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Popular Woodworking Magazine

December 2015 ■ #222

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Toshio Odate: Woodworker, Artist, Teacher

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- Motor: 2 HP, 110V/220V, single-phase, prewired to 220V, 16A/8A
- Precision-ground cast iron table with wing: 27" x 40"
- Arbor: ⅝"
- Arbor speed: 3850 RPM
- Capacity: 3⅛" @ 90°, 2⅜" @ 45°
- Rip capacity: 30" R, 12" L
- Approx. shipping weight: 416 lbs.

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10" 3 HP CABINET LEFT-TILTING TABLE SAW

- Motor: 3 HP, 240V, single-phase, 3450 RPM, 14A
- Precision-ground cast iron table with wings: 40" W x 27" D
- Capacity: 3" @ 90°, 2⅛" @ 45°
- Rip capacity: 26" R, 8" L
- Base dimension: 20½" x 20½"
- Approximate shipping weight: 508 lbs.

FREE 10" CARBIDE-TIPPED BLADE

G1023RL ~~$1325.00~~ SALE **$1250.00**

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10" CABINET TABLE SAW with RIVING KNIFE

- Motor: 3 HP, 220V, single-phase, 12.8A
- Precision-ground cast iron table with extension: 27" x 40"
- Table height: 34"
- Arbor: ⅝"
- Arbor speed: 4300 RPM
- Max. dado width: 13/16"
- Capacity @ 90°: 3⅛", @ 45°: 2⅜"
- Rip capacity: 29½" R, 12" L
- Approx. shipping weight: 530 lbs.

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10" LEFT-TILTING TABLE SAW with RIVING KNIFE, 7' RAILS & EXTENSION TABLE

- Motor: 3 HP, 240V, single-phase, 3450 RPM, 14A
- Cutting capacity: 8" L, 53" R of blade
- Max. depth of cut @ 90°: 3"
- Max. depth of cut @ 45°: 2⅛"
- Extension table: 44" W x 27" D
- Base dimension: 20½" x 20½"
- Approximate shipping weight: 550 lbs.

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10" CABINET TABLE SAW with RIVING KNIFE & EXTENSION RAILS

- Motor: 3 HP, 220V, single-phase, 12.8A
- Blade tilt: Left, 45° • Arbor speed: 4300 RPM
- Arbor size: ⅝" • Max. dado width: 13/16"
- Max. depth of cut: 3⅛" @ 90°, 2⅜" @ 45°
- Rip capacity: 50" H, 12" L
- Dist. from front of table to blade at maximum cut: 12¼"
- Dist. from front of table to center of blade: 17¼"
- Approx. shipping weight: 557 lbs.

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8" JOINTERS

- Motor: 3 HP, 240V, single-phase, TEFC, 3450 RPM, 15A
- Precision-ground cast iron table size: 9" x 72½"
- Cutterhead speed: 4800 RPM
- Cutterhead diameter: 3"
- Max. depth of cut: ⅛"
- Max. rabbeting depth: ½"
- Cuts per minute: 20,000 (G0656P), 21,400 (G0656PX)
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12" JOINTER/PLANER with SPIRAL CUTTERHEAD

- Motor: 5 HP, 220V, single-phase, 25A
- Jointer table size: 14" x 59½"
- Cutterhead dia.: 3⅛"
- Cutterhead speed: 5034 RPM
- Max. jointer depth of cut: ⅛"
- Max. width of cut: 12"
- Planer feed rate: 22 FPM
- Max. planer depth of cut: ⅛"
- Max. planer cutting height: 8"
- Planer table size: 12¼" x 23⅜"
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- Min. stock length: 8"
- Max. cutting depth: 1/8"
- Feed rate: 16 & 30 FPM
- Cutterhead dia.: 3", speed: 4800 RPM
- Approx. shipping weight: 675 lbs.

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3-KNIFE CUTTERHEAD
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SPIRAL CUTTERHEAD
G0453PX ~~$1795.00~~ **SALE $1695.00**

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20" PLANERS

- Motor: 5 HP, 240V, single-phase, 19A
- Precision-ground cast iron table size: 20" x 25¾" (20" x 55½" with extension)
- Max. cutting width: 20"
- Min. stock length: 8"
- Max. cutting depth: 1/8"
- Feed rate: 16 & 20 FPM
- Cutterhead dia.: 3⅛", speed: 4800 RPM
- Approx. shipping weight: 932 lbs.

4-KNIFE CUTTERHEAD
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SPIRAL CUTTERHEAD
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- Motor: 3 HP, 240V, single-phase, with reversing switch, 12A
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- Spindle taper: MT#2 • Spindle travel: 3¼"
- Speeds: 140, 260, 320, 380, 480, 540, 980, 1160, 1510, 1650, 2180, 3050 RPM • Collar size: 2.595"
- Precision-ground cast iron table size: 11⅜" square
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- Maximum static pressure: 11"
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- Table tilt: 45° R, 15° L
- Cutting capacity/throat: 13½"
- Max. cutting height: 6"
- Blade size: 92½"–93½" L (⅛"–¾" W)
- Blade speeds: 1500 & 3200 FPM
- Approx. shipping weight: 196 lbs.

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30TH ANNIVERSARY 17" HEAVY-DUTY BANDSAW

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- Amps: 20A at 110V, 10A at 220V
- Precision-ground cast iron table size: 17" x 17" x 1½" thick
- Table tilt: 10° left, 45° right
- Floor-to-table height: 37½"
- Cutting capacity/throat: 16¼" left
- Blade size: 131½" long
- Approx. shipping weight: 342 lbs.

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- Precision-ground cast iron table size: 17" sq.
- Table tilt: 45° R, 10° L
- Cutting capacity/throat: 16¼"
- Max. cutting height: 12⅛"
- Blade size: 131½" L (⅛"–1" W)
- Blade speeds: 1700 & 3500 FPM
- Quick-release blade tension lever
- Approx. shipping weight: 346 lbs.

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BOOKCASE & SLIDING-LID BOX PHOTOS BY AL PARRISH; TOSHIO ODATE PHOTO BY LAURE OLENDER; PLANE PHOTOS (CLOCKWISE FROM TOP): SAUER & STEINER TOOLWORKS PHOTO BY KONRAD SAUER; DAED TOOLWORKS PHOTO BY RANEY NELSON; BRESE PLANE PHOTO BY RON BRESE

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To celebrate the holiday season, *Popular Woodworking Magazine* and its sponsors are giving away a prize a day throughout December. To earn your chance, you must enter separately for each day's prize. All entrants will qualify for the Grand Prize: a JET 10" ProShop Table Saw (Model 708494K) with 30" fence, cast iron wings and riving knife.

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GRAND PRIZE

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Popular Woodworking Magazine and its sponsors will award one prize each day from December 1 through December 31. The prize pictured on each day in the calendar above is the prize offered for that day. To register for a chance to win each prize, you must enter on the day the prize is offered. You may enter as many of the daily contests as you like, but are limited to one entry per day. All entries from the first 30 days will be eligible for the Grand Prize: the JET 10" ProShop Table Saw (Model 708494K).

Registration starts midnight EST, December 1, 2015
and ends midnight EST, December 31, 2015

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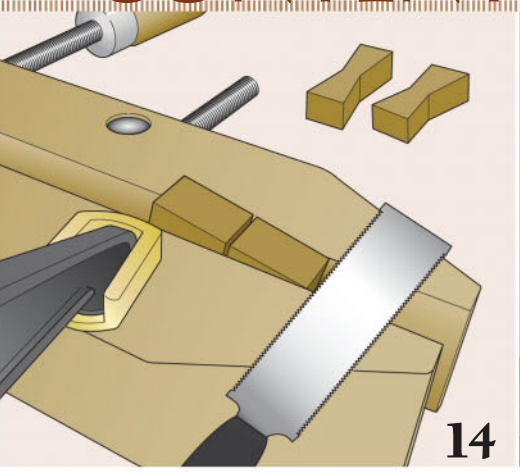

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Shop-made Sandpaper

You'd have to be an idiot to spend lots of money on a tool or shop staple when you can simply make your own, or buy a cheap one at the flea market and fix it up. You'd save a lot of money, and a cheap X will work just as well as an expensive X.

I'm so thankful that generous commenters have let me know the above. I feel like such a fool.

