Dovetail Saw Easier to Start

I was playing around one weekend and wondered if I could improve my old and favorite saw's starting. I don't know if others have done this before, but I filed the front 1 1/4" of teeth as crosscut and the saw starts beautifully now – particularly when pulled backward to start the cut. Most of the teeth are still rip and the saw cuts as quickly and as accurately as ever.

Tony Sutton
Markfield, Leicestershire

Remove Yellow Glue From Your Clothing

Frequently I find hard yellow streaks or spots on my T-shirts – dried yellow glue.

Here are the remedies recommended by Titebond. Choose one of the three methods, not all three.

1. Heat. Iron the spot, covering it first with a damp cloth, to soften the glue so it can be washed out.
2. Soak the spotted areas in vinegar.
3. Apply acetone.

Harry Dubetz
Alexandria, Virginia

Various Strategies for Marking on Walnut

Walnut and other dark woods are difficult to mark with a standard pencil. The lines disappear against the dark grain, appearing only when you shine a raking light across them. We've tried a variety of strategies here at *Woodworking Magazine*. Here are a few notable ones:

- White or red pencil lead. Keep the lead very sharp so you can get a line that is accurate enough for joinery. If you use mechanical pencils, you can buy replacement lead in a variety of colors (pink!). Another alternative is white 0.9mm lead used for marking fabric. This gives a consistent and readable line.
- Strike knife lines, then powder the lines with some chalk dust to make them more visible.
- There are white and silver ink pens you can purchase at art-supply stores. These have a fairly consistent line as long as you keep the pens moving; otherwise the ink tends to leach all over the place.
- Wrap masking tape around the wood and mark on that. Some tapes take pencil lines better than others.
- And finally, my favorite: Use a marking knife to strike your joints, then use a raking light across the work (I use a lamp with an articulated arm mounted on my workbench). This makes the knife line visible, as long as your saw or hand doesn't eclipse the light source.

Christopher Schwarz, editor

Dowel Plate for Bamboo Skewers

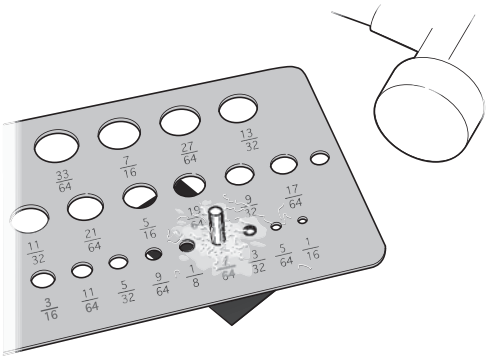
I go through a lot of bamboo skewers in my shop. I use them to stir paint, apply glue, cap glue bottles etc. I also frequently use them as pins or plugs in my projects. I like the size, the price is great and I enjoy the look of the finished piece. They do, however, have one major drawback – they are rarely round.

The most usual defect is a lump, or ridge, that runs the length of the skewer. They also can vary significantly in diameter. While these defects in no way interfere with the paint-stirring ability of the skewers, they can make for some very messy looking pegs. I used to dig through whole packs of skewers trying to find the best ones, all the while thinking, "If only my dowel plate had holes smaller than 1/8"."

But then, "Eureka!" I hit on an easy fix. I took my metal drill gauge and tried using it as a dowel plate with the skewers. The gauge is not exactly beefy, but then again neither are the skewers. It works great. I find that the 7/64" hole gives me consistently round skewers with the least amount of effort or waste.

After I drive them through the gauge, I cut them with a knife. A rolling action makes the cleanest cut, and it avoids the skewer's tendency to splinter or shred. The end result is a much cleaner look. WM

Dan Klauder
Wasilla, Alaska
dans-woodshop.blogspot.com



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Three-clawed Dragon Stool

BLOG

This simple stool – built with a twist – will challenge the way you think about layout and joinery. Strength is in the engineering, not perfection.

PHOTO BY AL PARRISH

This simple stool features straightforward through-tenon joinery. The first challenge in building it is to find reference points to lay out the joints; they aren't on the stool but in the spaces between the parts. The second challenge is trusting these reference points to make the cuts.

In my 35 years of woodworking, there are a handful of projects that stand out as landmarks of change, points in time where I had a different attitude and a more developed set of skills at the end than at the beginning. This seemingly simple stool is one of them. And like all good things from the Orient, a paradox presents itself every time you think you have a problem solved.

We found an antique version of this stool in a catalog, thought it looked interesting and ordered a couple. The joinery is as simple as it appears. The three stretchers join with one another and with the legs using through-tenons; and this same type of joint connects the legs to the seat. The complexity was revealed as I disassembled one of the originals.

This little stool is seat-of-the-pants engineering at its finest. The beauty of a triangular assembly is that it cannot rack, and in this stool each mortise-and-tenon joint reinforces another. The legs push the stretchers together while the stretchers wedge the legs into the seat. Taking the sample stool apart was difficult at first, then there came a point where it became easy.

The good news here is that this also works in reverse; less-than-perfect joints can combine in rather loose assemblies to form a very strong unit. The joints in the original were all wedged to hold them together, and there were several places where damage had been done during fitting.

My joinery was less than perfect, yet I'm very happy with the finished product. I also managed to inflict nearly identical damage around the joints, though not because of any desire to be authentic. Challenging work has its risks, and the original contained fixes that worked. If I really wanted to be authentic, however, it would have been handy to know how to cuss in Mandarin.

Simple, But With a Twist

To build this stool, you need to establish some references. The obvious first reference is a vertical centerline through the seat. From this line the location and angle of the legs is determined. The stretchers are also located with the center of the stretcher assembly on this centerline. That intersection is conundrum number one.

The three stretchers intersect to form a triangle, making the center of the assembly the center of the triangle. So the reference point isn't something that can be found and marked on the wood; it is out in space. This brings us to conundrum number two. For the stretchers to meet all three legs, the stretchers can't come squarely off the legs; they must twist a few degrees.

This means that the end of each stretcher will meet the leg at a compound angle, and the tenon will go through the leg at a different angle. If the prospect of cutting this joint sounds like a

challenge, it is. If it fills you with dread or seems beyond your skills, don't worry; you're in good company with the rest of us. But if you can get your brain to consider it as nothing more than cutting to a line, you can do it. The trick is where to put the line.

So don't put the magazine down and head to Ikea to buy yourself a stool. The lines are there, and you can find them and cut to them. I began this project by making a full-size layout on a piece of plywood. I also started with parts for two stools; I planned on making one for practice and one for real. I recommend this approach and also recommend having some extra stock on hand. A momentary lapse meant making an extra set of stretchers for me.

I cut a 24" square of plywood to 20½", the overall height of the finished stool. I drew a centerline, then a circle with a radius of 7⅞" – the distance from the center to the inside edge of the legs at the floor. I drew a second circle with a radius of 2¾" – the distance from the center of the round seat to the inside edge of the through tenons at the top of the leg. With a framing square I transferred these points to opposite edges of the plywood.

Connecting the resulting points established the actual length of the leg, and the angle of the leg from vertical. I set my sliding bevel gauge to this angle, then marked off the ends and the shoulder locations on the leg. These dimensions were taken from the original we had, and my CAD program told me the angle is 14.5°. In cases such as this, setting the bevel to a full-size layout is easier and more accurate than using numbers.

When I went to set the angle on my miter saw, it kept dropping into the saw's detent at 15°. I chose to use this detent to make it easy to return to this exact angle setting on the saw. This small change places the edges of the legs about ⅛" outside the layout I drew. You could argue that I cheated, but I would argue that it doesn't make any practical difference. After cutting the legs to length, I reset my bevel to the new, 15° angle.

Kung Pao Chicken or Egg Drop Soup?

To lay out the tricky tenons at the junction of the stretchers and legs, two subassemblies need to be made first. The stretchers must be dry-fit to each other and the legs dry-fit to the seat. It doesn't matter which fork in the road you go down first. I chose to put the stretchers together before fitting the seat and legs, reasoning that I would waste less material if anything went wrong.

My standard procedure is to make mortises first, then tenons, but here I made the tenons first. The triangle formed by the three tenons is defined by the distance from the shoulder of the tenon to the edge of the mortise. I wanted to keep the legs of the triangle as equal in length as possible, and a tenons-first approach gave me a second chance if things went wrong on my first attempt.

This is a good place to mention that none of the parts ought to be cut to final length until the joints are fitted. There isn't any advantage to making bigger pieces of scrap at the start instead of small pieces at the end. The extra length will be trimmed after the stool is together, and if you need to re-cut any joints, you'll be glad you have it.

The stretchers are ⅞" wide and 1" high. This subtle difference from square is visually interesting in the finished piece, but it's easy to miss when laying out the parts. I made a mark on the top of each one with a red lumber crayon to avoid confusion. The shoulder angle is 30°, and a bevel set to that angle is needed to lay out the tenons. I came in from the end of the stretchers about 1¾" and marked the shoulder with a knife held against the bevel. I then carried the shoulder lines across with a combination square.

I used a cutting gauge to lay out the cheeks. The tenons should be about one-third of the thickness of the stock, and it doesn't make any practical difference if these are 5/16" or ⅜". Make your choice based on the tools you will use to make the mortises. You also have a choice about what tools you use to cut the tenons.

If you're dedicated to using power tools and think hand tools are slow and inaccurate, this is the project that just might change your mind. You can set up to cut the simple angled tenons on the table saw, but to get two matching angled shoulder cuts you will need two perfect miter gauge setups in opposite directions.

The key to good results in hand-cutting tenons is in the layout. Knife in the lines to give your saw a rut to follow. Turn the corners by sticking the

A full-size layout is essential for determining finished sizes of parts, locations of intersections and angles. It is used as a reference several times during this project.

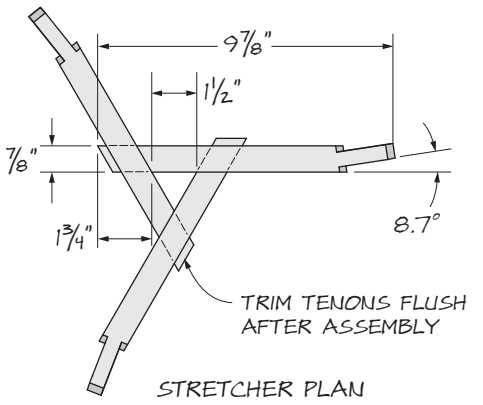
Marking lines with a knife instead of a pencil establishes a path for the saw to follow, and it makes it easy to carry lines around corners.

Start cuts with the sawblade just outside the knifed line. Push the saw gently and the teeth will follow the path of least resistance to the line.

Use a cutting gauge to establish the lines for the tenon cheeks. Mark from both sides to center the tenon layout and provide a path for the saw.

knife in the line you just made and bring your square up to it. Place the stretcher on a bench hook, and start your saw cut carefully. Make the two shoulder cuts, then put the stretcher in your vise to cut the cheeks. You'll be finished before you can find your digital angle gauge and set the miter gauge to the table saw blade.

After cutting the tenons, I gave them a quick once-over to be certain that the shoulders were square to the cheeks and the cheeks were a consistent thickness. Final adjustments will be made later, but the tenons should be consistent before the mortises are located and made. When I was happy with the tenons, I lined the stretchers up in a row with their shoulders even and clamped the three pieces together.



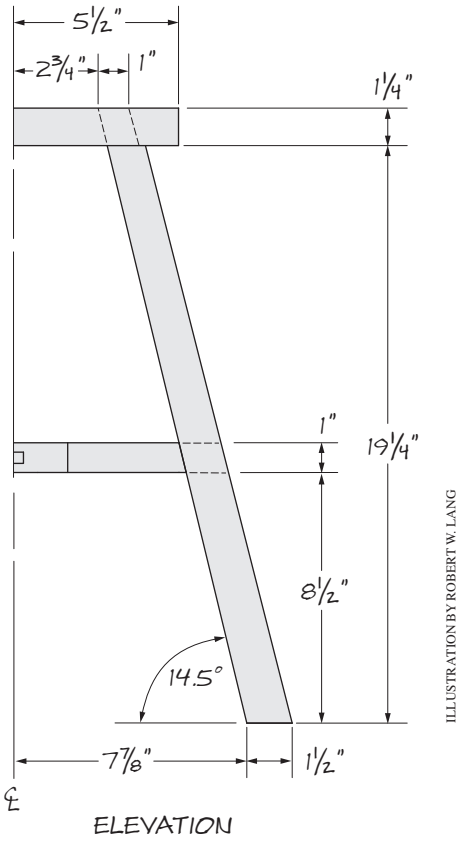


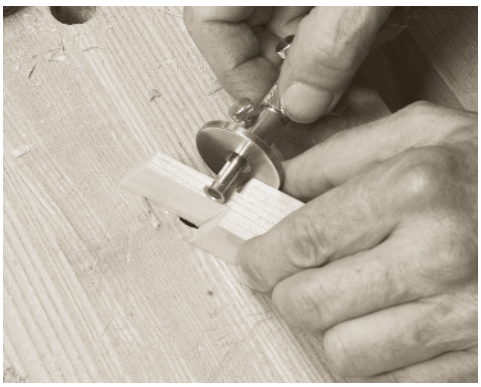
ILLUSTRATION BY ROBERT W. LANG

I made a mark 1½" back from the short shoulder of the tenons and squared a line across the three stretchers. From the square line, I came down each edge with an angled line. The mortises angle is in the opposite direction of the tenon shoulders. I set my cutting gauge to one of the completed tenons, placing the cutter to the far side of the tenon. The cutter is wedge shaped and this method leaves a clean line on the inside edge of the mortise.

I put a 5/16"-diameter brad-point bit in the drill press and made a simple jig to hold the stretchers at a 30° angle. A Forstner bit would work just as well. The idea is to remove waste, not create a finished surface. The series of holes I drilled is 1/16" smaller than the finished mortise; I finished the mortises by paring with a chisel. To pare the ends, I clamped an angled block on top of a stretcher to guide the chisel at the correct angle.

Each tenon was fit to a mortise one at a time by removing material with a joinery float. These joints, and all of the joints in the stool, should go together easily, but not sloppily. I left extra room on the ends to make assembly easier; wedges are driven in at the end to keep everything together. When I had a good connection, I made a mark across each joint to identify the pieces and their relation to each other.