Who knew I could make my own dovetail marking gauge from scraps, instead of spending $25 (and now it's even pricier at $29!) on the Woodjoy one that I've used on almost every project for nine years? What a colossal waste of money. And I'm in publishing – it's not as if I've scads of discretionary income!

Lie-Nielsen planes? I'm such a nincompoop. Why in tarnation didn't I save myself $280 by picking up an old Stanley, order citric acid and await its arrival, then spend a day or two soaking the tool before cleaning and tuning it? But darned if that old blade isn't ground down past usefulness. No problem – I can order a replacement blade and while I await delivery, I can spiff up the Japanning.

And my goodness am I a spendthrift! Instead of using a Domino and buying Festool's pricey loose tenons, I could cut those mortises with my router and whittle the tenons as I watch television at night. (My router is a nice 1960s Porter-Cable model I inherited from my grandfather; it weighs slightly less than a full-term newborn human.)

So I'm going to turn over a new leaf, and start making all my own tools and supplies. (Speaking of leaves...obviously, I'll soon be planting a Brazilian palm tree, so I can scrape the leaves to obtain my own Carnauba wax. I expect the greenhouse to keep it alive in the Ohio River Valley winters will be a little pricey, but it's an investment in my woodworking future, plus I'll be able to grow my own food year-round.)

But for my first venture into miserly woodworking, I shall make my own sandpaper.

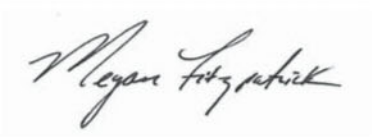
All it takes it some coarse or stiff paper (I plan to dig through the neighborhood trash if I can't find suitable materials in my own recycling bin), a putty knife (but I figure the hotel key card I forgot to return will serve – $5 saved on the knife!), a wire-framed sifter (I think the screen from one of my windows ought to work) and some sand (I doubt the kids next door will miss a cup or two from their sandbox).

Oh, and glue. For that, I'll have to slaughter and render a cow. No problem – I've read "Little House on the Prairie," and I eat steak. (And after I tan the leather, it will be perfect for lining vise jaws. Nothing wasted.)

Simply place a sheet of paper atop a 1/2"-thick or so piece of plywood that's slightly larger than the paper (plenty of ply in my basement already!), spread the glue across the entire face of the paper, then dump a handful or more of sand on top of the screen, and shake the screen across the stickified paper. Let it dry for a while, then place another piece of ply on top, and clamp up the fresh sandpaper for a day or two.

Et voilá!

Option B is to make "sandpaper" the old fashioned way, by catching and skinning a shark. But first, I have to make my own sunscreen. **PWM**



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Drawer Slips: A Closer Look

I read with interest the "Drawer Slips" article in the October 2015 issue (#220). I must say, it took a lot of work and re-reading to figure out what a rounded, flush and mitered slip were, and how they differ.

Keith Mealy,
Cincinnati, Ohio

Keith,

My apologies for muddying an otherwise clear puddle! The difference between the three types of slips is how each is integrated into the drawer box, and how they relate to the drawer bottoms they carry.

Rounded slips have grooves that hold a drawer bottom below the top surface of the slips themselves. In the article, the edge of the projecting portion is moulded with a round profile, hence the name. In reality, any shape profile can be used.

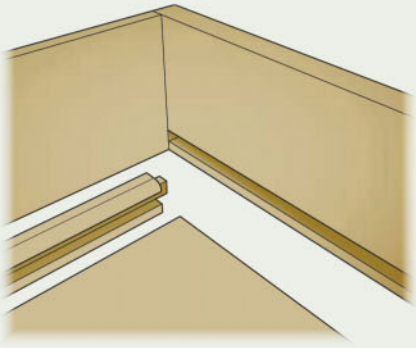
The top surfaces of flush slips (the surfaces you see when you look inside the drawer) are in the same plane as the top surface of the drawer bottom. Achieving this requires a careful arrangement of grooves and rabbets.

Mitered slips work in threes; one slip is glued to the drawer front, while the remaining two are attached to the drawer sides. In place of joinery, they are simply mitered where they meet.

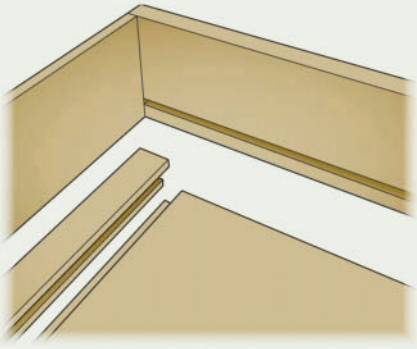
To complicate matters, you can mix and match these types. For example, it's entirely possible to fashion a mitered version of rounded slips.

As with any number of woodworking operations, things will become clearer when you set out to face the immediate, physical problem of making a slipped drawer yourself. Also, an illustration is worth the sum of these words.

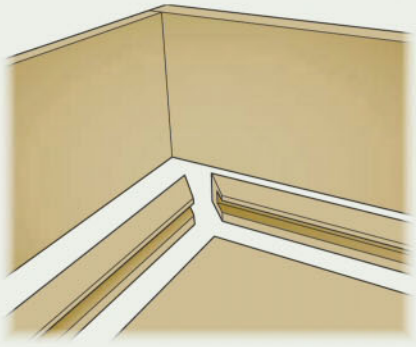
Geremy Coy, contributor



ROUNDED SLIP



FLUSH SLIP



MITERED SLIP

Turning (or Burning) Treated Lumber is Risky Business

I was recently given a bunch of lumber from a backyard lumber mill. The person who gave me the wood mentioned that it had been treated.

I have a small lathe, and had planned on using the wood to turn glasses and cups. Would it be harmful to use treated wood for projects that children might play with? How can I find out what chemicals were used and if they could be harmful?

Richard Robusto,
New Bern, North Carolina

Richard,

An emphatic "No." I would absolutely not use treated wood for anything that will come in close contact with children (or people in general) with any regularity, or anything other than an exterior structure such as a deck or raised garden bed.

There's no reliable way (short of a mass spectrometer reading) to really know what's in it (though the predominant preservatives today are amine copper quat and copper azole) but you can bet it's not something that should be ingested. And the sawdust shouldn't be inhaled.

You'd be putting yourself at risk by turning it, even with a proper HEPA filter mask. In fact, in many places it's illegal to burn treated wood; in my book that is a red flag.

What's available today is safer than the pre-2003 chromated copper arsenate preservative, but still…No.

Megan Fitzpatrick, editor

Why Bother with Glue?

I have a question regarding the "Sideboard Fit for Tea" article in the June 2015 issue (#218). Why use glue on leg joints that already have a complicated sliding-dovetail, mortise-and-tenon structure locking each leg into position?

Most of the time when it comes to gluing, I hear such phrases as "why not?" or that the glue joint is "stronger than the wood itself," yet it seems common knowledge that historic pieces frequently fail at the glue joint.

Why bother with all the panic, squeeze-out, clamping and waiting time for joints that are mechanically secure by design? Is there any benefit to gluing the dovetail joints in a wall-

CONTINUED ON PAGE 12

ILLUSTRATIONS BY MARY JANE FAVORITE

CONTINUED FROM PAGE 10

mounted box or frame that is not going to see much abuse?

Conversely, why not just make a simpler joint if glue is going to be used anyhow?

Greg Smith,
via e-mail

Greg,
Each half of the sideboard's leg joint was designed to counteract a particular force. When the main section of the cabinet is lifted, the sliding dovetail mechanically prevents the leg from slipping out. At the same time, the long tenon helps prevent front-to-back racking by anchoring part of the leg's length in the rigid cabinet side.

However, the joint itself does not prevent the leg from sliding out in the opposite direction from which it was installed. Glue opposes this third force. A metal fastener could do the same, but I found glue to be the neater solution.

Glue, combined with a precisely fitted joint, should keep the legs attached for at least my lifetime.

Geremy Coy, contributor

Why Do I Get Glitter?

I am making a jewelry box out of red cedar veneer and oak, which is an open-pored wood.

I originally sanded to #320 grit, then thoroughly washed the piece down with white spirits, let it dry, then applied two coats of Livos oil sealer three days apart.

The end result is a freckled glitter finish. The entire surface is totally covered with this glitter effect if you look at light reflecting off the piece.

What caused this? What should I do to get a nice even finish with no glitter?

Joe Slaven,
Townsville, Queensland

Joe,
Your problem makes sense to me. Basically, you're dealing with linseed oil, some solvents and driers.

A very common phenomenon with all slow-drying oil products is "bleeding" or "bleed back" from large-pored woods. The thing to notice is that all the glossy spots are over pores.

Oil, and also thinned varnish finishes, often bleed back out of pores in large-pored woods such as oak and mahogany. The finish rises to the surface and creates wet shiny areas above and around the pores.

When the finish dries, it's still shiny and may be difficult to remove. So it's important to keep wiping off the bleeding every half-hour or so until it stops.

The bleeding normally occurs soon after application. But it can also occur even several days later if the wood is moved from a cool to a warm area. The warming of the still-uncured finish deep in the pores causes it to expand and break through to the surface.

But the oil can bleed out even without being warmed. I think the explanation is that as the linseed oil absorbs oxygen in the drying process, it expands (as much as 12 percent). If the pores are fairly full of oil, the only place to go is up or out. Thus the shiny spots.

If you should miss some bleeding and it dries hard, try rubbing the surface with fine steel wool or an abrasive pad to dull the bleeding. You'll then need to apply another coat of finish because you will have abraded off most of it.

As long as the pores are sealed, there shouldn't be any more bleeding. If the abrasive rubbing doesn't remove enough of the shine, you will need to strip the finish and start over.

You could also sand off the finish, but that is more work. **PWM**

Bob Flexner, contributing editor

ONLINE EXTRAS

Letters & Comments

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PHOTO BY THE AUTHOR

Highly Recommended

I bought an Elipse P100 Dust Mask ($30 at highlandwoodworking.com) for use in the shop – I can't sand or use a table saw without developing a sore throat from the dust, no matter how good the dust collection.

This three-quarter mask has exceeded my expectations. Not only do I no longer get a sore throat from wood dust, the NIOSH P100 filter (according the maker, it captures more than 99 percent of airborne particles) has been a lung-saver while removing old drywall and plaster in my house.

— Megan Fitzpatrick

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Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular 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.

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THE WINNER:

(Almost) Effortless Dutchman Keys

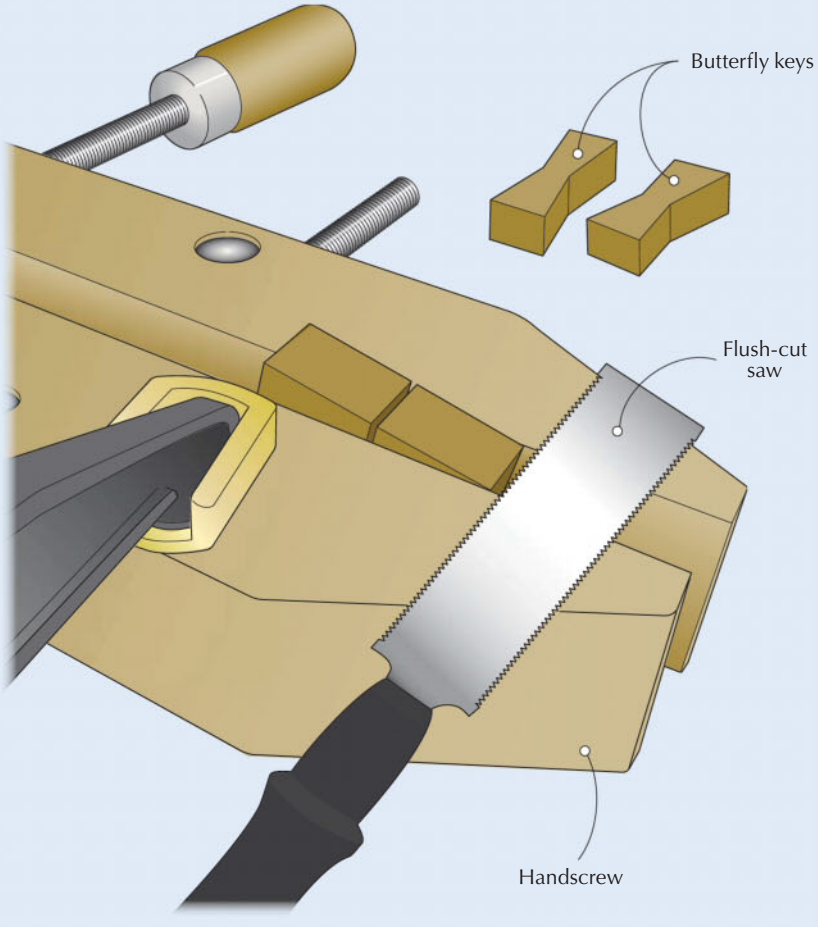
I used to struggle making Dutchman keys (also known as butterflies) – but I love using them in my furniture. So, I came up with an idea that works well and makes the process completely painless.

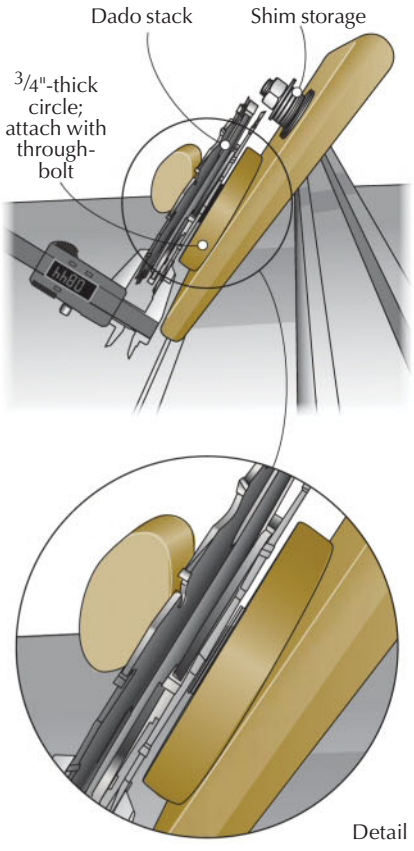
Because the pieces are small (only 2" long in my typical work), I had them set up in a handscrew on my benchtop to chisel out the waste. I realized that if I were to line up the cut with the side jaw surface of my handscrew, I could use my flush-cut saw to split the layout line and not have to worry about paring.

The waste that drops off also happens to make perfect wedges, minimizing waste.

One thing to keep in mind while using handscrews either as a paring block or saw guide is that rarely are the two jaws ever completely in line with each other. This is a huge advantage when making pieces for inlay, because it allows for a slight taper to be cut, much like double-bevel marquetry. Just clamp to your line and saw.

Ethan Thrasher,
Rohnert Park, California





Dado Stack Jig

For many years, I set up my dado stack directly on my table saw. So if my test cut was not correct, it required the removal of a portion of the set to add or remove shims, or swap out one of the chippers until I was satisfied.

I thought, how great would it be if I could accurately measure the setup before it was mounted it on the saw's arbor?

So I made an "Easy-Set Jig," with a 3/4"-thick circle that's smaller than the diameter of the dado blades, attached to a base with a through-bolt. After tightening the 5/8" x 2 1/2" bolt, the circle lifts the stack sufficiently to measure with calipers the full width of the teeth at any place along the circumference.

With this jig, I can test the setup before loading the dado stack onto the table saw.

I added a short bolt at the top to store my extra shims.

Dennis Snyder,
South Burlington, Vermont

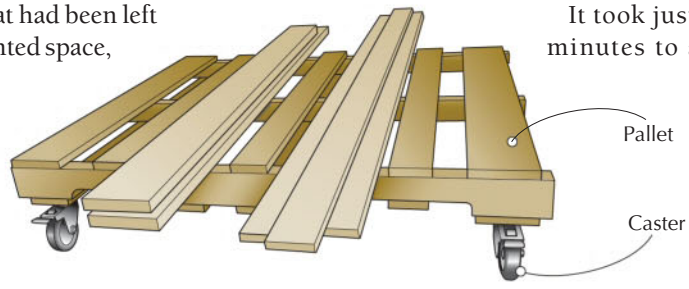
ILLUSTRATIONS BY MARY JANE FAVORITE

Upcycled Pallet Dolly

I had to unload a lot of wood recently, and was groaning about the effort it was going to take to carry an armload at a time from the truck through the hall to my shop.

As I walked by an old wooden pallet that had been left in the rented space, I thought how handy it would be if I could use it to move all the wood at once.