After cutting the first set of tenons, line up the shoulders and clamp the three pieces together. Measure for the mortise locations and mark all three stretchers at the same time.



Reset the cutting gauge to a finished tenon. This will ensure an accurately sized mortise even if the finished tenon is smaller than intended.

An angled block clamped to the drill press table will hold the stretcher securely while you remove waste from the mortise with a bit that is smaller in diameter than the width of the mortise.

An angled piece of scrap clamped to the edge of the mortise is an effective guide for paring the ends. There should be some extra space at the ends, but the corners should not be sloppy.

Three-clawed Dragon Stool

	NO.	PART	SIZES (INCHES) T	W	L	MATERIAL	NOTES
❑	3	Stretchers	⅞	1	12	Cherry	Rough length
❑	3	Legs	1½	1½	28	Cherry	Rough length
❑	1	Seat	1¼	11	11	Cherry	

Assembling the three stretchers as a unit appears to be impossible. With a point of a tenon started in each mortise, I tapped the end of each stretcher on my bench, rotated the group and tapped the next stretcher until all three were together. A few adjustments were needed to the shoulders to get a tight fit on all the joints. The ability to slide the parts sideways helps in this, and it reduces the possibility of the pointed end of a tenon blowing out the end of a mortise.

Take a Break and Have a Seat

I couldn't find wide enough material to make the seat a single piece, so I glued two pieces edge-to-edge to make a block roughly 11" square. I established a centerline and used a compass to draw a circle with a radius of 5½" for the outer edge of the seat, and a second circle with a radius of 2¾" to locate the inside edge of the mortises. One of the mortises should be lined up with the grain direction of the seat, as a different orientation would be more likely to split the seat as the legs were wedged.

Without changing the settings on my compass, I stepped off marks around the perimeter of the smaller circle, starting from the intersection of the centerline and the perimeter. This technique was detailed on the back cover of the Autumn 2009 issue (Issue 15) and makes six equally spaced marks on the edge of the circle. Starting from the centerpoint of the circle, I drew lines on the top of the seat to every other mark. These lines establish the centers of the mortises in the seat.

I drew lines ¼" away from and parallel to the mortise centerlines to establish the outer long edges of the mortises. I held a straightedge across the points where these lines intersected the circle and drew a straight line for the inside edge of the mortise. I reset the compass, moving the point out 1" to make marks for the opposite end of the mortises. After establishing these points, I marked out the mortise locations with my knife and a straightedge.

"When it is obvious that the goals cannot be reached, don't adjust the goals, adjust the action steps."

Confucius (551-479 BCE)
philosopher

I didn't want to build a second or third angled jig for the drill press, so I tilted the table instead, lining up an angled scrap to the edge of a 7/16"-diameter Forstner bit. The seat mortises finish about ½" wide, but this dimension isn't critical as the tenons can be laid out and cut after the mortises are made. The goal is a tenon that is about one-third the thickness of the leg.

I secured a scrap of plywood to the drill press table to prevent the drill bit from blowing out the grain on the underside of the seat. I drew a line on the plywood to help see that the mortise locations were at a right angle to the incline of the table. After boring, I clamped an angled block to the top of the seat to guide my chisel and pare the ends. Then I used a wider chisel to pare the sides and followed up with a float to finish the mortises.

The tenons on the legs are angled, and there is a shoulder on the front of the legs as well as the sides. This shoulder cut is 1" away from, and parallel to, the back of the legs. I cut the tenons the full width of the leg, then I used a float and a shoulder plane to get a good fit in the seat mortise. I marked the front tenon shoulder directly from the mortise and left extra space at the ends. I strove for a fit on the cheeks that would go together with hand pressure only.

I marked each tenon and its seat mortise so that each leg could be returned to its own mortise. The stool will need to be taken apart and put back together a few more times, and it can be easy to lose track of the parts. I fit all three legs to the seat and left them assembled.

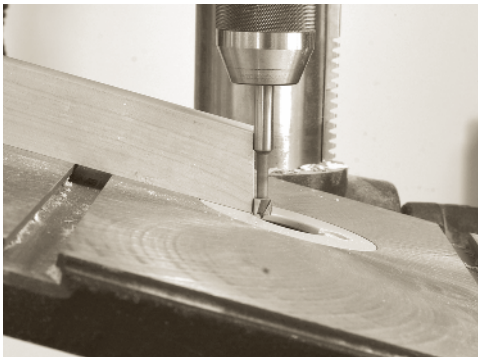
Return to the Pattern

The stretcher-to-stretcher and leg-to-seat tenons gave me some practice, and it was time to make the joints that connect the stretchers to the legs. I marked centerlines on the top of the assembled stretchers and the back of each leg. I drew one more circle on the pattern with a radius of 5⅝". This represents where the stretchers join the legs, at the bottom of the stretchers.

I placed the stretcher assembly on top of the plywood pattern, centering it on the circles drawn earlier. Then I rotated the assembly until each stretcher lined up with the lines representing the legs. With the stretcher assembly in position, I placed the dry-assembled seat and legs on top of the stretchers. The inside edges of the legs were

After fitting the joints one at a time, assemble all three stretchers. Get the ends started, then tap and rotate the assembly until all three joints come together.

Draw a circle on the seat to the inside radius of the leg mortises. Leave the compass set to this radius and step off six points around the circle. Every other point will be the location of a leg.



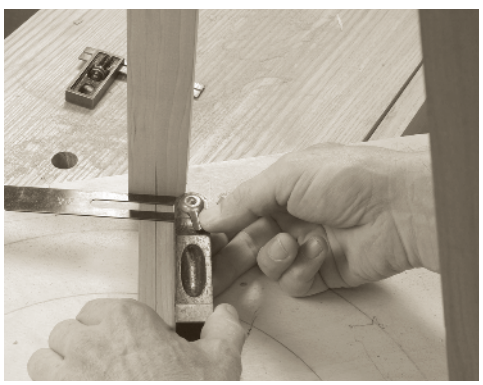
Tilt the table of the drill press to match the angle of the leg and drill out the mortises in the seat.

Clamp an angled scrap, or one of the legs, to the seat as a guide for paring the ends of the mortises.

just outside the circle on the pattern, so I adjusted the position until I had equal distances between the circle and the back of each leg.

I set a second bevel gauge to match the angle between the side of the stretcher and the back of the leg, leaving my first bevel gauge set to the angle of the leg from vertical. I marked the stretchers at the points where the sides of the stretchers met the 5⅝"-radius layout circle. I needed to mark the same intersection on the legs, so I removed the stretcher assembly from the pattern, then returned the legs and seat to the proper position.

I placed one leg of my framing square on the circle, and made two marks on the leg, one at 8½" and one at 9½". These marks indicate the top and bottom of the mortises in the legs. I used my marking gauge to outline the sides of the mortises, ½" wide and centered in the legs. I wasted the bulk of the mortises at the drill press, and refined them with a chisel and float.



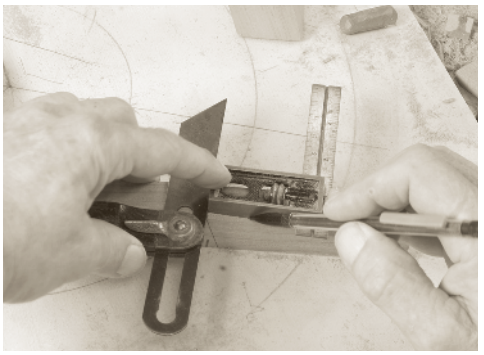
Line up the stretcher assembly on the pattern, then place the assembled legs and seat on top to set the actual angle between the stretchers and the backs of the legs.

The last bit of joinery is the tenons on the ends of the stretchers. It calls for some careful layout and cutting. It also calls for a leap of faith; there isn't a good way to double-check the locations of the tenon shoulders. There is also a trap that I managed to fall into in one attempt at making this stool. The stretcher assembly can be twisted in either of two directions, depending on which side of the assembly is up.

In my errant go 'round, I marked the leg locations on the bottom of the stretchers but laid out the joints as if that were the top, resulting in three through tenons that twisted the wrong way. The only fix was to remake the stretchers. This time, I made sure to mark both edges of the stretchers where they intersected the layout circle. Then I wrote "TOP" on the top edges in big red letters.

To lay out the shoulder cuts, I began by marking the 8.7° angle on the bottom edge. Then I marked the 15° angle on one side, followed by the angle across the top. Last, I made the angled mark down the remaining side. That took care of the shoulder layout, but I needed to come off the shoulder line on the top of the tenon at a right angle. I made a mark ¼" from the centerline on each side. My small machinist's square has a stock with a square end, so I placed that end of the square against the blade of the bevel gauge and marked the tenon.

Making these angled cuts isn't as difficult as you might think. Knife cuts on the layout lines help the saw to track as the cut is started, and I was careful to watch the angled line as the cut progressed. It didn't hurt that I had already practiced these cuts three times. The length of the cheek cuts was beyond the reach of my dovetail saw, so I made these cuts at the band saw, then removed the saw marks with a float.



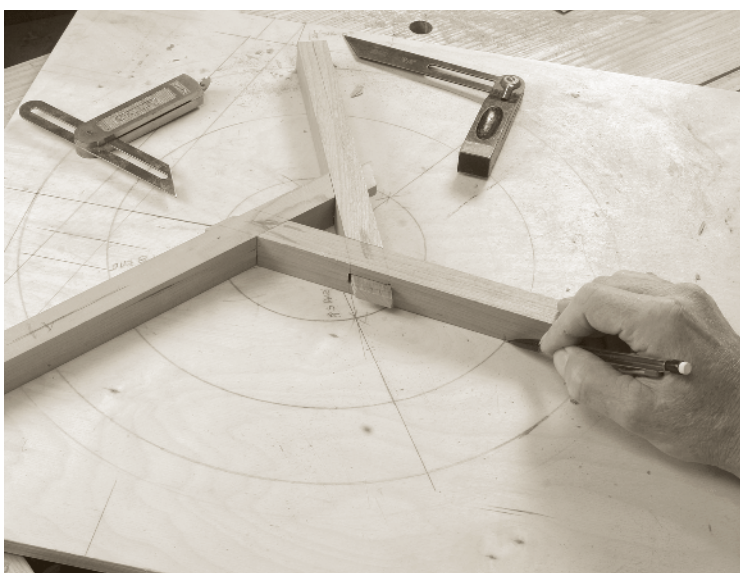
After setting out the shoulder lines, use a square in combination with a sliding bevel to mark out the cheeks.

All Together Now

I fit each stretcher to a leg, being careful to keep the legs and stretchers in order relative to the mortises in the seat. When each had been fit individually, I checked to see if the assembled stretchers would fit neatly to the legs, and if that subassembly would fit to the seat. Building this stool may not be a cure for perfectionism, but it is an effective treatment for that affliction.

Gaps at the ends of the tenons provide space to drive wedges on final assembly. These gaps also provide forgiveness for minor errors in layout or cutting. The ability to move the tenons laterally in the mortises makes it possible to push the joints tightly together at the end. The cheeks don't need to fit too tight either. They shouldn't be sloppy, but the entire structure will be very strong, even if they twist a bit.

Wait until you've fit the entire stool together to bash your joinery skills. The wedges won't show when you're done, and neither will a few discreet



Mark the intersection points on the stretchers, and be careful not to flip the assembly over when marking out the tenons.

Use a framing square to transfer the point of intersection between the stretchers and the legs up from the full-size drawing.

shims on the cheeks. If you're determined to hang on to your perfectionism, make the tenons .009" undersized for twist clearance, and leave 11/64" space at the end of each tenon.

I placed the legs on the ends of the stretchers, with the tenons about three-fourths of the way into the mortises. To start the tenons on the ends of the legs into the seat, I needed to tilt the legs slightly. I tapped on the top of the seat with a dead-blow mallet, and when the tenons were started into their mortises, I tapped the legs farther on to the stretchers, then alternated tapping on the top with tapping on the legs until all the joints were seated.

There were a couple spots where there was a gap at a shoulder, so I marked these areas with a pencil, took the stool apart and made adjustments. When I was satisfied with the fit, or at least able to calm my inner perfectionist, I made sure to mark all of the joints so that when I assembled the stool for the final time it would go back as I had it. With all of the work to get the stool together, I was reluctant to take it back apart, but the seat and legs needed shaping, and most of that work would be easier working on one piece at a time. I did leave it together overnight.

The Shape of Things

The legs are tapered on both sides and the front. I marked in 1/8" on each side at the top of the leg and 1/4" back from the front. I used my straightedge to draw lines from these marks to the bottom front corners of the legs. I cut just outside those lines with the band saw, then removed the saw marks with a pass across the jointer.

The edges of the legs are also rounded, with a radius that varies from about 1/2" at the bottom to about 1/8" at the top. The block plane was my weapon of choice for this, and I began by planing a tapered bevel on the two front corners. I made an initial pass starting 4" or 5" back from the bottom of the leg, then moved the plane back that same amount for each successive pass.

When I reached the top of the leg, I removed the arris on the edges of the bevel, making a faceted surface. I repeated this until the edge was close to being round. Then I adjusted the plane to take a lighter cut and refined the surface. After completing the front edges, I made a simple radius along the back edges. The last step to shaping the legs was to plane a radius on the bottom edges. I left the final sanding of the legs until after the stool was assembled.

The seat of the stool is dished down from a line 3/4" in from its edge to 1/4" deep at the center. There are several ways to accomplish this, either by hand or machine. See the article on page 13 of this issue for a detailed comparison of methods. On the first stool I made, I dished the seat with hand tools; I roughed in the seat with a gouge then followed with an inshave and a curved-edge scraper. For the second stool, I used a Kutzall disc in an angle grinder, followed by a #36-grit flat disc. I then disc sanded to #120-grit with a foam-backed disc chucked in an electric drill.

After successfully dry-fitting the entire stool, mark the locations of all the parts, then take the stool apart for tapering the legs and shaping the legs and seat.

A series of beveled cuts with a block plane will quickly create a tapered radius on the legs. When the curve is formed, reset the plane for a finer cut and remove the facets.

The outside edge of the seat is rounded over to almost a semi-circle. On the first stool, I did this shaping entirely with a spokeshave, and on the second I rough cut the edges with a 1/2" radius roundover bit at the router table. I increased the radius and softened the curve with the spokeshave on the second seat.

I rounded the edges of the stretchers on both stools with a rasp, staying away from the areas where the tenons met the through-mortises. With all the parts shaped, I was almost ready for final assembly. All I needed to do was cut some wedges.

I sliced a 1" piece off the end of some 3/8"- and 1/2"-thick scraps, and set the band saw's miter gauge to 5°. After making one cut to get started, I flipped the scraps over after each cut to make tapered wedges. I placed a pile of each width on my bench and got ready to glue the stool together. I wanted to have plenty of open time, so I used liquid hide glue.

After rounding over the edges of the seat with a router, I softened and extended the curves with a spokeshave on one of the seats.

This Time for Real

I spread glue on the tenons and mortises of the stretchers to begin. When all the joint surfaces

Final assembly begins by brushing liquid hide glue on all the surfaces of the joints. The long open time is an advantage with a complex assembly.

were good and gooey, I eased the points of the tenons into the mortises. When all three joints were started, I tapped the ends of the stretchers on the bench as I rotated the assembly. This went together more easily than the dry assemblies, and when the stretcher-to-stretcher joints were home, I brushed glue on the tenons and inside all the surfaces of the mortises in the legs.

After pushing the legs onto the tenons on the ends of the stretchers, I set the seatless stool upright on the bench, then put glue on the leg tenons and in the seat mortises. The seat went on with a few taps of the dead-blow hammer, and after wiping off the excess glue with a damp rag, I began to place the wedges.

I started on the joints at the innermost point, where the stretchers joined each other. I brushed some glue on the pointy ends of the wedges and inserted one wedge on each end of the through-tenons. I pushed in until I met some resistance, then moved on to the joints where the stretchers met the legs. Again, I placed a wedge on each side of the protruding tenon, leaving them snug, but not tight.

The last group of wedges were placed in the joints on the top of the seat. I looked for places all around the stool where the joints weren't completely closed, and tapped the wedges in at those locations. Some of the wedges will have an effect on joints other than the ones where the wedges are located.

The three tenon stretchers must be assembled at one time. Get the points started and tap each joint together in turn.

For example, the wedges below the mortises in the legs will raise the position of the stretchers, tightening the joints in the triangle at the center of the stretcher assembly. The wedges on the inner side of the seat mortises will lever against the angle of the legs, tightening the joints at the back of the legs and in turn the central stretcher joints. When all the wedges are in place, each piece of the structure acts as a brace for several other parts, and the entire structure is solid.

After a second check of the wedges, I rinsed out my rag with warm water and cleaned off the excess glue around the joints. I scraped any remaining glue from the joints with the back of a chisel, made sure the assembled stool was sitting on a flat surface, and allowed the glue to dry for 24 hours.

Time to Trim and Rub

After the glue dried, I trimmed the protruding tenons and wedges flush with a saw, then cleaned up these surfaces with a block plane. The end grain is easier to trim when wet, so I saturated the surfaces with mineral spirits before planing. I have a saw with a flexible blade that I used to trim the tenons through the seat, then used a shallow-sweep gouge to trim the end grain. These tenons could have been marked with a pencil before gluing, and precut with a band saw.

I removed all the crayon marks on the wood surfaces with mineral spirits before rounding over the edges on the stretchers and finish sanding. After going over everything with #120-grit Abranet in a pneumatic sander, I hand sanded with #180-grit, then #240-grit Abranet. Abranet is an abrasive-impregnated mesh that cuts quickly and lasts much longer than conventional sandpaper.

The original stool was nearly black, but I wanted the grain on mine to be visible. I did want it a shade or two darker than natural cherry, so I stained the stool with Cabot's Special Walnut oil-based stain. After letting the stain dry overnight, I applied three coats of Watco Natural Danish Oil, letting each coat dry for 24 hours. A coat of paste wax followed the oil, and the finish was complete. WM

— Robert W. Lang

It's a piece of cake to put the legs on the ends of the stretchers, but the seat is another matter. The legs must be tilted to fit the tenons in the angled mortises.

Strategic placement of the wedges ensures tight connections. Pushing the stretchers up toward the seat tightens the central stretcher joints.

Chairmaker's Secret Weapons

Create a hollow with a minimal amount of noise, suffering and collateral damage – or create a hollow in a hurry.

As with most tasks in woodworking, there are several ways to make a concave surface in a seat. Which method to choose depends on your temperament, experience and budget. In the end, you want a smooth surface, and achieving that involves removing material as fast as you can, then refining the surface. Because I had two stool seats to hollow, I did the bulk of the work on one with hand tools, and on the other with power tools, to compare tools and techniques.

I found it impossible to be a purist with either approach; I sanded the hand-hollowed seat with a power tool, and I used a card scraper to remove tool marks from the machine-cut surface. The next time I do some hollowing, my tool choice will be based on the size and number of seats. One or two small seats would be reasonable to do by hand. If I were facing more seats, larger seats or a tight deadline I might alter my approach.

Making a chair involves different skills, tools and assumptions than building a cabinet or a table. The tools that work best may not be familiar, and the techniques for using them aren't the same as when doing flat work. Don't rush out and buy every tool mentioned in this article. See how far you can get with what you have and keep an open mind if you're opinionated about hand tools vs. power tools. Many of the power tools mentioned here were recommended by traditional chairmakers.

Hand tools developed specifically for this task, such as inshaves (also called scorps) will perform best, but you may not want to invest the money to purchase one, or the time to learn to sharpen and use such a tool if you're only exploring chairmaking. An inshave can be used for almost the entire job. You can hog off a lot of material by working across the grain, then refine the surface by taking lighter cuts with the grain.

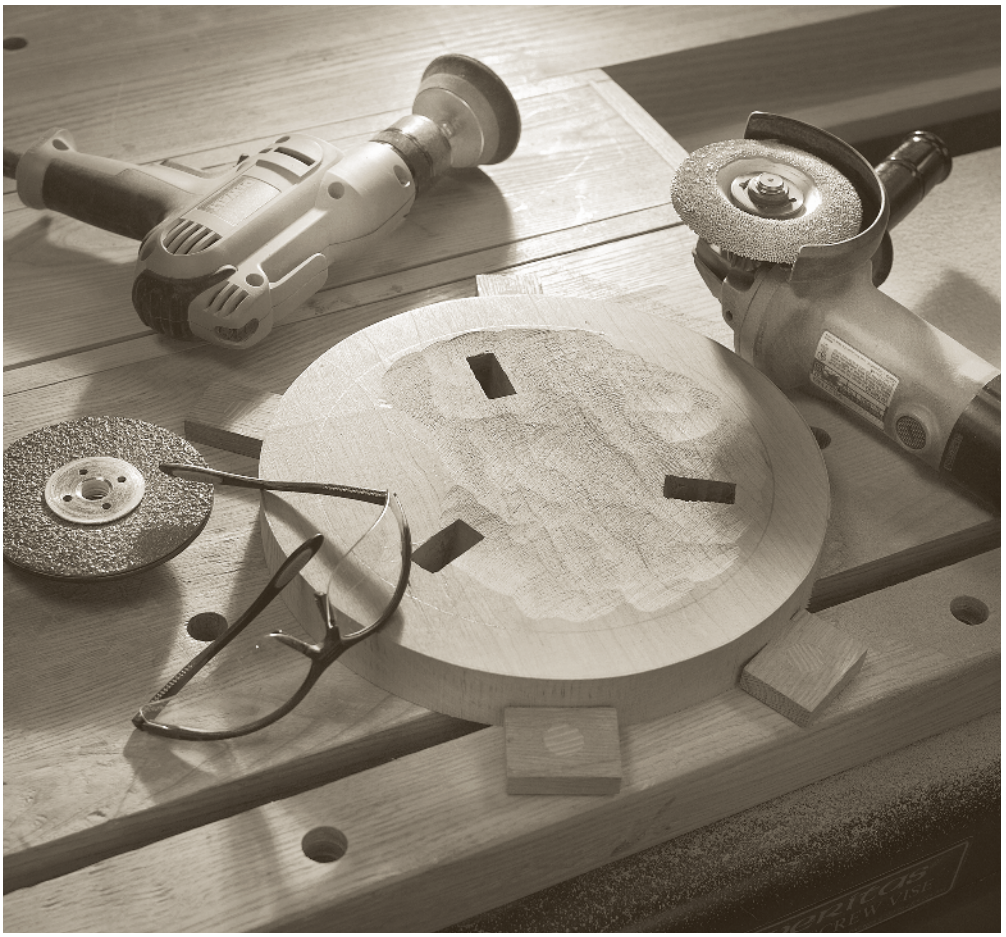


PHOTO BY AL PARRISH

Power-tool scooping methods remove a lot of material in a hurry, but they are difficult to control – and they leave a surface that still requires a lot of work. Hand tools give you greater control, but leave a distinctive trail behind them.

An inshave is an effective tool for both roughing and refining hollows. Muscled across the grain this tool will remove a lot of material quickly.

Used with a delicate touch and with the grain, the inshave can take thin shavings and produce a surface with a smooth, flowing curve.

Drive a large gouge with a mallet, deepening the cut as you move from the outer edges into the center of the seat.

Remove the ridges between the gouge marks as you continue to work around the seat.

Switch to a gouge with a flatter sweep and shave the remaining ridges by pushing the tool with your hand.

The Kutzall wheel is like a bunch of beavers on steroids. Mounted in an angle grinder, this wheel will remove material quickly.

The surface left in the wake of the Kutzall needs additional work to level the surface and remove tool marks.

Whatever method you try, the easiest mistake to make is going too deep. A deep seat isn't as comfortable as a shallower one, and it's often the result of fixing something that went wrong in the early stages. On a stool this size, ¼" deep in the center of the seat is plenty. You can drill some holes to that depth with a Forstner bit before you begin if you think you need a guide. I prefer to lay a straightedge across the hollow to judge the depth as I go.

Removing the Waste

The least expensive way to create a hollow is with carving gouges to start and a curved edge scraper to finish. The first gouge you will use should be rather wide and have a strong curve. The goal is to remove material, and the curved edge is easier to drive with a mallet. Work from the outer edge into the center, and don't worry about grain direction at this point. Make a series of cuts by working around the circle.

When you finish a complete rotation, go around again, this time aiming to remove the ridges between the gouge marks. This is exploratory surgery; there will be areas where chunks tear out because of the peculiarities in the grain of the piece of wood you're working with. When you carve, there is a preferred direction for the shape you're making – downhill. There will also be a preferred direction according to the grain pattern – uphill so that you don't wedge the end of the tool under a grain line.

It isn't often that the cut you want to make goes in the ideal direction for both shape and grain. The best solution is to get the gouge as sharp as you possibly can to minimize tearout while you get to know the piece of wood you're working on. After a couple rounds of mallet-driven cuts, switch to a shallower gouge and begin removing the ridges by pushing the gouge by hand.

Supplies

Barr Specialty Tools
800-235-4452 or barrtools.com

- Mike Dunbar-style Scorp
  #MDS5X11X4, $134

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

- Kutzall Sanding/Carving Disc
  #77J62.01, $59.50
- Lancelot Woodcarving Tool
  #99T20.01, $44.50
- Tim Skilton Premium Sanding Pad
  #68Z25.31, $20.50

Prices correct at time of publication.

Controlling the grinder and cutting wheel takes finesse. It's hard to see the action and you don't get good feedback from the material.

A #36-grit abrasive disc will level the ridges produced in the previous step.

The large bumps and ridges are removed now, but the #36-grit wheel leaves serious tracks that must be removed.

As the seat takes shape, you will want to move more in line with the grain rather than into the center. But don't lock yourself in to the notion that you must follow the grain. There will be places, especially where the curve bottoms out, that you'll need to take a different approach. Make careful, shallow cuts if you're moving against the grain or the shape, and if the wood tears out, change direction.

The power-tool alternative to the initial removing of stock is a special wheel mounted on a 4" angle grinder. I tested both the Kutzall wheel shown above, and the Lancelot, a wheel with a chain saw blade mounted to a circular disc. The Lancelot was overkill on a project this small, but it would be a good alternative on larger chair seats. The Kutzall was nearly as fast at removing material and easier to control.

With each of these tools, the key to success is a light touch. If you're thinking that the power tool will take less skill than the hand tool, think again. These whirling discs remove material rapidly and indiscriminately, and you don't get any appreciable feedback from the material as you do when you're cutting with a gouge.

It is also harder to see what the tool is doing; your vision is limited by the backside of the tool and the wheel. You can't really see what you're doing; you see what you just did.

There are also issues of noise, dust and vibration from the angle grinder. It took me a little longer to remove equal amounts of material with the gouges, but that was time pleasantly spent. I could hear the radio, and I didn't need to don a dust mask or hearing protection. When I was finished I had a pile of chips to sweep up as opposed to a coating of dust on everything within a 5'-radius of where I was working.

With one or two stools to do, my choice would be to do this roughing work by hand. An angle grinder and one of the wheels would be a good alternative only if I were making chairs on a regular basis. The advantage of using hand tools is that they have built-in limits; you can only cut so deep, so fast. It's also easier to see what is happening as it happens, and to make corrections if you need to.

Refining the Surface

Removing material quickly is only the first step. To arrive at a surface worth sitting on or looking at requires additional effort, and again there are power-tool and hand-tool alternatives. The surface roughed in by a gouge needs a tool with a wider surface that takes a smaller bite. The first step will leave ridges and valleys, and the ridges need to be removed without creating new valleys.

An inshave or a small plane with a convex sole will work well, and a card scraper with a curved edge is an alternative. The key is to match the curve of the cutter as close as possible to the curve of the seat and to take light shavings. The advantage of hand tools is twofold; the work is quiet and it doesn't require much skill. Place the tool of choice on a ridge and push. The risks of going too far or inflicting damage are minimal.

On the power-tool side, a coarse, #36-grit sanding disc will remove large tool marks, but will leave behind marks of its own that will also need to be removed. This also takes a light and skilled touch to control the disc, and as with the grinder, the work is noisy, dusty and difficult to see. It can be faster than using hand tools, but any savings in time can be quickly lost if the tool should dig in.