I don't have a pallet jack, but I remembered the "factory cart coffee tables" I'd seen in many hip boutiques and in this magazine (October 2010, issue #185). And I had casters! It took just a few minutes to attach four 4" casters (one at each corner). I typically use the double-locking swiveling casters with a four-hole mounting plate from Woodcraft (item #141050, $20.50 each) – the load rating is 300 pounds per caster.



The dolly works great for moving all sorts of things in my shop – and I know from experience that it can handle a full pickup-truck load of timber.

Keith Jones,
Winston-Salem, North Carolina

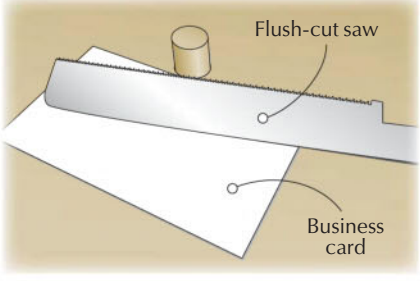
Better Dados by Hand

When making dados by hand the trickiest part is sawing the walls square and avoiding chewing up the work with the saw teeth.

You can clamp a batten to your work to use as a sawing guide to help remedy these problems, but the saw will still tend to wander, even if you press the saw plate against the batten with your fingers.

The solution is a block of wood about as wide as your hand. Use the block of wood to press the saw plate against the batten and your saw will cut dead vertical.

Charles Hayward,
reprinted from *The Woodworker*



No-scar Flush Cutting

I've found that no matter how hard I try, sometimes when I cut a protruding plug from the face of a project I scar the surface while using my flush-trim saw – even though the set on my saw is on only one side.

So now when I flush-cut, I place a business card under the saw to raise its elevation slightly – no scarring.

Dan Martin,
Galena, Ohio

Pilot Holes for Cut Nails

Because cut nails have a tapered shape, it can be tricky to find the right drill bit (or combination of drill bits) to make the pilot hole and prevent the wood from splitting.

One solution with small nails (2" and smaller) is to convert one of your nails to a drill bit. Using nippers, snip the head off one of the nails you are using for your project and chuck the modified nail into your drill.

Use that nail to make the pilot holes. Remember that the pilot hole should only be two-thirds the length of the nail, otherwise the nail won't hold well.

Using a nail as a drill bit works surprisingly well – the sharp burrs left from manufacturing do a decent job of cutting the pilot hole. PWM

Christopher Schwarz,
Fort Mitchell, Kentucky

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Grizzly 12½" Benchtop Planer

Lightweight but solid, this two-knife model is a decent starter machine.

I admit to some skepticism as I unboxed the Grizzly G0790. This benchtop planer has only two knives, and at just $285 (plus $49 for shipping), I wasn't expecting to be impressed. And while I'm not completely blown away by the machine's performance, I have to admit that for the price, it performs surprisingly well.

According to the manufacturer, this one-speed, 65-pound, 2-horsepower, 110-volt planer takes 60 cuts per inch, has a feed rate of 26 feet per minute, a cutterhead speed of 8,750 revolutions per minute and makes 17,500 cuts per minute. The maximum cut width is 12½"; the maximum stock thickness the planer will handle is 4½".

In other words, it will handle surfacing most of your rough-sawn stock needs. But here's the catch – the most stock I could remove in any one pass on 8"-wide boards was just a hair over 1/32" in white pine. With maple, red and white oak, I was able to remove no more than 1/32", the maximum amount recommended by Grizzly.

On the flip side, I experienced only about .002" in snipe at the outfeed end of 4'-long workpieces (and almost none on 2' pieces) and the overall surface quality was decent enough to hit it with a smooth plane or sander and be ready to finish. (To be fair, though, I wouldn't expect a finish-ready surface from any powered planer.)

Assembly was fairly simple and intuitive (with easy-to-follow directions, if you're so inclined). The top-mounted cutterhead elevation crank is conveniently located, and one full turn equals 1/16" movement.

Inexpensive & decent. *For less than $300, you can get a pretty good two-knife planer; one drawback is its 1/32" maximum stock removal per pass.*

While the machine comes with reversible knives installed, I inserted a new pair to test how easy it was – and it was simple, if a little laborious. Remove two screws to release the blade guard on the back, then turn the cutterhead until the six gib screws on one side face up. Remove them, then remove the gib and blade using the supplied magnetic handles. The new (or flipped) blade fits over registration pins, and can be shifted slightly right or left to eliminate lines from nicks in the knives . Screw the gib back in place, and you're back in business. The blade change took about 30 minutes total, and that included having to fuss with properly reinstalling the somewhat bockety blade guard. (I'd add a piece of weatherstripping where the cover meets the machine, to cut down on dust issues.)

The G0790 includes a 2 3/8" dust port and a dust collection bag – but skip the bag and connect the machine to a vacuum; the bag collection is ineffective. I'd also recommend a dust mask; not everything gets collected (typical for a benchtop model).

Another safety consideration is the high noise level – at 112 dB in use, be sure to use ear protection.

Despite the minor drawbacks I've noted, if you need an occasional planer and don't mind taking your time to get to final thickness with multiple passes, for about half the price of most benchtop models, the G0790 might be the right small planer for you.

— Megan Fitzpatrick

CONTINUED ON PAGE 18

Grizzly G0790 Planer

Grizzly ▪ grizzly.com or 800-523-4777

Street price ▪ from $285

▪ BLOG *See the inside of a straight-knife planer and a helical-head version.*

Price correct at time of publication.

PHOTOS THIS PAGE BY AL PARRISH; PHOTOS NEXT PAGE BY THE AUTHOR

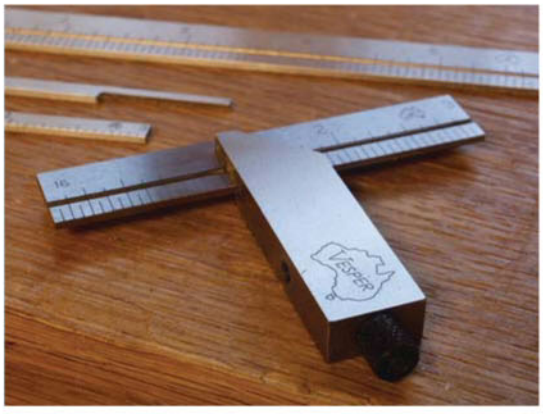
CONTINUED FROM PAGE 16

Vesper Double Square with Mini Blade

Many of the difficult measuring jobs we face are too big or too small for us to accurately assess. For big jobs, I end up making my own giant wooden straightedges or try squares. For the tiny problems, I reach for the Vesper Double Square.

This beautifully machined adjustable square sneaks into places that no other square will go. It is the perfect tool to find bumps and odd angles in dovetails, or to assess the flatness of a mortise wall.

And now that Chris Vesper has started making these squares marked in inches (as well as offering metric), North American woodworkers can use them for layout chores as well.



The heart of the tool is its metallic stock, which contains reference surfaces that are at 45° and 90° to the blade. The blades are secured in the stock by a spring-loaded pin that will not rotate out of position. In other words: No more fiddling with the pin to insert your blades – truly ingenious.

The basic blades are 3" long and 6" long, which are nice for marking out joinery and checking machines. What makes the tool extra special are the two narrow blades. The small blade is 3" long and about 1/8" wide. The mini blade is also 3" long, but is notched at the end so a portion is only 1/16" wide. You can go almost anywhere inside a joint with these two blades.

If you struggle to take your joinery to that next level with an exact fit, the Vesper Double Square is a fantastic way to measure your progress.

— Christopher Schwarz

Vesper Double Square

Vesper Tools ■ vespertools.com.au

Street price ■ from $111 to $161, depending on blade selection

■ **ARTICLE** *Read a profile of Chris Vesper and his shop.*

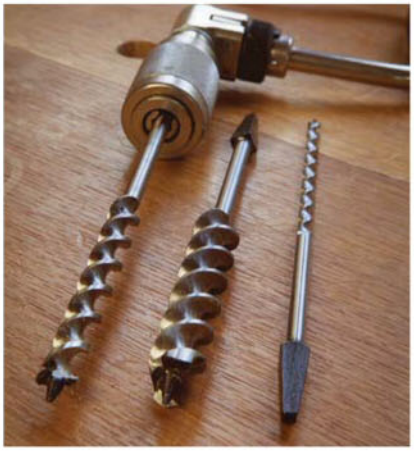
Prices correct at time of publication.

Jennings-pattern Auger Bits for Braces

Finding good auger bits that work in a brace is almost impossible in places of the world that don't have a lot of vintage tools (such as the Midwest and West). And even if you do manage to get some of these bits, they are frequently bent, misfiled, used up or rusted beyond recovery.

Tools for Working Wood in Brooklyn now offers traditional Jennings-style augers with the tapered square shank that works in a bit brace. These European-made bits are the real deal. They are true to size (not metric) and have the proper cutting lips and spurs.

Their lead screws are well-formed and the bits chuck perfectly in a vintage brace. The bits are offered in nine sizes from 1/4" to 1" and come sharp; you don't need to do any tuning or filing before you start boring.



My only quibble is the flutes. I wish they were polished and their sharp corners were eased at the factory – like vintage Jennings-pattern bits I've owned. You can (and should) ease the sharp flutes yourself with some fine sandpaper.

The bits cost between $31.95 and $43.45 each. If you buy some, be sure to pick up an auger-bit file at the same time so you can keep the bits in good shape for years to come.

The other important thing to buy or make is a tool roll or box to store your augers. The reason these ones work so well is all of the cutting surfaces are perfect from the factory. But throw them in a tool box unprotected and they'll soon end up as bad as the ones you find at flea markets for a quarter.

Kudos to Tools for Working Wood for helping bring back another almost-vanished and critical tool for handwork. **PWM**

— CS

Jennings-pattern Auger Bits

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

Street price ■ from $31.95 to $43.45

■ **BLOG** *Learn to sharpen an auger bit.*

Prices correct at time of publication.

Drawing Strategies for Design

It will take more than one drawing to get it right – and that's OK.

My best days in the woodshop are with my 4-year-old grandson, Seth. He's just tall enough to see over the benchtop and quick to grab every scrap of wood or curly shaving before it hits the ground.

Typical for a boy his age, his repertoire of sound effects outshines his vocabulary. Walnut offcuts become bulldozers, jet planes and rockets, powered by Seth-supplied motor noises and sirens. These are all equipped with loud machine guns and lasers, and they all tend to crash in fiery explosions.

The sound wafting upstairs is a mixture of my sawing and hammering and Seth's alien space battles. Yet once in a while, when he's resting up between invasions, that little boy will sing quietly to himself. The words make no sense but the music spilling out of his vocal cords sound like the clear notes of a wood thrush in a forest.

I can't help but stop and wonder where that comes from. It's hidden in some small corner in Seth's mind along with a jumble of lightsabers, roaring lions and firetrucks.

Hidden Treasure

The more I learn and teach about design, the more I'm convinced that we all have within us some hidden treasure just waiting to come out. We each have a sense for beauty, even if it only surfaces in the rare moment when we pause to enjoy a sunset. The challenge for all of us is to learn to tap into that inner sense despite all our busyness and noise.

Drawing is a time-honored way to focus our minds and allow us to begin to tap into those inner resources. Now before I go any further, I'm not talking about drawing in the artistic sense. Don't think you have be a great draftsman or artist. All that's really required is that you have a desire to unlock your potential, and a bit of persistence.

Wake-up call. *Drawing is one of the most powerful tools to awaken your imagination. It forges a link with your inner eye.*

What is Drawing?

When thinking about design, drawing can take many forms, but it's important not to confuse drawing with blueprints or plans. Our efforts at drawing may eventually end up as a formal plan, but drawing in the design sense is more a process of unlocking and guiding our imaginations. It's more about helping us to see clearly with our inner eye. That's not a thing that we can simply push a button and turn on or off.

For that reason, we can employ a number of different drawing techniques to coax out and develop our ideas. These techniques include quick small-scale sketches, larger proportional drawings of elevations or façades, isometric projections to visualize objects in space and even full-size renderings.

Also, I'd include in the category of drawing, 3D small-scale and full-scale mock-ups. Although these aren't actual drawings, mock-ups aim to accomplish the same thing. They help us gain a clear vision of the design in real space so we can better develop the idea.

Let's focus on the first type of drawing that can unlock our imagination: the quick sketch.

Quick Sketches for Takeoff

I liken this type of drawing to an airplane taking off. The entire flight may be many thousands of miles, but that first little stretch down the runway is necessary to get underway. Instead of jumping headfirst into a detailed drawing, it's helpful to begin with a series of quick sketches.

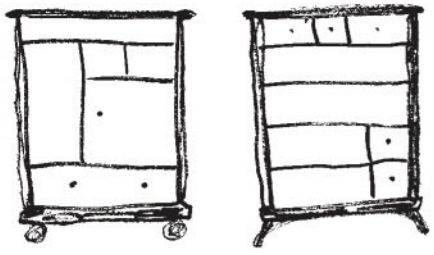
These drawings focus on the general

Hot tomato? *This artist's "notan" drawing captures the essence of a form. It excludes details and keys in on lights and darks.*

CONTINUED ON PAGE 22

DRAWINGS & PHOTO BY THE AUTHOR; TOMATO DRAWING BY BARB WALKER

CONTINUED FROM PAGE 20



Zero in. *Rapid-fire sketches clear out the cobwebs and free up the imagination. Draw fast, not pretty.*

shape of the design and the major parts. Artists often use a similar technique called a "notan." A notan is a thumbnail sketch that just includes the major lights and darks in a composition.

That's a good way to think about a quick sketch. What part is going to be a solid structure, such as legs supporting a case? What part will be air, like the space between those structures?

You might also include rough lines showing doors, shelves or drawers, but don't fuss over details. In fact, it's better to draw a series of quick sketches; five, 10 or even 50.

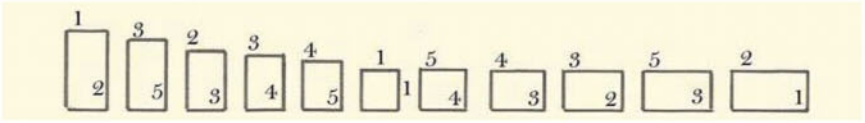
Try to get your mind to spill ideas by drawing fast, not pretty. Don't spend more than a minute on a quick sketch. Twenty-second sketches get your ideas flowing better than taking your time and trying to overthink it.

Somewhere in the process, your ideas will begin to gel. Your airplane is off the ground and you have a destination vaguely mapped out.

Your final design may end up nothing like this initial snippet, but you at least have a toehold on an idea. Now it's time to begin organizing this into something with a little more detail.

Up & Down

Our brains are programmed to read our surroundings like a story. For objects like buildings and furniture, our first read is normally bottom to top. We size up and read a building by looking at the vertical façade. So if we want to begin to help our mind imagine a furniture design, it helps to begin drawing a simple proportional front view in just



Take your pick. *One of these simple rectangles is a good frame work to begin to flesh out your design for a desk or a chest.*

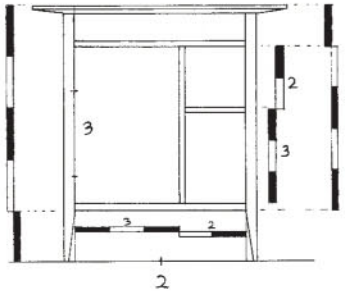
two dimensions, height and width.

I always begin this drawing by blocking in a simple square or rectangle that will govern the form. Eventually, the design may develop into something with lots of curvature, but a simple rectangle gives me some structure to build on.

For millennia, designers often used a small handful of simple rectangles to block in the bones of a design. These simple rectangles had whole-number proportional relationships between the height and width.

For this reason, and because it's easy, I always begin with some sort of rectangle, like a 2:3 – two parts wide, three parts high. With just a handful of simple ratios I can cover almost any furniture form – 1:1 (square), 1:2, 2:3, 3:4, 3:5, 4:5. These rectangles can be stretched either vertically or horizontally.

The next step is to organize the space vertically. Again, I turn to simple proportions to locate the boundaries of major parts. I may divide the overall height into five equal parts and assign the bottom fifth to the open space below the case. I continue to divide the remaining space in simple ratios to establish smaller elements.



Getting closer. *You can begin to refine details on a façade view. This has a long way to go, but the idea is taking shape. You don't have to include the proportional scales that I did, but you might want to make notes as you refine the design.*

Likewise, when I organize horizontal elements, simple proportions show me where each part begins and ends.

There are several advantages to first establishing this proportional façade view. One is that it will help in the development of side views. Often elements from the façade carry over into the side elevation, so working through problems on the façade also answers questions on the side views.