The goal at this stage is to arrive at a uniform surface, free from bumps and furrows. Get the entire area consistent before moving on to get any particular part of it smooth enough for finishing. Concentrating on one spot for too long a time can leave an area too flat or too deep. Remember to work on the high spots, not the low ones. If you have an area of tear-out or a deep gouge, avoid the urge to work on those spots first. Material must be removed everywhere else to arrive at an even surface.

Fit to be Finished

You may be patient enough (or stubborn enough) to get the surface smooth enough for finishing with the inshave, round-bottom plane or a scraper. If so, you probably won't mind seeing the texture of a few tool marks left as evidence of your efforts. I'm not that patient, and I want the seat to be as smooth as the flat surfaces on the other parts of the stool, so I do a bit of power sanding.

A random-orbit sander will do a decent job, provided the pad is flexible enough to make good contact in the hollow. If the pad is stiff, the disc will spin and leave swirl marks. Work sequentially through the grits, changing when the marks left

A card scraper with a curved edge gets the surface closer to even, removing ridges and marks left behind in the previous steps.

"Design is not just what it looks like and feels like. Design is how it works."

— Steve Jobs (1955 -)
co-founder of Apple

by the previous grit have been removed. You can, of course, sand by hand, and a flexible pad under the paper will make the work easier and the results better. To make really quick work of the sanding, look for a tool that turners keep tucked away.

A thick, spongy disc of a small diameter works quickly, and it doesn't suffer from the issues found with most disc sanders. It gives way instead of digging in, and while it will leave some marks, it quickly produces a smooth, easily refined surface and you have to work hard to do significant damage with it. WM

— Robert W. Lang

A disc sander with a flexible pad, attached to an electric drill, will quickly remove tool marks left by hand tools or power tools.

Stepping through the grits with the flexible disc sander produces a smooth surface, and the remaining swirl marks can be removed with some light hand sanding.

The Turning Alternative

If the prospect of scooping out a seat by hand sounds like a lot of work, it is. Most of the tools and techniques presented are typically used on larger seats, and on seats that aren't round. If you want to make the stool in the article on page 6 there is another method for hollowing the seat, if you have a lathe.

Because the seat is less than a foot in diameter, it can be turned on most lathes, even small benchtop models. It's a good alternative, and a good introduction to faceplate turning. It can provide a welcome break from cutting tenons and making mortises.

Stay Centered

Turning the seat before cutting the leg mortises makes things easier; you can't catch the edge of a tool in a mortise if the mortise isn't there. Lay out the bottom first, and include a centerline that goes from edge to edge. Then, when you are finished, transfer the centerline to the top of the seat and lay out the top.

Use a band saw or jigsaw to cut a rough circle, and use the center of the circle to locate the faceplate and secure it. Use as large a screw as you can in a length but short enough to avoid cutting into the screws as you turn. A #12 x 1" screw would work in most situations.

Mount the faceplate to the lathe, and set the tool rest. Turn the blank by hand to be certain it clears the lathe bed and the tool rest. With the lathe set to a slow speed, begin working the edge. When the blank is round, increase the speed and radius the top and bottom edges.

You can make all of the shaping cuts with a round-nose scraper. This will lessen the chances of the tool digging in and removing too much material. When you're satisfied with the outer rim, turn off the lathe and move the tool rest around to the face of the seat. Make sure the seat clears the tool rest, and reduce the speed of the lathe before you begin to work on the face.

Work from the center of the seat blank out to the edges. Check the depth and don't go too deep.

Blend the sweeping curve of the hollow into the radius at the edge of the seat.

Remove material in stages, starting in the center and working out to the edges. Aim for a depth of about 1/4" and blend the rising curve of the hollow with the radius at the edge.

Rough sand the surface on the lathe to remove tool marks. The edges can be completely sanded on the lathe, but the seat's surface will need some additional work after the leg mortises have been cut. The flexible sanding disc mentioned above was developed for sanding turnings on the lathe, and it does an excellent job.

Find the center of the turned seat and lay out the mortise locations as detailed in the main article. A flexible metal ruler will conform to the curve in the seat to draw and knife in your layout lines. You won't be able to clamp a guide block to the seat to pare the ends of the mortises from the top, but you will be able to use a guide on the flat bottom. Because you will be wedging the ends of the mortises, it won't matter if these ends are slightly off the leg angle.

— RL

Hide Glue in Liquid Form

BLOG

Many woodworkers look down their noses at liquid hide glue, but after a detailed inspection, we deem this glue worthy of a second look.

PHOTO BY AL PARRISH

We evaluated liquid hide glue from two major manufacturers to see which brand to buy. Along the way we discovered that it's not difficult to make your own, if you're so inclined.

Hide glue has been around woodworking since it began. Sure it takes a pot in which to mix the glue, a heat source to melt the hide glue crystals or pearls, and once that's over, there is a short pot life in which to use the glue. Why, then, would woodworkers insist on using this glue? The main reason in modern times is reversibility.

In woodworking shops during the 19th century, woodworkers discovered a secret to working with hide glue. If you added urea (a high nitrogen compound used primarily in fertilizer today) to animal protein glues (of which hot hide glue is but one), you could lengthen the gel time of the hide glue, or keep the glue in a liquid state much longer, thus allowing more intricate work to be completed before the glue set.

As we moved into the 20th century, woodworkers (and manufacturers) understood how additives could affect the properties of hide glue even more. In the 1930s, anti-gelling agents were added to hide glue and the result was products that could stay liquid at room temperatures and achieve a slower set time but continue to be totally reversible.

A point to be made here is that these additives all reduce the strength of hide glue. But that is not a critical issue due to the fact that liquid hide glue, although slightly weaker than hot hide glue, is still stronger than the wood itself.

"Not choice, but habit rules the unreflecting herd."

— William Wordsworth (1770-1850)
English Romantic poet
from Poems of the Imagination, "Reflection"

Jump ahead some 80 years and today we have two primary manufacturers of liquid hide glue. There's Old Brown Glue produced by Antique Refinishers (W. Patrick Edwards) and Titebond Liquid Hide Wood Glue made by Franklin International. These glues have similar working properties and both provide sound a glue joint for furniture conservation or construction.

Head-to-head Comparison

Let's first take a look at the make-up of these two products. Old Brown Glue is a mixture of animal collagen and urea with no other additives. Titebond Liquid Hide Wood Glue lists cyanoguanidine (used in the manufacture of plastics and pharmaceuticals) and ammonium thiocyanate (used chiefly as a herbicide and in textile printing).

Old Brown Glue appears opaque or cloudy when squeezed from the bottle, and getting it from the bottle is no easy task when the glue is at room temperature. According to the manufacturer, Old Brown Glue is best used at 80° Fahrenheit (F). On a summer's day that is easily achieved, but during the cold months in northern climates, that means you have to first warm the bottle and its contents.

Of course that's not a difficult task. Editor Christopher Schwarz, an ardent user of Old

It's clear that these glues are not created equal. Additives to the glues make the Titebond product (left) transparent while the Old Brown Glue is nearly opaque.

Brown, simply deposits the bottle into a pail of hot tap water. After a few minutes, the glue is ready to use.

Titebond liquid hide glue, when dispensed from the bottle, is very clear, almost transparent. The glue pours from the bottle with ease, even with the ambient air temperature, and the glue, at 66º F.

How will your nose react to these glues? We often hear woodworkers disparage the smell of hot hide glue. It is animal-based so you wouldn't expect a pleasing bouquet. But does the liquid version of this smelly adhesive possess the same attributes? We blindly tested the smell of the two glues within the *Woodworking Magazine* shop. What we discovered was a landslide winner – if you can call it a winner. Every member of the staff chose the Old Brown as the smelliest.

But we didn't limit the fun to ourselves; we trekked through the building of our publishing company to ask idle co-workers their opinions. Interestingly, after we finished our non-scientific poll, we found that there was a tie in the race for the most-smelly glue. Non-woodworkers, for the most part, preferred the Old Brown smell and found the Titebond glue more offensive.

More Interesting Comparisons

A rub joint, wherein you add glue to two pieces of wood and rub them together until the glue achieves its initial tack, is a benefit of hot hide glue. And while most everyone agrees that you cannot get a true rub joint with liquid hide glue as you do with the hot hide glue, there's still a certain amount of tack available.

So, we tested the initial tack with the two glues. The Titebond product had virtually no perceivable tack. When the Old Brown product was rubbed, you could immediately feel a tack in the process. No, there was not the same tack as with hot hide glue, but you could feel a slight grab as the two pieces were joined. Score one for Old Brown.

However, we remembered that the Old Brown glue was heated and wondered if that preliminary tack was due to the glue gelling as it cooled. To keep the test equal, we heated the Titebond glue and performed the same test. Our original findings held. The Titebond glue exhibited less tack than was found with the Old Brown Glue.

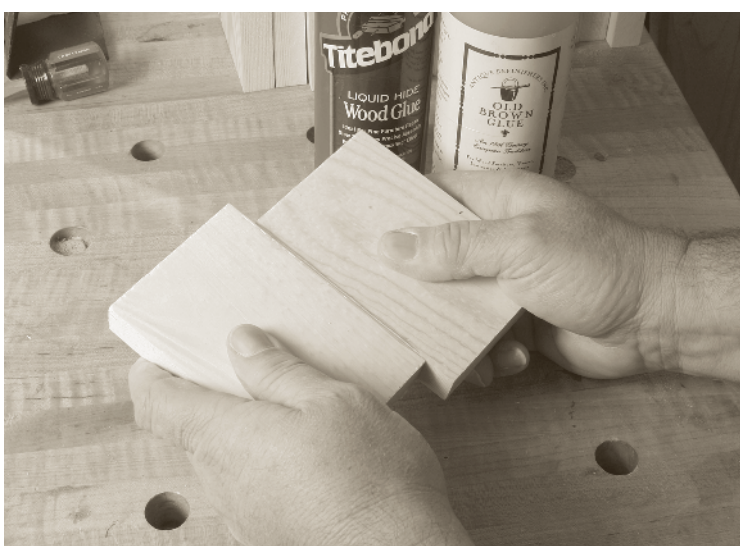
The Most Important Comparisons

Smell, color, transparency and initial tack are notable characteristics of these two liquid hide glues, but the important features are how the glue joint holds up and what it takes to reverse glued-up joints.

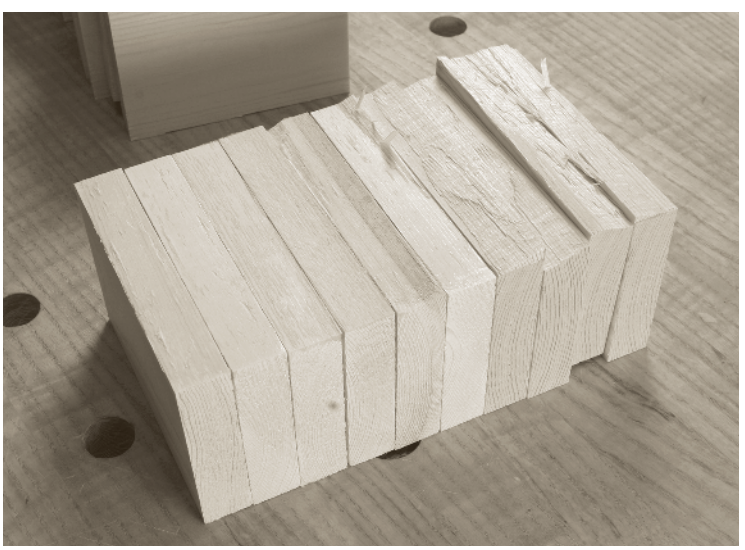
The holding power of the glue joint is of primary importance when building or constructing a project. If you experience failure, your project is nothing more than a pile of sticks.

There are two types of failure as shown in the photo below. The first is glue failure (the left-most pieces), where the glue bond fails and the two pieces come apart directly on the glue line. A second failure is wood failure (the right-most pieces in the photo). This is what you hope to find if you have a problem. A wood failure means that the glue bond held and the wood itself gave way to stress. While this is not something you wish for, it happens to a single joint, for the most part, and not throughout your project.

To test the glues for failure, we assembled 10 sets of joints using Eastern white pine, five joints per glue. After a 24-hour period we placed the

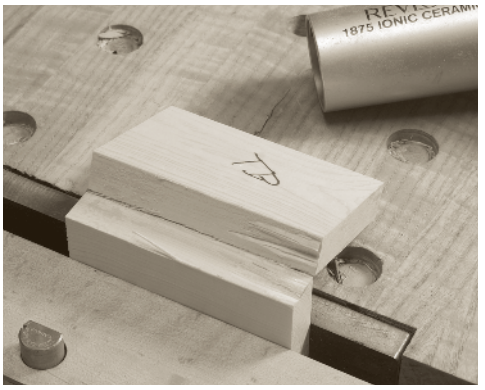


A rub joint with liquid hide glue is not as strong as when hot hide glue is used, but it's still useful in some circumstances.



Pieces on the right side, with ragged edges, clearly show wood failure. As you move to the left, you'll notice the smooth edges, which indicate glue failure.

A simple test to determine if joint failure is a result of glue failure or wood failure, is to assemble a few joints then whack the assembly with a hammer. Something has to give. Just hope it's the wood – because that means the glue is stronger than the wood.



Heat from an ordinary hair dryer was all it took to reverse these small joints, but with a more traditional glue joint, a damp cloth and stronger heat source might have been needed.

pieces with one edge resting ¾" above the bench, hammered the pieces until we achieved separation then examined each result for a specific type of failure.

What we found from our basic test was that 60 percent of the failures were in the wood, 30 percent involved partial wood failure and 10 percent were a complete glue-joint failure. What was interesting is that both liquid hide glues experienced identical results. The only difference was in the partial wood failures. More wood fibers were apparent on the Titebond assembly than on the joint glued with Old Brown glue.

Let's talk reversibility. Hot hide glue is reversible with heat and moisture. Liquid hide glue has the same characteristic. The simple test we did to discover which product is most-easily reversed was to apply heat from an ordinary hair dryer. If we didn't see results with this test, we were prepared to move to a damp cloth and a steam iron. In 6:34, the Titebond glue separated. The break was about 80 percent glue failure. Additional patience might have kept the wood preserved. It took only 5:20 for the Old Brown glue to reverse and that was a true reversal – no wood breakage.