Also, by using whole-number proportions, I am able to easily scale this drawing up or down.

And most important, don't be afraid to erase, tear up and restart a drawing at this or any stage. Sometimes getting to your final destination is just a matter of exploring the bad notes until you discover what does resonate.

In a future issue, I'll discuss how to develop a proportional isometric drawing that will help you envision a design in three dimensions. For more instruction on these techniques you can refer to the workbook, "By Hound & Eye," just published by Lost Art Press. **PWM**

George is the author of two design DVDs (Lie-Nielsen Toolworks) and writer of the Design Matters blog.

ONLINE EXTRAS

For links to all these online extras, go to:

- **popularwoodworking.com/dec15**

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About This Column

Design Matters

Design Matters dives into the basics of proportions, forms, contrast and composition to give you the skill to tackle furniture design challenges with confidence.

Arts & Crafts Bookcase

BY NANCY R. HILLER

Dramatic details showcase leaded glass and English style.

Some of the most aesthetically compelling pieces of furniture I've seen in the Arts & Crafts style were made by an English company most Americans have never heard of. Between 1890 and 1910, the Harris Lebus Company of London exploited the prevailing fashion in home décor, producing a variety of sideboards, hallstands, wardrobes, washstands and related furniture characterized by simple lines and bold proportions.

Many of these items were production pieces built with a price point rather than handcraft in mind. Yet by virtue of their affordability, these pieces achieved one of the Arts & Crafts movement's central ideals: to make useful and beautiful things available to those of modest means.

While researching an article on Harris Lebus several years ago, I came across a knockout wardrobe. Detail photos revealed less-than-optimal fabrication; the door panels had been screwed into their frames rather than housed in grooves, which resulted in predictable splits. The Gothic-style door and drawer pulls looked like the kind of gaudy hardware that belongs in Hollywood. But the overall look… Wow!

So when I had the opportunity to build a bookcase to go in a bibliophile's home library, I suggested using the Lebus wardrobe as a starting point for the design.

The basic form of the bookcase follows a range of Lebus pieces built with solid-slab side panels glued to front and back legs, without top and bottom rails. The long-grain to long-grain glue-up makes for a perfectly sound connection without any additional joinery.

These side assemblies are connected to each other by mortised-and-tenoned rails at the top and bottom, front and back. The bottom and top are added later – the bottom supported by wooden cleats, the top attached by metal fasteners or wooden buttons, after the piece's decorative brackets have been installed in sliding dovetail slots.

A paneled back and leaded-glass doors with C. R. Mackintosh hardware complete the picture.

Shelf-pin holes. *The holes are 3/4" on center from the inside edges of the legs, spaced 1 1/2" apart vertically. I use a 1/4" Forstner bit at the drill press to bore them. For the most harmonious appearance in the finished case, align one or more of the shelves with the lead lines in the glass (and with the muntins, in a mullioned door, for that matter).*

Make the Case & Brackets

When choosing lumber for the bookcase, bear in mind that the most visible features will be the top and bottom front rails, and the rails and stiles of the doors.

Mill and glue up the side panels (and the top, but set it aside for now), then mill the four legs and the top and bottom rails – but don't cut the arch on the front bottom rail until after you have assembled the carcase (removing that much material prior to glue-up would reduce clamping effectiveness). Note: While the sizes for the rails, stiles and panels can be pulled from the cutlist, "verify in field" (direct-measure from the case) the rest of the workpieces rather than relying on the cutlist sizes).

Trim the side panels to final size, then mark and drill for the shelf-support holes. Sand the inside and outside faces now; it would be challenging to sand these after assembly.

Now mortise the legs at the front and back to accept the top and bottom rails that will join the side assemblies to each other.

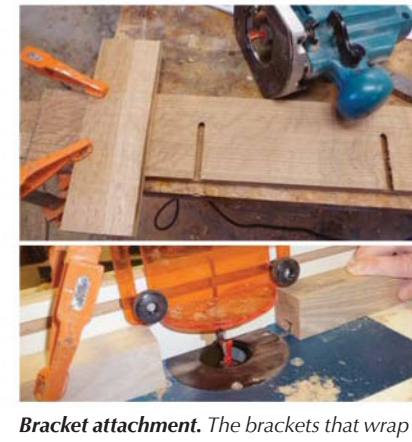
Cut the matching tenons on the rails to fit; I did this at the table saw using a dado stack. It's critical that the top edges of the front and back bottom rails end up at the same height.

Next, mark out the positions of the sliding dovetail slots for the decorative brackets on the top front rail, then cut them using a router against a clamped-down fence.

Fit the same dovetail cutter into your router table, setting it up so the height of the cut will be precisely the same as the depth of the slots you just cut in the top front rail. Set the fence so that the cutter is centered in the width of the leg, and set a stop so the slot will be approximately the same length as those in the top front rail. Absolute precision here is not that important because you can finesse the fit by hand later if necessary.

Make a mark on the outside face at the top of each leg to ensure that you cut the slots in the correct place, then cut a slot in each of the four legs. If you

Mortises first. *Lay out the mortises so the rails and stiles will be flush. I like a 5/16"-wide mortise, and typically leave at least 1/2" clearance from the top of the leg.*



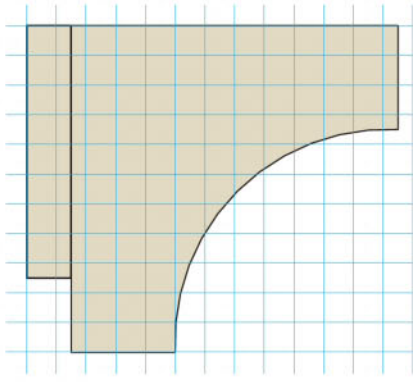
Bracket attachment. *The brackets that wrap the front and sides of the case are seated with sliding dovetails. A router with a 3/8" dovetail bit makes quick work of the slots on the rails. Switch to the router table to cut the slots on the four legs.*

OPENING PHOTO BY AL PARRISH; STEP PHOTOS BY THE AUTHOR; ILLUSTRATIONS BY DONNA R. HILL FROM THE AUTHOR'S DRAWINGS

have dust collection you can do this in one movement; if not, carefully pull the leg back and allow the dust to clear, then push the leg forward to the stop to complete the cut.

Although it's not strictly necessary with brackets that are decorative rather than structural, I cut my bracket blanks so that the grain runs diagonally. Leave the blanks oversized, because the long mitered edges will help ensure accuracy on the router table. (If you run the grain diagonally, scribe the shoulder line of the dovetail on the face where the cut will be going against the grain to avoid tear-out.)