Option No. Three

While we have dissected and evaluated the two chief liquid hide glues on the market, we have yet to mention the possibility of making your own liquid hide glue. We contacted an expert, Don Williams, senior furniture conservator at the Smithsonian's Museum Conservation Institute, to find out how we can make our own hide glue that stays liquid at room temperatures. You'll be fascinated by how easy this process is.

In general, Williams finds that the fewer ingredients, the better, because it's a fresher product in the end. If you have a lot of preservatives, how do you know how old the glue is?

To make a batch of liquid hide glue takes about three minutes of active work, according to Williams, but it's three minutes spread over a 48-hour period. And you don't need anything special in addition to the hide glue – except table salt.

To begin, you have to make hot hide glue. I'm sure if you have yet to purchase a glue pot (a special pot for making and reheating hot hide glue), you're not of the mind to do so for this single purpose. You don't have to. You can use an electric hot plate, a saucepan, a small glass jar and a small amount of hide glue flakes or pearls, along with salt.

Here are the steps: The first day, mix two parts hide glue flakes with three parts water into the jar and let everything soak. The following morning, heat water in the saucepan to a temperature of 140° F (a thermometer helps with accuracy), add in one part salt to the jar then cook everything for about two hours. Next, immediately stick the cooked mixture into your refrigerator for the balance of the day (quick cooling is key).

On morning three, fire up the burner and cook the mixture for another two hours (Williams always cooks the glue twice). Once the batch cooks the second time, you have liquid hide glue. Williams adds that he seldom makes more than a pint of glue at a time. He pours it into a plastic ketchup or mustard squeeze bottle for easy dispensing.

And here is the most interesting part of homemade liquid hide glue: The salt makes this product stay liquid at room temperature and salt preserves the glue so there is no spoil date – just as salt has done throughout time in salting meat.

Buy It or Brew It?

In the end, you can easily make liquid hide glue in your shop or in your kitchen, and the product is fresh. But sometimes it's just best to purchase the glue, especially if you're opposed to the odor associated with hot hide glue. If that's your scenario, we think it's a toss up. Old Brown Glue has a fewer number of ingredients and a noticeable initial tack. Titebond Liquid Hide Wood Glue performs just as well and is more readily available. WM

– Glen D. Huey

Homemade liquid hide glue is as simple as 1,2,3 – one part table salt, two parts glue and three parts water.

All you need is a hot plate, saucepan and a small jar if you decide to brew your own liquid hide glue. That and a clothespin for your nose.

White Water Shaker Bench

BLOG

We build a reproduction of a rustic and sturdy walnut bench using hand tools and local walnut.

The joinery on this bench is simple, yet the original has held up remarkably well to regular use. And if you are a budding hand-tool user, you'll find this bench a great practice piece.

PHOTO BY CHRISTOPHER SCHWARZ

The Shakers in the White Water community built these walnut benches so that visitors would have a place to sit while they observed the Shakers' worship services.

While going to a church just to watch might seem a bit odd to us moderns, I probably would be in the front row if I could travel back in time to the 1830s. Their worship services were marked by choreographed, rhythmic and practiced dances, and original and moving hymns.

Though I've never gotten to observe Shaker dancing in person, I have had the privilege of hearing their hymns reenacted on a few occasions. Many of the hymns are devoted to the daily tasks of life (such as sweeping), and are simply beautiful.

The White Water community in Hamilton County, Ohio, has one of the closed village's original benches in its possession; it's a 13'-long behemoth made from six pieces of walnut nailed together. I was permitted to measure the original and pore over its details to build two reproductions that *Woodworking Magazine* is donating to the Friends of White Water Shaker Village (whitewatervillage.org).

The walnut for this bench was graciously donated by Dr. David Bryant, a local woodworker and turner with a band-saw mill. As a result, the bench shown in this article was built using wood that was cut about 10 miles from the original village.

We've scaled the 13'-long version down to a more home-friendly 6' long in the construction drawing. However, if you have a big family and would like a SketchUp drawing of the 13'-long version you can visit our web site and download it for free.

The original bench had tool marks that indicated it was built with hand tools using wood that had been processed (probably) by the Shakers' sawmill with a reciprocating blade (sort of like a giant jigsaw). In that spirit, I decided to use hand tools as much as possible for this project.

Processing the Stock

The original sitting bench was built using boards that were wide enough to be used without having to glue up several narrow boards into the necessary widths for the seat and the legs.

While finding walnut (or wood of any species) this wide can be a struggle these days, it's worth every effort. A seat made from a single wide board makes quite an impression on the viewer.

I roughly surfaced these boards (with some assistance) using a powered jointer and planer, then dressed them all by hand, first with a jack plane to get them flatter, and then with a jointer plane, which removed slight twists and cups. Then I ripped and crosscut the top and aprons to their final sizes.

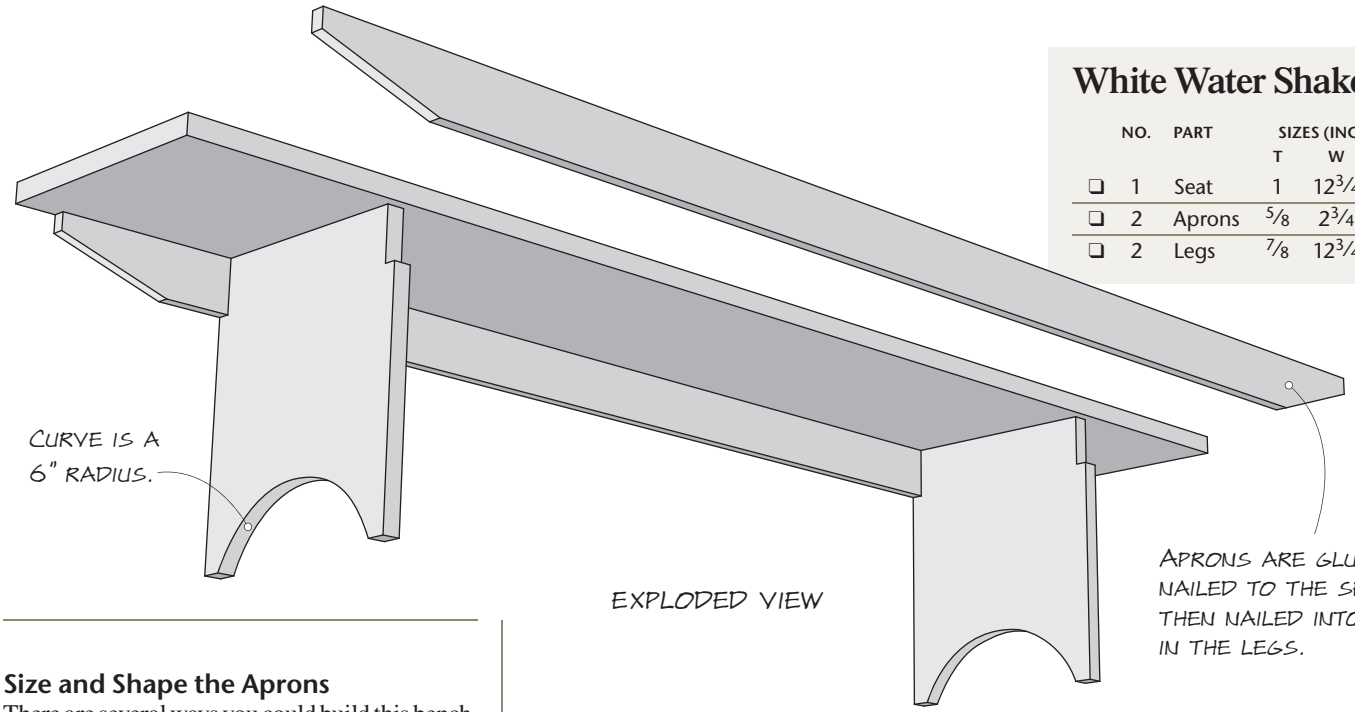


ILLUSTRATION BY CHRISTOPHER SCHWARZ

White Water Shaker Bench

	NO.	PART	SIZES (INCHES) T	W	L	MATERIAL
❑	1	Seat	1	12¾	72	Walnut
❑	2	Aprons	⅝	2¾	68	Walnut
❑	2	Legs	⅞	12¾	15	Walnut

Size and Shape the Aprons

There are several ways you could build this bench, and I have no way of knowing how the Shakers went about it originally. Here's how I decided to proceed: First I shaped the aprons, then I nailed and glued them to the underside of the seat. Then I notched the legs so they fit between the aprons and nailed them in place. If you're going to do it my way, the first step is to deal with the aprons.

Plane the aprons so they are flat and true using a jointer plane. Then mark the taper at both ends using the drawings as a guide. To cut the taper, I put each apron on my sawbenches and cut the taper with a panel saw filed with rip teeth. Then I cleaned up the sawn edge with a block plane.

Attach the Aprons to the Seat

The most critical joint in this project is the way the aprons attach to the underside of the seat. A good joint ensures the seat will stay rigid and will keep the legs in place as well. I was impressed by how tight this joint was on the original, even after 150 years or so.

To ensure this joint was tight, I took extra pains to dress the top edge of the apron so it was perfectly flat and square. Then I made sure that the apron mated with the seat without having to pull out any warping with clamps. This, by the

First I use a jack plane set to take a thick shaving to dress the long edges of the seat. I follow that up with a jointer plane, which straightens the edge and leaves a nicer surface. Finally, a smoothing plane prepares the edge for finishing.

Sometimes it's easier to take the tool to the work. Here I'm using a panel saw to cut the tapered shape on the end of an apron. The apron is resting on one of my two sawbenches, which are a handy workshop appliance.

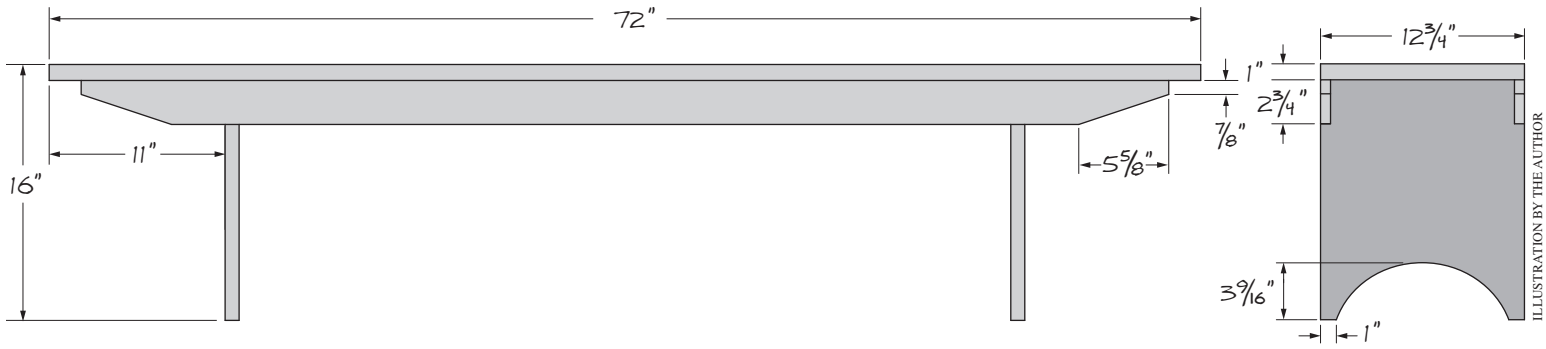


ILLUSTRATION BY THE AUTHOR

way, is a challenge when you have 13'-long boards and an 8'-long workbench.

Then I glued the aprons to the seat. I used a modern yellow glue – our hide glue had gone missing that day. I let the glue cure overnight. Then I nailed the seat to the apron using 6*d* cut nails spaced every 8½", just like the original.

It only takes a few strokes to clean up the sawn edge with a plane. Any sharp plane will do – planing downhill is always easy work.

Once you've driven the nails, set them below the surface with a nail set. For cut nails, I use a homemade nail set made from an inexpensive punch. I filed its round tip to a rectangle, which is much more effective when setting rectangular-head cut nails.

Then plane the edge of the seat and apron flush and smooth.

Shape and Notch the Legs

The legs are simple but effective. The two feet are formed by cutting a curve on the bottom edge. Then you notch out the top and nail the leg in place. To begin, lay out the curve on the bottom of the legs using a compass.

Cut the curve using a bowsaw or some other frame saw, then fair the curve with rasps. The original craftsman stopped at this point. You can continue to refine the curve with sandpaper if you wish.

Now you can lay out the notches on the top of each leg. I think you should lay out and fit each leg individually. Don't just use the drawings to lay out your joints. Instead, place each leg where it will go on the underside of the seat/apron assembly and mark out the locations of the notches.

"Practical appeals to me because people will pay for it. I learned that people will buy 10 practical pieces for every room brooch."

— Hank Gilpin (1946 -)
furniture maker

Then use a combination square to gauge how deep each notch should be. Again, don't trust your cutting list or the drawing. Take the measurement from the actual apron where the leg will go. This is one of the keys to tight joints in handwork.

Now saw out the notches on the top of each leg. If you have a full nest of saws, use a tenon saw to rip the long section of the notch and a carcase saw to crosscut the waste free. If you have only one saw, a crosscut carcase saw can do the whole job.

Some creative clamping ensures a tight joint. The clamp on the far right ensures that the apron will be f ush to the edge of the seat at the ends. The F-style clamp keeps the tapered apron against the seat. Thank goodness for its swiveling clamping pad.

I laid out the nails using dividers (shown on the left). Then I drilled 3⁄32" pilot holes and drove in the 6*d* nails and set them with a homemade nail set.

A sharp bowsaw makes quick work of this curve. The biggest challenge is keeping the blade level during the cut – the tendency is to tip the far end of the saw up. To train yourself, I recommend marking the curve on both faces of the leg and stopping every few stokes to gauge your progress.

A couple rasps make quick work of cleaning up the curve to your pencil line. Rasps are two-handed tools. Beware of your left hand. Until you build up callouses, you can cut yourself this way.

Here's the leg in place and balancing on the aprons. I'm marking the location of the notches. This is a remarkably accurate way to work.

This is fairly easy work with a backsaw and is a great way to improve your sawing skills. If the joint is too tight, you can clean up the notch with a wide paring chisel to get the leg to fit.

While some might say that 6*d* nails are a bit of overkill here, I don't think so. This joint keeps the legs from twisting and the bench from collapsing. So a little overkill is good.

One common error is to make the notches a little too long. The result is that the bottom of the notch won't fit tight to the apron. To fix this, plane the top edge of the leg on a shooting board, which will tighten up the fit between the leg and the apron.

Now you can nail the legs in place. I clamped each leg tight to the apron and secured the leg to each apron with two 6*d* nails. Then I nailed the seat to the leg with five evenly spaced 6*d* nails. You can reinforce the legs with glue blocks.

Finishing Up

After setting all the nails, I finished up all the visible surfaces with a smoothing plane. However, the original craftsman didn't bother. The pencil lines from construction are still visible on the exterior surfaces.

It's unclear what sort of finish was on the original – if it had a finish at all. The bench doesn't exhibit any evidence of a film finish, and it is water stained in some places, so I opted for a boiled linseed oil finish. Boiled linseed oil is appropriate to the period and it would become stained if exposed to water. But I hope that won't happen with this reproduction.

I applied four coats of boiled linseed oil and followed that up with wax. Then it was time to take a seat and wait for the dance to begin. WM

— Christopher Schwarz

Supplies

Tremont Nail
800-835-0121 or tremontnail.com

- 6*d* Fine Finish Standard cut nails #CE6, $9.85 for 1 lb.

Price correct at time of publication.

BLOG

Bench Planes: The System of Three

We rethink the Western bench plane system. All you need to know is that there are three tools, three setups, three jobs and three surfaces.

PHOTO BY CHRISTOPHER SCHWARZ

Bench planes come in almost every imaginable length from about 5" up to 30". How do you pick the right ones for your work? How should each plane be set up? We show you how to think for yourself when it comes to bench planes.

Some days I think that every bench plane should come with a decoder ring to help the user understand how to use it. But while a magic ring might seem handy, it wouldn't help explain all the different ways that bench planes can be adapted and used in the workshop.

For example, the earliest English instructions we have on handplanes (from Joseph Moxon from the 17th century) indicate there are three bench planes – a fore, a jointer and a smooth plane. Sounds simple, right? But then how is it that the late legendary English craftsman Alan Peters used a No. 7 jointer for almost everything? Or that craftsman David Charlesworth uses a No. 5½ panel plane for most tasks?

Clearly, there are lots of valid ways to work wood with your bench planes. So you have two choices: You can pick a woodworking idol and imitate what he or she does. Or you can spend a little time to really understand the system and how it can be bent to your will.

I prefer the second approach (otherwise this would be a short article). If you know bench planes like you know your home in the pitch-black dark, you'll buy fewer tools and spend less time trying to make them work. You'll also be able to discard the weirdo numbering and naming systems for bench planes. But before we can put those systems in the waste bin, we have to understand what we're throwing away.

The most traditional way of setting up bench planes is to use a jack plane to remove material, a jointer plane to straighten it and a smoothing plane to prepare it for finishing.

The Venerable Bench Plane Model

In the traditional British and American shop, there are three bench planes, each with a particular job. The first plane to touch the wood is called the fore or jack plane. It's typically 12" to 20" long, and is used to hog off material. In the Stanley numbering system, this would be the No. 5 (called a jack) and the No. 6 (called a fore plane).

The plane used after the jack is the jointer, which seeks to straighten the wood. It typically is 22" long. In the Stanley system, the Nos. 7 and 8 are both called jointer planes.

The last tool to touch the wood is the smoothing plane, which prepares your parts for finishing. Smoothing planes are typically 10" or shorter. In Stanley's world, this is everything between the cute No. 1 and the burly No. 4½.

As you can see, it's the length of the tool that seems to determine both its name and function.

But the length of the tool is only part of the story. How each tool is set up is just as important. And these two features – the length and the setup – can be adjusted by the user to do all sorts of cool, crazy and downright dumb things.

So let's now forget the plane numbering system and focus on their three jobs, which is far more helpful.

Strong, OK and Weak

All bench planes do three things: They remove material, they straighten the wood and they prepare it for finishing. When you set up a bench plane, what you are doing is making one of these characteristics really strong (such as its ability to remove material) and the other two characteristics weak. Here's how it works with the traditional setup of three planes.

- **Jack plane:** The typical setup is to configure this tool so it does a great job of removing material, a passable job of straightening the wood and a terrible job of preparing it for finishing.
- **Jointer plane:** Its typical job is to straighten the wood; it does OK at removing material and preparing it for finishing.
- **Smoothing plane:** This tool is used to prepare the wood for finishing. It also can be useful when removing small (and controlled) amounts of material. It isn't very good at straightening boards unless the boards are very short.

So when you are standing in your shop and trying to decide which tool to set up and use, the first thing you have to do is grab the one that is the right size for the job (you can't change the length of your tool without a hacksaw or a welder). So let's talk about what I call "the rule of length."

The Rule of Length

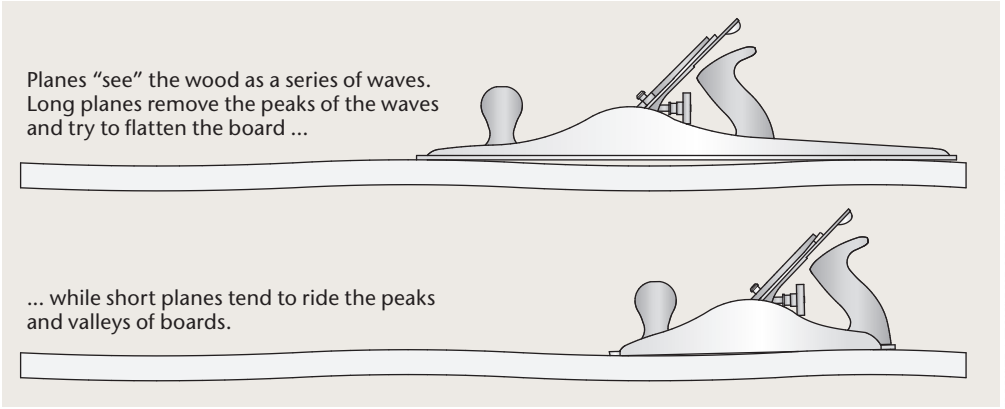
To our eyes, wood might look like a flat surface. But to a handplane, wood looks like a series of gentle waves. As a plane gets longer, it tends to skim over the tops of these waves, removing the peaks with the cutter and reducing these peaks so that they are level with the troughs between.

That is why jointer planes are long. The plane's length creates a straight edge or face. So how do you pick which length is suitable for your work? The rule of thumb is that you can easily straighten a board that is twice as long as the handplane's sole. So a 22"-long jointer plane can reliably straighten a 44"-long board. And because typical furniture parts max out at 48", this makes sense.

On the other hand, as the plane's sole becomes shorter, it tends to ride the wooden waves instead of trying to trim off the tops. So the cutter can rapidly touch the wood in both the peaks and the valleys.

That is why smoothing planes are so short. They are trying to make the wood look good at the expense of trying to straighten it. Many surfaces (typically show surfaces, such as tabletops) don't need to be dead-nuts flat. They just have to look good. The shorter the plane, the faster you'll get to the bottom of the troughs on a board.

When you use a plane that is of a middling length, say that of a 14" jack plane, you can push the tool either to be good at straightening or preparing the wood for finishing. You can create an oversized smoothing plane or a shortish jointer if you please.



ILLUSTRATIONS BY ROBERT W. LANG

On this spray-painted board, I started planing it with a jointer plane on the right side and I started planing it with a smooth plane on the left side. You can see how the jointer plane is trying to flatten the board and the smooth plane is trying to finish it.

The Rule of Width

Of course, planes come in different widths, too. Jointer planes can use irons that are 2" to 3" wide. Jacks can be $1\frac{3}{4}$" to $2\frac{3}{8}$". Smooth planes can be $2\frac{3}{8}$" down to $1\frac{1}{4}$". This characteristic isn't as important as the plane's length in my book, but it deserves mention.

Like the plane's length, a plane's width also affects how flat the resulting board will be and how much work it will take to get there. Wider planes usually make flatter surfaces, but it can take longer to achieve that goal. Narrower planes can get the work done faster if wielded correctly.

One more important detail about width: Wider planes are always heavier and harder to push.

One you've selected the right body style for the job at hand (removing material, straightening or preparing for finishing), the next step is to adjust the tool so it is suited for this job. The following is how I set up any handplane so its primary function is to either remove material, straighten the wood or prepare it for finishing.

Here I'm planing across the grain of this pine board with a plane set up for removing material. The iron is curved. The mouth is wide open. The shavings are thick.

The Setup to Remove Material

The goal when you remove material is to take the absolute thickest shaving you can with the absolute least tear-out on the board. Here's how you accomplish that: Have a cutting edge that is

curved and push the plane across the grain (which is easier than planing parallel to the grain).

The tool's cutter should have a curved edge that looks like a carving gouge. You are trying to scoop out the wood, and sharp corners will only jam up the works. How curved should the cutting edge be? I am fond of an 8" radius – though others like a 10" radius. This curve is created on the grinder, by the way, and refined on your sharpening stones.

Because you are trying to take a large bite of wood, you want the iron to be pitched fairly low. Anywhere from 37° to 45° is ideal for a plane that's set up for roughing out your material. Angles that are higher than this will make the tool a bear to push (with no appreciable side-benefit). Angles lower than this cause other problems that are outside the scope of this article.

What about the chipbreaker? Back it off. Get it back behind the curve on the iron. It's not going to do much except help deflect the shavings out of the tool (a noble function nonetheless).

The mouth of the tool: You want it as wide open as possible without interfering with the function of the handplane. With some planes, if you open the mouth all the way, the body casting of the tool will prevent the iron from seating on the frog of the tool. That's bad. Open the mouth up so it can easily pass a gnarly shaving.

How thick is gnarly? I think a good shaving for removing material is about .03" thick (about $^{1}/_{32}$"). That is 30 times thicker than a smoothing-plane shaving (and 30 times faster at removing wood).

Flatness of the handplane's sole: If you are one of those people who obsess about the flatness of your plane's soles, this is one place where you need to relax. Because of the rough-and-ready nature of a roughing plane, sole flatness is almost irrelevant.

This is what the curved iron looks like in the mouth of the tool. Note how wide open the mouth is, which allows it to pass thick shavings.

This Stanley No. 5 has a frog pitched at 45°, which makes the tool easier to push than a high-angle plane. And note the position of the breaker on the iron in the foreground. It's backed way off.

In other words, don't buy a $5,000 (or $500 or even $50) roughing plane. Go to the flea market. Buy an old vintage Stanley or wooden-bodied roughing plane. Spend your premium dollars elsewhere.

The Setup to Straighten Wood

To straighten the face or edge of a board, the most critical characteristic is the length of the tool. The longer the plane, the straighter the result. The other characteristics of the plane are flexible.

For example, when it comes to the shape of the cutting edge of the tool, woodworkers are divided. Many insist that an iron that is sharpened straight across is the way to go. After all, they say, straight irons are required for straight results. Other woodworkers, however, use a jointer plane with a shallow curve (imperceptible to the naked eye) that prevents the corners from digging into the work, allows the tool to remove material from select areas and produces a result that looks flat to a machinist's square.

Either approach works. Pick one that appeals to you and stick with it until you master it. Then (if you end up hating it) you can switch.

If you use a curved edge, how curved should it be? I like an edge that sweeps .008" back at the edges of the iron. That works well.

Other considerations: The pitch of a jointer plane is flexible in my book. Most modern jointer planes have the iron pitched at 45° – called "common pitch" in American handplane parlance. This makes the tool easy to push, but it has the risk of creating some tearing.

If you look at old (really old) jointer planes, they would use high pitches – 55° or more – to control tearing in tricky material, such as mahogany. If you have problems with tear-out throughout a project, consider a high-pitch jointer to tame it at an early stage.

A high pitch will make the tool harder to push, but it might just save you some work with the smoothing plane.

Long jointer planes can create ridiculously flat surfaces (flatter than machinery can create). This can be a benefit or a liability depending on what you are trying to achieve. Jointer planes are generally used diagonally. This helps remove twisting at the corners of the board.

This is why I like a curved cutting edge. Here you can see the plane tracks left by a straight iron. Depending on your depth of cut, these can be an effort to remove.

When you set the chipbreaker of the jointer plane, you want to prevent the tool from clogging in use. I set the breaker 1/16" back from the cutting edge and adjust it forward or back until the plane doesn't clog. Then I forget about the breaker unless it causes problems.

The mouth of the tool: The principle here is to set the mouth so that the tool doesn't clog when you take a typical shaving. A .008" to .01" mouth is ideal. Open it up a little more if needed. And how thick is a typical shaving? I can manage .004" to .006" thick in most woods (and thicker in softwoods).

What about the soles of the jointer planes? Jointer planes need to have fairly flat soles to work well. And metal jointer planes are difficult to true for the user. If I had to own only one nice plane, it would be a metal jointer. That's because you can use it to true other wooden-bodied planes.

"Few lends (but fooles) their working tooles."

—Thomas Tusser (1524 - 1580)
English poet and farmer

The Setup to Prepare The Wood For Finish

When you set up a plane for finishing, lots of factors become important. In my experience, I've found that the most important two factors are the pitch of the plane and the sharpness of the cutter. Those two variables trump the other things you can control. However, every little bit helps, so here are the details on tweaking a plane for smoothing.

If you want to get the work done quickly, select the plane with the shortest and narrowest sole possible. Early smoothing planes were 7" to 8" long. Modern smoothing planes have become bloated in length and width (in my opinion). These big smoothing planes have an appealing mass to be sure, but they also tend to skim over the waves of the wood and try to straighten the stuff more than necessary.

A good jointer plane shaving is like a nice ribbon in its thickness. Don't go for gossamer shavings (you'll be working at it forever) and don't go for raunchy curls (you'll wear yourself out).

Though the iron looks like it is pitched low here, this bevel-up plane is actually set to a 62° pitch (it has a 42° microbevel on its cutter and the iron is bedded at 20°). At this high angle, tear-out doesn't stand much of a chance.