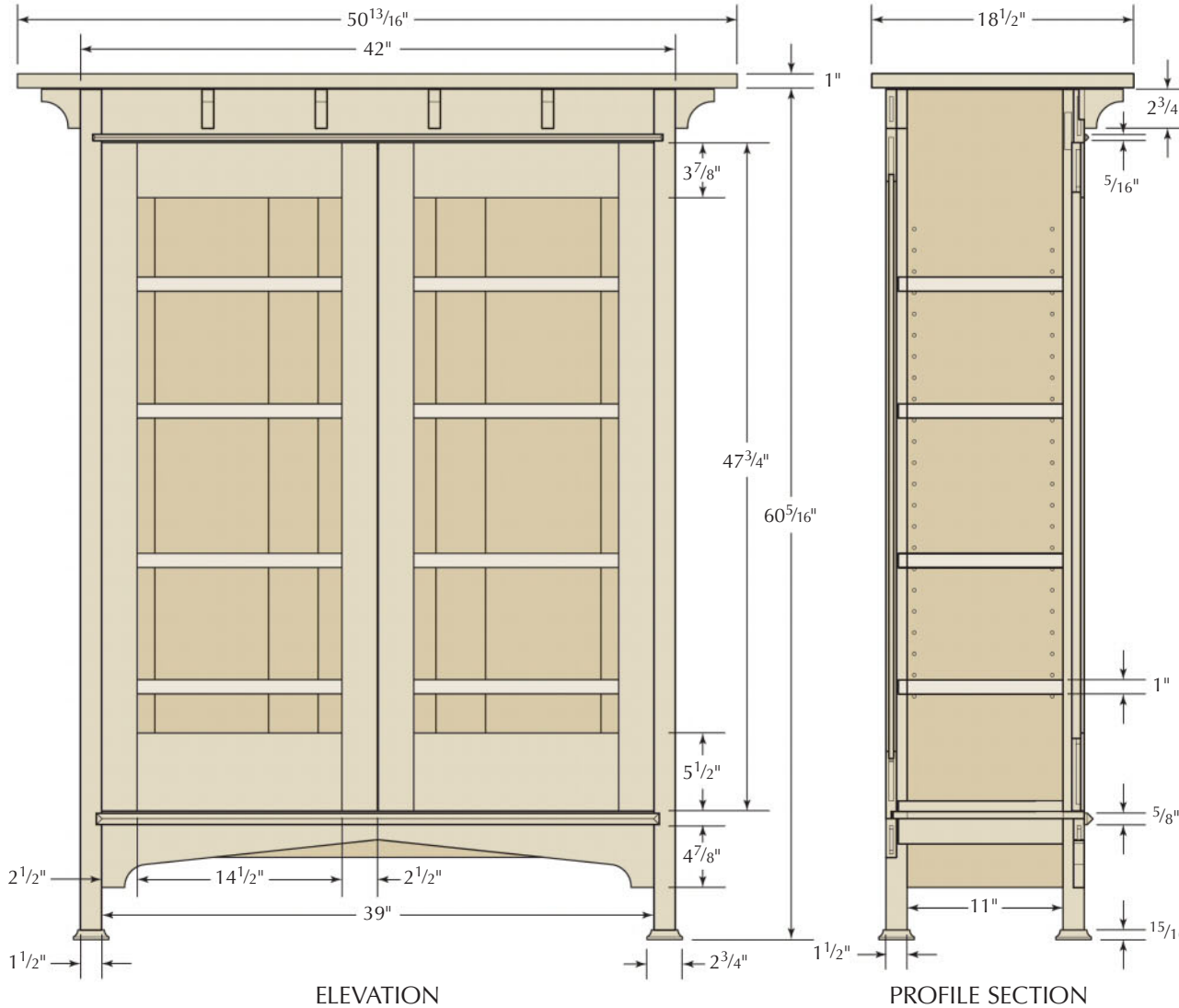
Next, cut the bracket ends square. If you do this on a power saw, you'll need



BRACKET PATTERN
One square = 1/4"

Scribe then rout. *To cut the dovetails on the brackets, scribe the baseline to reduce tear-out, then run the blank over the router table. The bit height is the same as that for the leg sockets; you'll need to adjust the fence to center the dovetail on the bracket.*

Stop cut. *Set a stop to align each bracket for matching cuts as you square the end.*



ELEVATION

PROFILE SECTION

"To affect the quality of the day, that is the highest of the arts."

—Henry David Thoreau (1817-1862), American author & naturalist

two stop settings: one for the height, and another for the width which includes 3/8" for the dovetail.

Cut off the dovetails up to the shoulder line of their slots using a tenon saw.

Finally, mark the radius for the arch on each blank, cut it at the band saw, then sand. To expedite the sanding of eight brackets, I rigged up a custom tool using an empty cat food can with sticky-backed sandpaper around it, and chucked it into my drill press. (You can, of course, use a spindle sander.)

Glue Up

Because the side panels are butt-glued to the legs without any locating joinery, you need to hold these parts in precise alignment during glue-up. Cut two 3/16"-thick spacers at least as long as the side panels to make the reveal consistent (apply wax to the spacers if you're worried about glue squeeze-out sticking them to your panels). Be sure to glue up the sides on a flat surface; any deviation may alter the reveal. Apply glue to both panel edges, then line up the top of the panel with the tops of the legs.

When the glue in the side assemblies is dry, glue up the frame. Tape a piece of scrap over the dovetail slots in the legs to protect the slots from damage by the clamps. Sight across the top rails to check for racking, then across the front to check for twist. Check the diagonals across the front and top.

Now make a routing template (I use 1/4" plywood) for the Tudor arch (refer to the rail pattern on page 28). Cut the arch in the lower rail with a jigsaw, clamp the pattern to the rail one side at a time, then clean up the arch using a top-mounted-bearing pattern bit.

Bottoms Up

Turn the case upside down and make the two-part feet. The blanks for the coved portion are 11/16" thick, 2 1/2" square. Cut the coves on a router table

Arts & Crafts Bookcase

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑ 2	Side panels	3/4	11	56 5/8	Oak	
❑ 4	Legs	1 1/2	1 1/2	59 3/8	Oak	
❑ 1	Top	1	18 1/2	50 13/16	Oak	
❑ 4	Feet, cove portion	11/16	2 1/2	2 1/2	Oak	
❑ 4	Feet, base	1/4	2 3/4	2 3/4	Oak	
❑ 1	Front top rail	3/4	3 3/4	41 1/2	Oak	*1 1/4" TBE
❑ 1	Front bottom rail	3/4	4 7/8	41 1/2	Oak	*1 1/4" TBE
❑ 2	Back rails	3/4	2 3/4	41 1/2	Oak	*1 1/4" TBE
❑ 8	Brackets	13/16	2 3/4	3 1/8	Oak	**
❑ 1	Bottom	1/2	13 5/8	40 1/8	Oak	
❑ 2	Bottom cleats (under)	3/4	1 3/8	12 3/8	Oak	
❑ 2	Bottom cleats (over)	3/4	1 3/8	11 5/8	Oak	
❑ 1	Beveled trim, top	5/16	13/16	39 3/4	Oak	
❑ 1	Beveled trim, bottom	5/8	7/16	40 1/4	Oak	
❑ 4	Shelves	1	11 5/8	40	Oak	
❑ 2	Back stiles	3/4	3 3/4	49 1/8	Oak	
❑ 1	Back top rail	3/4	3 3/4	32 1/2	Oak	
❑ 1	Back bottom rail	3/4	4 3/4	32 1/2	Oak	
❑ 2	Back vertical dividers	3/4	3 1/2	41 5/8	Oak	
❑ 3	Back panels	5/16	8 7/8	41 3/8	Oak	
❑ 2	Keeper strips	3/4	3/4	42	Oak	
❑ 4	Door stiles	7/8	2 1/2	48	Oak	
❑ 2	Door top rails	7/8	3 7/8	17	Oak	*1 1/4" TBE
❑ 2	Door bottom rails	7/8	5 1/2	17	Oak	*1 1/4" TBE
❑ 6	Glass keeper strips	1/4	5/16	48	Oak	†
❑ 1	Door stop	1/2	2 5/8	4 5/8	Oak	

*TBE = tenon both ends; **Includes 3/8" sliding dovetail on back; †Thickness is approximate

Spaced out. *Long strips of 3/16"-thick material hold the panels in the correct alignment as you glue the side panels to the legs.*

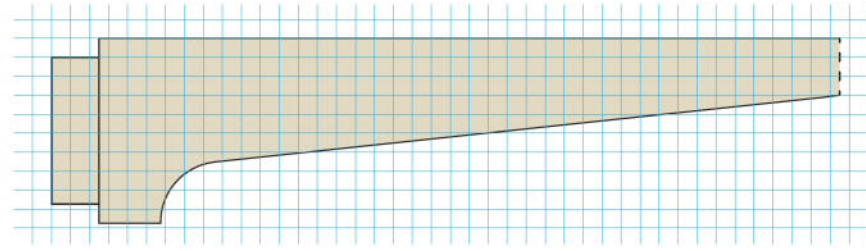
Clamp it. *Pads over the dovetail slots for the brackets protect them from clamp damage as you glue and clamp the carcase.*

using a 1/2" cove bit, cutting the end-grain first so the long-grain cuts will remove tear-out. The bases are 1/4" x 2 3/4" squares. Glue and pin the parts together with the coved piece centered on the foot.

Center each composite foot on a leg; you can do this by eye – the overlap is small. Tack them in place, then drill for and attach two countersunk screws to prevent rotation.

Take care when standing the case upright to avoid damaging the feet. Now cut the top to size.

Use traditional wooden "buttons" or metal fasteners to hold the top on the case. If using buttons, you will have to rout or chop mortises near the top of the sides, front and back rails; if using metal attachment hardware, you can cut slots at the requisite height using a biscuit jointer after the case has been assembled. In either case, set the height of the slots so there is a space of about 1/16" to 1/8" between the top edge of the case and the top of the fastener to ensure a positive pull.



RAIL PATTERN – LEFT SIDE
One square = 1/2"

After fitting the top and its attachments, remove it and set it aside for now.