If you aren't concerned with making wood look like a granite surface plate, choose the shorter, narrower planes.

About the pitch of the tool: I think that 45° (the common pitch) is simply not high enough for anything except softwoods and mild hardwoods. If you work with boards with reversing grain, kooky figure or exotic ports of origin, I recommend you step up to 50°, 55° or use a bevel-up plane to get yourself up to the 62° neighborhood.

Otherwise, you'll be scraping or sanding a lot more that you would probably like.

When you sharpen a cutter for a smooth plane, there are three common shapes for the edge:

- A straight cutting edge with corners that have been relieved by a file or sharpening stones.
- A curved cutting edge that sweeps back about .005" or so at the corners.
- A hybrid edge that begins with a curved cutting edge and is flat in the middle. This produces a wide shaving and never digs in at the corners.

All three types of edges work brilliantly. Try them all. Pick the one that suits you.

With your iron sharp, it's time to attach the chipbreaker (if your plane has one). There is a lot of blustery rhetoric about chipbreakers. Some insist that breakers control tear-out. Others mock this notion and point to early planes that perform great and have never had a chipbreaker.

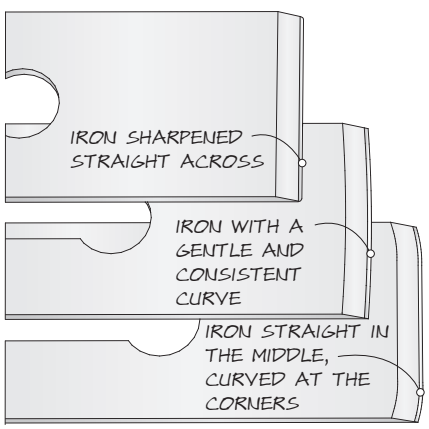
I keep my chipbreaker fairly close to the edge (about 3/64"), but I will readily back it off if the plane clogs even the least bit. I'm skeptical of chipbreakers. I think they cause more problems than they solve. (Someday I will write a chipbreaker epistle.)

Which brings us to the mouth of the tool. Like the chipbreaker, many woodworkers are torn about the role of the mouth. Should it be tight to control tear-out? Or does it have little control over tearing? I've worked a lot with the mouths of planes, and I am still on the fence.

When looking at electron microscope images of how wood fails when it is cut by a plane (yes, I need a life), it's easy to see how a tight mouth might prevent tearing, which is when the shaving is lifted from the wood ahead of the cutting edge. However, I've used high-angle planes with wide-open mouths with great results.

So what should you do? I don't know. But here's what I do: I close up the mouth as tight as I can and still keep the plane from clogging.

With smoothing planes, I think shorter is better. These tools save work because you can get to the bottom of the valleys quickly.



SMOOTHING PLANE EDGES

ILLUSTRATION BY ROBERT W. LANG

The soles of smoothing planes need to be trued occasionally. They get dinged up and they need to be dead flat for best results. Here's my dirt-cheap setup: belt sander paper (aluminum zirconia) stuck to a granite tile from the home center.

Here's my rationale: There is no downside to a tight mouth that doesn't clog. So my mouth is .005" wide, or a bit less.

That mouth size is ideal for clearing a shaving that is .002" thick or thinner. Personally, I try to take the thickest shaving I can without the wood tearing. A .002"-thick shaving creates half the work than if your plane is set for a .001"-thick shaving.

However, if a .002"-thick shaving produces torn grain, I immediately back it off to see if that helps.

What about the sole of the tool? I think smoothing planes need to be flat. Even slight bumps in the sole interfere with your ability to take thin shavings consistently across the face of a board. The lucky thing is that smoothing planes are small and easier to true than any other bench plane.

Take this System and Run With it

Once you know what the length of a plane's sole does to its performance, and once you know you have three basic setups to try, you can understand some planes that have vexed classification.

For example: the scrub plane. It's the size of a smoothing plane but has a setup for removing material. What does this get you? A tool that is easier to push but doesn't do as much to help straighten a board.

How about panel planes? These English tools are about 15" long but they are used for fine work. In essence, they are jack planes with a smoothing plane setup. What does this get you? A tool that produces remarkably flat finished surfaces. The downside: You probably will have to take more passes with the tool to achieve those results.

And you can create your own combinations. If you build small boxes, you can set up a jack plane with a setup that emphasizes straightening the wood. That would be nice. If you need extremely accurate finished surfaces for applying moulding, you could set up a long jointer plane with a setup for preparing the wood for finishing. And if you have a lot of upper body strength, you could set up a long jointer plane to remove material. The end result would be flatter than usual.

Work the Three Surfaces

So there are the three planes and three setups. It's also convenient that there should be three surfaces to work: faces, edges and ends. Let's begin with some tips on planing faces.

When dressing boards by hand, the first step is to plane a face flat. Secure the board on your bench. I like to start planing the heart side. In general, the heart side will be crowned in the middle and the bark side will be cupped. By putting the bark side against your benchtop you only have to shim between the board and benchtop if the wood is in wind.

Then prepare the board for traversing. Plane a quick chamfer on the far edge with a jack to reduce spelching (a.k.a. blow-out). Use the jack's sole to check the board across its width. Look to see how cupped it is.

Now plane directly across the width of the board with your jack. See if you are removing wood from just the middle of the board's width (which is desirable) or if you are following the crown. If you are following the crown you need to take out the middle, either with short, localized traversing strokes, or by planing with the grain right up the middle of the board. Aim to create a slight hollow or get it flat.

Now use winding sticks or a straightedge (positioned on each diagonal) to look for wind. Wind is when two corners are up and two corners are down. If the winding looks slight, you can move to the jointer plane. If it's serious, correct the wind by working the high corners with a jack until the board reads flat with the winding sticks or straightedge.

Now use the jointer plane to work diagonally. Work diagonally one way, then the other to remove minor twisting. Keep working until you get consistent shavings from all points of the board. Check your work with a straightedge, the corner of the sole or winding sticks. The board should be quite flat now.

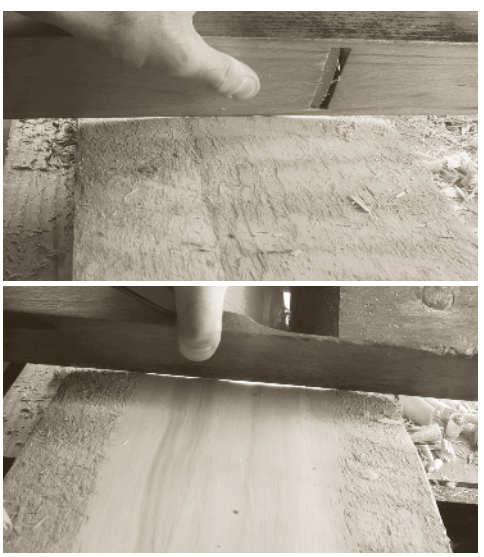
Work with the grain with the jointer plane if you like. Some people go right to the smoothing plane. This is a point of personal preference.

Finally, work with the grain with a smoothing plane. The shavings will begin as irregular. When they are regular and the board looks good, stop.

Planing the Edges

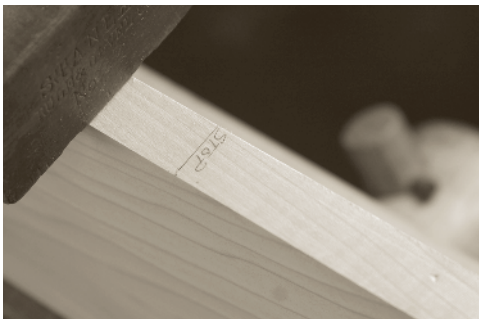
Plane one long edge dead square. Here's how: Secure your work in the vise. Place the board so the interior face of the board (inside of the case, etc.) faces you. This is the reference (or datum) surface. It needs to be flat for joinery. Work with the grain. Choose your plane based on the condition of the board's edge. If it's really wavy and rough with a lot of hills, start with a jack. If it's fairly consistent, start with the jointer.

A scrub plane (foreground) is a smoothing plane with the heart of a roughing plane. A panel plane is just a jack plane with the guts of a smoother.



After traversing with the roughing plane I can see that I'm just following the crown of the board (top). So next I'll plane out the middle using with-the-grain strokes to create a valley (bottom). Valleys are easy to traverse until they are flat.

Here is the proper hand position for a jointer plane. The thumb goes right in front of the mouth. The fingers trail behind and act as a fence. Don't grab the front knob while working edges.



I'm making a stopped shaving here. I'll lift the plane up off the board when I reach the pencil mark. Hollowing out the middle of an edge makes it easier to get it straight.

To straighten the edge you need to hold the plane correctly. Your off-hand should serve as a fence. Your thumb goes on the plane's body right in front of the mouth. Your fingers trail behind, against the work.

Try the edge with a straightedge (or a known straight edge such as the edge's mate in a panel glue-up). Look for a hump or dip in the middle of the edge. With a hump, the straightedge will spin on the board's edge. With a dip, the corners of the straightedge will drag. A slight hollow in the middle is OK (this is called a spring joint.) If you have a hump, remove it with localized strokes. Finish with a long pass along the entire edge.

You also can use "stopped shavings" to dress an edge. This is where you plane out the middle of the edge using stopped strokes (about 3" in from either end). Work until the plane stops cutting. Then follow through with a stroke or two all the way along the edge to bring it into true. This is analogous to removing the middle of the face to create a slight cup, then removing the cup.

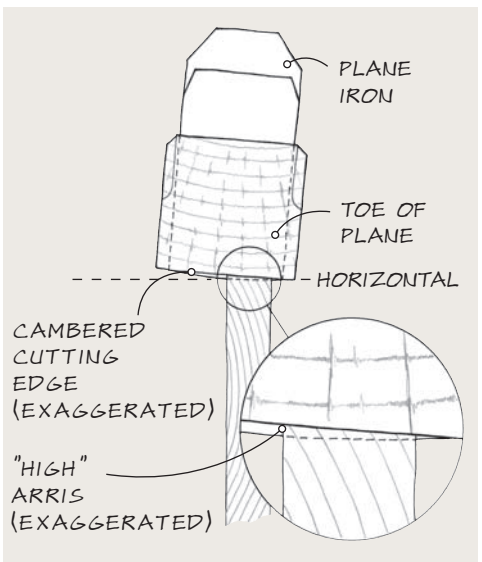


ILLUSTRATION BY MATT BANTLY

CURVED EDGE IN A JOINTER

Now test the edge for truth with a try square. Place the stock of the try square against the reference face and look to see if the edge is perpendicular. Check every 12" on long boards.

If the edge is out, you need to correct it. A curved iron can correct an edge by shifting the plane left or right on the edge of the board to remove the high edge. If you use a straight cutting edge, you can correct it with hand pressure. Lean over the high corner to remove it. Other woodworkers change the lateral adjustment of the tool. I haven't as much luck with this technique.

With one edge and one face complete, use a panel gauge to scribe your finished width on the board. Use a jack on the opposite edge to get down near the scribe line. Then pick up the jointer and straighten it as per the above instructions.

To complete your work, scribe your finished thickness on all the edges and ends using a marking gauge. Flip to the bark side of the board and being by traversing with the jack again. You should be working on the cupped face, so this should be easier to get flat. Work with your jack until you almost hit your scribe line on your edges. Finish with the jointer and smoother like before.

Planing the Ends

Do you have a shooting board? If so, skip to the next step. If not, get your smoothing plane. Mark all the way around the board the finished length you desire. Saw to the line. Use a smoothing plane to work down to that line. To avoid spelching on the outfeed side, plane into that corner a few inches with stopped strokes. Then plane the other way. Work to the line.

If you have a shooting board, use a jointer plane (or a dedicated shooting plane) to trim the ends. Here's how: Mark the finished length you desire on the board. On the outfeed side, plane or chisel a small chamfer to stop spelching. Then plane the other direction until you work down to the line.

If you have a very irregular edge (in softer woods) you can start with a jack to remove most of the roughness. Then switch to the jointer plane.

Conclusion

So how do I use this system to choose the bench planes that I use? Well, I build pretty standard furniture – nothing too big or too minuscule. For my roughing plane, I use a vintage Stanley No. 5 that I picked up years ago for $12. For my jointer plane, I have a Lie-Nielsen No. 7 with a standard 45° frog; however, I'm considering purchasing a 50° frog for the tool.

And for my smoothing plane, I'm torn. My first love is a Stanley No. 603 Bed Rock. I love its small size, but the 45° pitch makes it suitable for mild woods only. I have a Lie-Nielsen No. 4 with a 50° frog. It's a little bigger than I prefer, but the 50° frog is a real plus. And for woods that simply won't behave, I have a Veritas Bevel-up Smoothing Plane that has a 62° pitch. With these three smoothing planes, I can solve any problem. I wish I could get by with only one smoothing plane, but I'm afraid that's like eating only one potato chip: somewhat impossible. WM

— Christopher Schwarz

On the shooting board, mass is your friend. Mass helps keep the plane in the cut and provides momentum to slice the end grain.

A True Oil Finish

Oil finishes are simple to apply and are the 'go-to' finish for many. But to achieve the best results, you may have to adopt a new set of rules.

PHOTO BY AL PARRISH

Step one for a great oil finish is to make sure your finish is pure oil. Many of the products on store shelves include additives (driers and solvents) with the oils – and sometimes there is no oil at all.

You just completed the build on your latest project. Now you have to decide on the finish. For many woodworkers, finish application is the best opportunity to wreck what has been weeks of woodworking. As a result, many of us choose a simple oil finish. Can you achieve a great finish with oil? Are you really adding oil to your project? Before we put the cart before the horse, let's fully understand what an oil finish is.

If you go to a store and pick up a can labeled "oil finish," chances are it's not just oil. Many of the manufacturers of so-called "oil" finishes include additives such as driers to speed the drying process. Or it could be varnish thinned with solvents (which is by all rights a wiping varnish and not an oil finish at all).

The two most commonly used oils, linseed and tung, are natural products extracted from seeds or nuts. Linseed oil is derived from flax seed and tung oil is from the tung tree nut, which is grown mainly in the mountainous regions of China. Both of these oils are drying oils, which means they will cure when exposed to air; they absorb oxygen to form a thin skin-like surface. Boiled linseed oil has a brownish tint similar to sugar on its way to caramelization while tung oil is about half that shade.

In This Corner

Linseed oil is sold as either boiled or raw. Raw linseed oil will cure after an extended period of time, so you should avoid that as you decide on a furniture finish. In the past, linseed oil was boiled to slightly polymerize the oil to shorten the drying time. But today the product almost never boiled – even though we continue to refer to it as boiled linseed oil (BLO). Today, quicker drying times are achieved with the addition of petroleum solvents and metallic dryers. However, Tried & True Wood Finishes produces its Danish oil as a pure, pre-polymerized linseed oil without additives. So you can find a pure BLO, but it's not likely to be on the shelf at a local hardware store.

Tung oil is the most misrepresented finish on store shelves. Most off-the-shelf finishes that mention tung oil on the label are not pure tung oil. Check the label carefully.

In its pure state – labeled as 100 percent tung oil – this oil also dries via polymerization (molecules combine to form long chains) and oxidation.

Some suppliers offer polymerized tung oil in which the oil is thicker. As a result, the thicker polymerized tung oil is often cut with mineral spirits by 50 percent to achieve a proper viscosity for application. Also, fully polymerized tung oil produces a higher sheen.

A Different Kind of Animal

Surface preparation for an oil finish is quite different from how one would prepare a project for other finishes, and the difference is in sanding.

To prepare a surface for dyes or stains, you should not sand hardwoods beyond #180 grit. As you move above that level, you begin to close the pores of the wood and the dye or stain does not have the opportunity to color those areas properly. As a result, your dye or stain job appears blotchy and irregular. However, just the opposite is true for an oil finish. Closing the wood's pores actually helps you in the end.

Preparation for an oil finish should, at minimum, continue through the #220-grit level. And if you want to cut a couple coats of oil from your project and still achieve the best look, feel and finish, continue your sanding through #320 grit.

Handplane users take note: If your finish of choice is aniline dye or other stains, a planed surface presents no real benefits over sanding. With the application of the dye, especially a water-based dye, the grain is raised and has to be sanded back. But if an oil finish is in the cards, handplane users have an advantage.

I've always contended that a handplaned surface was better if you select an oil finish for your work, and after a couple experiments with oil finishes on different surfaces, I confirmed there was a big difference with handplaned surfaces. I did not expect such a result.

I planed the surface on a walnut board, but I didn't go at it as if I were making the last pass on my project; I simple whacked at it with my low-angle block plane. After one application of boiled linseed oil, it was difficult to see any difference between the finish on the planed board and that on a sanded piece that already had four layers of oil applied. If you're a Neanderthal, you have an advantage when it comes to an oil finish.

If drying oils are left thick on the surface of your project, the top of the oil dries as the oil below remains wet. The result is a wrinkle effect in your finish.

Contrary to Most Advice

Application of the oil is as important as surface preparation. If you follow the advice found on most of your favorite woodworking forums, whether you using boiled linseed oil or tung oil, you're probably going about it all wrong. Break away from the pack and your oil finishes will look great, and provide durability and protection.

Before you begin the application steps, let's take a look at where you're working. More specifically, what is the temperature in your shop?

"Pleasure in the job puts perfection in the work."

— Aristotle (384 B.C. - 322 B.C.)
Greek philosopher

Oils should be used at or near 70º. Around that temperature, the drying time for a drying oil is eight to 12 hours. Dip under that temperature by 10º and the drying time doubles.

Contrary to what you might believe, a great oil finish is not a continuous flood and soak proposition. As stated above, drying oils (boiled linseed and tung) cure when exposed to oxygen (and natural sunlight). If you flood your work then keep it wet and allow the oil to soak into the wood fibers, the top level of oil dries as it should and the oil left underneath stays wet. The result is an extended drying time and a longer time to complete the finish.

The best application method, in my opinion, is to use the flood-and-soak method on your first application. Allow it to sit for five minutes before wiping off the excess. That allows the oil to penetrate the surface and adequately reflect light when the finish is complete. Allow the first coat to dry completely, about 48 hours, before moving on to the second coat.

On successive coats, simply wipe on a layer of oil then use a #600-grit silicon-carbide sandpaper to rub the oil onto the surface. The sandpaper rubbing builds a slurry of oil and wood dust and that slurry acts as filler and builds the finish quicker. Then immediately wipe off any excess. Allow that layer to dry. Then continue the process until you have the build-up and sheen you're after.

With three to four coats, you're going to get good coverage. That's where most woodworkers stop. But if you have the patience to take your finish to the 25 to 30 coatings area, you're rewarded with a completely durable finish that looks great, stands up to dents and dings better than most film finishes and does not require any touch-up work whatsoever. Is your project worthy? WM

— Glen D. Huey

Application of the oil with #600-grit wet/dry sandpaper creates slurry. That slurry fills the wood pores and allows a quicker build-up of your finish.

Some gunstock refinishers have learned the secret to a great oil finish – multiple layers. Here you can see what's achieved with many coats of oil.

PHOTO BY AL PARRISH

Thrice the Advice

What used to be frustrating has become entertaining.

I was surprised and delighted when I was asked to interview for the managing editor position at this magazine – I didn't even know the position was open. I'd been writing marketing materials for our parent company for seven years, and was ready for a change – but I didn't expect that change would turn out to be enduringly entertaining and educational.

I was excited to suddenly find myself surrounded by expert furniture makers – guys with collective years of woodworking experience of more than double my age. I was eager to learn, and build pieces I'd be proud to claim as my work.

But I came into the job knowing next to nothing. The day I started, we were doing the read-through for final edits on an issue of a magazine. I circled "rabbet" as a misspelling several times that day, and understood maybe a tenth of what I read.

It took me several months to make my way into the shop and pick up a tool for the first time – and a good deal longer before I felt comfortable doing so. But I wanted to learn, so I started asking questions. Of everyone. All the time. I've no doubt I was annoying (and still am).

But I was also annoyed. No sooner did I think I knew how to do something the right way, when one of the guys of whom I'd not asked the question (that time) would wander over to see what I was doing, and shake his head in a despairing manner. "No, no. The right way to do that is … ." Then another guy would wander over and say the same thing. And another.

They were all correct. But when you're first learning, it can be intimidating to be given too many options. "Look," I longed to say, "I just want to get this done, and I don't care how." But I instead picked on their grammar and spelling – I suspect that's at least equally annoying.

I learned how to cut a tenon three ways: with a handsaw (Christopher Schwarz, natch); with a dado stack on the table saw (I think that was former senior editor David Thiel); and with a tenoning jig at the table saw (Bob Lang – and later, Glen Huey, who replaced David when he moved on to become Popular Woodworking Books editor). And no doubt there are other methods.

I was taught how to "properly" cut a machined mortise: with a drill press, then square up the cuts with a chisel; with a mortising machine (and two ways to go about it); and with a plunge router. And I was taught to do it by hand.

I discovered that there are at least four good ways to cut a hinge mortise: with a router and jig; with a chisel (and perhaps a handsaw for good measure); with a chisel and router plane; with a router and attached fence.

And please – let's just skip the many permutations and finer points of "proper" dovetails and the "right" way to sharpen a plane blade.

I recently passed the four-year mark in my job. I wouldn't take a bet that I can reliably define a jig versus a fixture (I think a jig attaches to a workpiece, while a fixture attaches to a tool?). And I still have trouble remembering the technical differences among rabbets, grooves and dados. But because all the guys have been so very generous with their time, tools and advice (I'm being sincere now), I've learned myriad ways to go about cutting rabbets, grooves and dados. Somewhere along the line, I realized it was foolish to be annoyed by all the conflicting advice – even if at the beginning, I just found it mind-boggling. I now feel privileged to learn so many woodworking techniques from so many good and experienced craftsmen.

Now when I build a piece, I still ask for advice – even if I don't necessarily need it. I've come to enjoy learning varied approaches to the same operation – I have just enough experience of my own to (usually) understand the different techniques and decide which one works best for me in a given situation. Also, it's just good fun to foment an argument among the guys. And I still pick on their grammar whenever possible. WM

— Megan Fitzpatrick

Extras

"Man's mind, once stretched by a new idea, never regains its original dimensions."
— Oliver Wendell Holmes (1809 - 1894)
American physician, poet and author

A NEW DVD by Christopher Schwarz
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Available for $24.95 from WoodworkersBookShop.com or call 800-258-0929, and ask for item #Z6075.

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Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Woodworking Magazine,* these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy us. Think about each procedure you're going to perform beforehand. Safety First!

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We welcome letters from readers with comments about this magazine, or about woodworking in general. We try to respond to all correspondence. To send us a letter:

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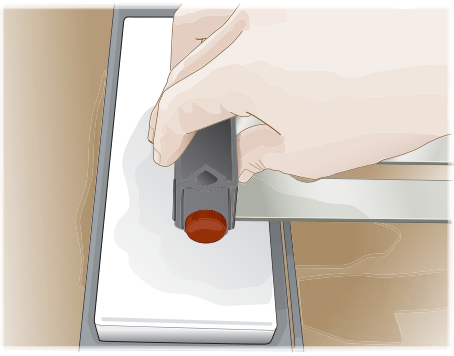
SHARPEN A PLANE BLADE

There are many ways to sharpen plane blades, and woodworkers have strong opinions on the best technique. Here is a simple, reliable method to achieve a sharp edge. It takes just three waterstones, an inexpensive jig and a few minutes.

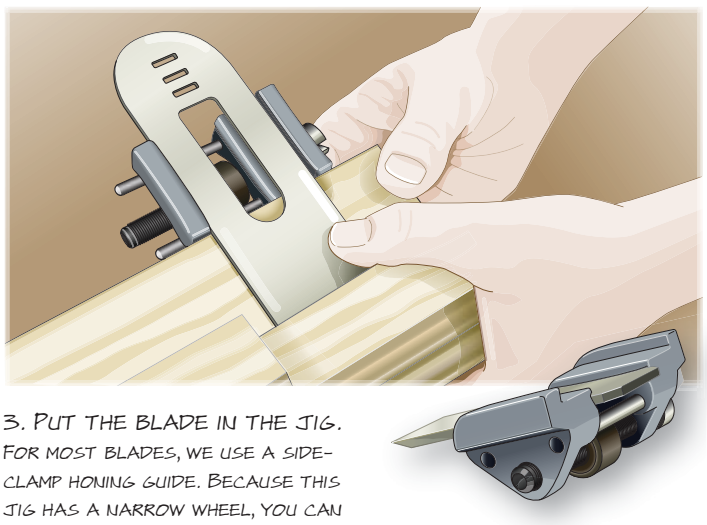
1. Get a flat back.

While some blades come with a flat back, you still need to polish it. Stick a magnet over the bevel to improve your grip. Start polishing the back on a #1,000-grit stone, then move to #4,000 and finish at #8,000. If the back needs serious work, start flattening on #80-grit sandpaper stuck to a flat surface.



2. Check the edge for square.

Confirm the primary bevel is ground straight across. If it is not square, regrind the bevel.

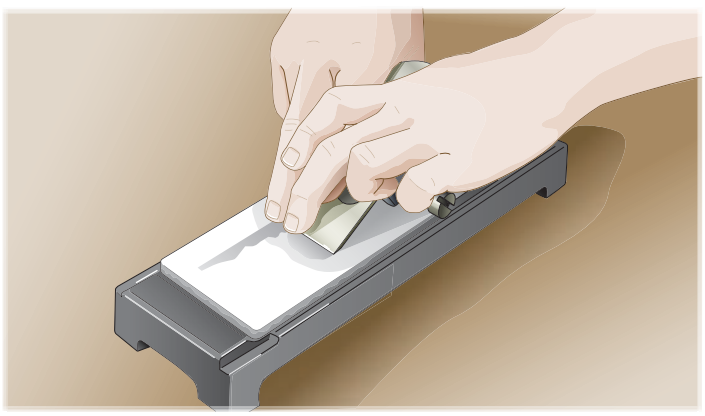


3. Put the blade in the jig.

For most blades, we use a side-clamp honing guide. Because this jig has a narrow wheel, you can use finger pressure to hone the edge straight or with a slight camber. Set the plane blade in the jig at 30° using a protractor. Then you can make a simple stop-block jig with two scraps to easily set the blade next time.

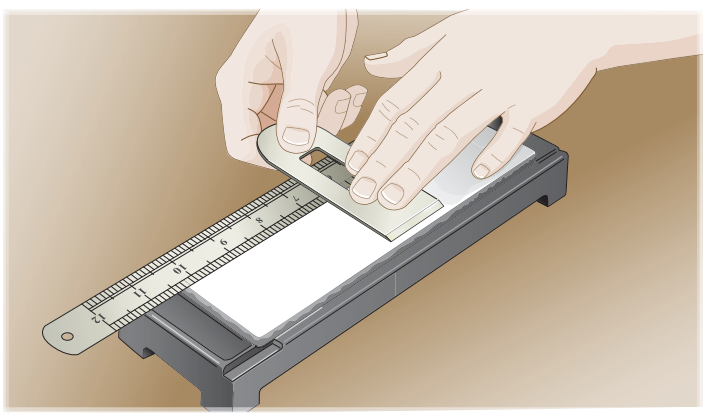
4. To hone a straight secondary bevel.

Use equal finger pressure at each corner to hold the blade edge flat to the #1,000-grit waterstone and pull it toward you 10 times. Observe the edge. Feel the back for a small curl of metal (This is called the burr). If the grinding scratches are gone, spritz off the jig's wheel and switch to a #4,000-grit stone. Hone, observe, repeat. Then move to #8,000 grit. Now jump to Step 6.



5. To create a cambered secondary bevel.

Follow the grit progressions in step 4, but take 10 strokes while applying finger pressure at one outside corner of the blade. Repeat on the other corner. Now shift your fingers one-third of the way in from a corner, and take six strokes. Repeat on the other side of the blade. Now apply pressure to the middle and take two strokes.



6. Remove the burr from the back of the blade.

Place a thin ruler across one edge of your #8,000-grit stone and place your blade across it. This will raise the blade less than 1° and concentrate the hone on the working edge. Hone the back by working the blade on and off the far edge of the stone for about 10 passes.

Illustrations by Mary Jane Favorite