The carcase bottom will be supported by the front and back bottom rails, and by cleats running from the front to the back legs.

Start by cutting cleats to fit between the front and back legs, then mark the inside corner of the legs on the cleat at front and back. Scribe the distance between the inside corner of each leg and the inside face of the carcase side (it should be about 1/2") on the cleat and cut a notch with a backsaw or at the table saw. The rear notch cut should be offset about 1/8" toward the front to leave additional room for movement of the side.

Drill a 3/8"-diameter hole in the notched part at the back to allow the carcase to expand and contract, then glue and screw the cleat in place on the front leg, taking care to make the top face flush with the top edge of the front rail.

Mark the position of the hole on the back leg, drill at the center for a #6 screw, then screw the cleat in place on the back leg using a 5/32" x 3/4" fender washer and a pan head screw. Repeat on the other side. The washer spans the hole, which is quite a bit larger than a #6 screw, to allow for movement.

The 1/2"-thick bottom will sit flush with the front face of the cabinet; trim will cover the joint between these parts. Measure the distance from this face to halfway through the thickness of the back rail and rip the bottom to this dimension.

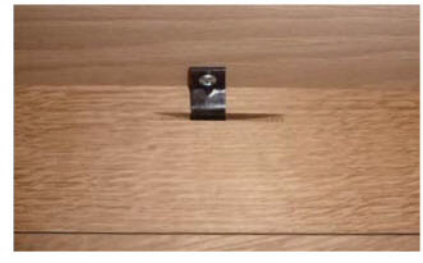
Crosscut the bottom to the full interior width of the carcase and notch it around the legs. Sand the bottom, then glue it in place on the front rail only (to allow for expansion and contraction toward the back).

Now cut and notch upper cleats to sandwich the bottom in place and keep it flat. Shape the front to avoid a clumsy look – I cut the same radius as I used for the brackets – and fasten the top cleats in place as you did with the lower ones.

So why go through what seems like more trouble than simply setting the bottom in dados? This down-and-dirty approach (I learned it years ago in a professional cabinet shop) actually makes life easier, particularly on large case pieces such as this one.

The 1/2" stock reduces the overall weight slightly, there are no dados to

Nice feet. *A 1/2" cove and slightly larger base combine to create an eye-catching bottom detail to the feet.*



Metal or buttons. *You can use metal connectors as I did, or wooden buttons to connect the top to the carcase. Either way, offset the slots in the case sides by 1/16"-1/8" so the top pulls down tight.*

Perfectly fit. *Pull the proper length and notch location from the carcase, not from the cutlist.*

Washer wear. *A fender washer transfers the tension between the fillet and side panel across the 3/8"-diameter hole that allows the side to move freely, and provides a solid surface for the screw head.*

Mark the cut. *With the back panel held in place, pencil a line where it meets the case bottom. Then, cut a 3/8"-deep rabbet (half the thickness of your back rail) to that line.*

cut, and there is one less piece to juggle as you apply clamps to a carcase glue-up. But of course, feel free to approach the bottom in a traditional manner if you prefer.

Back it Up

I made a paneled back that fits inside the opening, without rabbeting the case. The back is joined with pegged stub tenons in a 1/2"-deep groove with floating panels.

You could opt for a plywood or shiplapped oak back, but I think the paneled back adds an elegant touch.

Measure the height of the interior opening at the back and cut the stiles to this length, then use these dimensions to calculate the lengths of the top and bottom rails and vertical dividers.

You can avoid a small gap behind the shelves by rabbeting the panel edges so they're flush with the back's frame on the inside of the bookcase. (Because I bought 4/4 stock for these panels and bookmatched them, I made my panels 5/16" thick; this resulted in a 1/4" gap behind the shelves, which is negligible in a case designed for book storage.)

Fit the back into the opening and mark the horizontal line where it hits the bottom of the case on the interior of the cabinet. Rabbet the bottom rail of the back panel so that it will fit over the bottom of the case with its back face flush with the back of the legs.

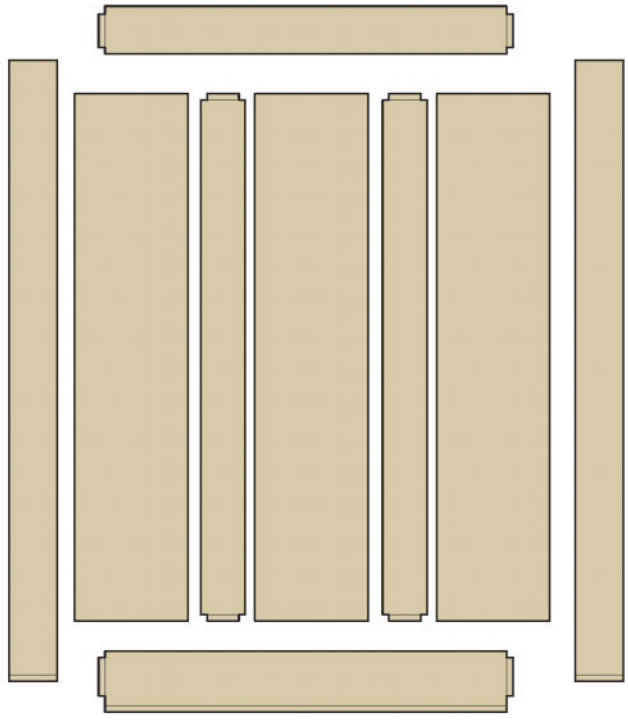
Now, with the back set in place, measure for the thickness of the "keeper strips" to which you'll secure it.

To determine this, measure the distance between the inside face of the back and the inside face of the legs – it should be about 3/4" – so that the strip will be flush with the front of the legs. Cut the strips to length and glue them in place.

What you're basically doing here is creating a glued-on rabbet – it's simpler than rabbeting the legs to accept the back, and – if you choose strips that match the grain in the legs – no one will ever notice in the back of a bookcase.

After the glue dries, secure the back to the strips with brass screws. (I use four or five on each side).

Now glue the arched brackets into their slots, taking care to make their tops level with the top of the case.



BACK – EXPLODED VIEW

SUPPLIES

Rejuvenation
rejuvenation.com or 888-401-1900

6 ▪ Ball-tip cabinet hinges
#C7685 BA, $25/pair

Horton Brasses
horton-brasses.com or 800-754-9127

2 ▪ Mackintosh vertical drop pulls
#AD-4065 DA, $41.50 ea.

Rockler
rockler.com or 800-279-4441

12 ▪ Top fasteners
#34215, $2.99/pack of eight

4 ▪ Rare-earth magnets, 3/8" dia.
#32907, $11.99/pack of 10

4 ▪ Magnet cups, 3/8" dia.
#39783, $8.99/pack of 8

4 ▪ Washers for 3/8" magnets
#38348, $6.99/pack of 10

Jamestown Distributors
jamestowndistributors.com
or 800-497-0010

8 ▪ #6 slotted-head brass wood screws, 1 1/4" long
#FBRWSFH6X11/4, $12.18/box of 100

▪ #6 slotted-head brass wood screws, 1 1/2" long
#FBRWSFH6X11/2, $13.76/box of 100

Delphi Glass
delphiglass.com or 800-248-2048

3 ▪ Lead came, 1/4" x 72"
#5584, $6.95 each

3 ▪ Zinc channel, 1/4" x 72"
#5601, 4.95 each

▪ Solder, flux and tools for making leaded glass panels

Homestead Finishing Products
homesteadfinishingproducts.com
or 216-631-5309

▪ TransTint Honey Amber Dye
#6001, $18.50/ 2 oz. bottle

Prices correct at time of publication.

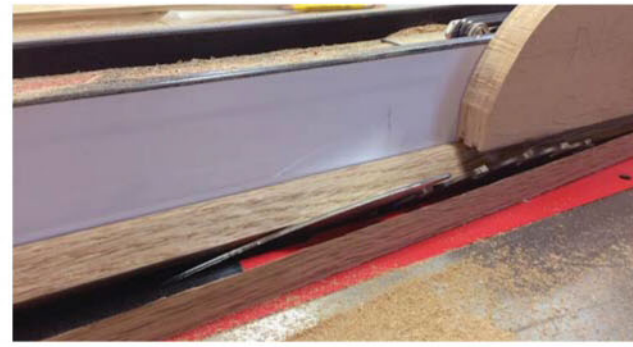
Beveled Trim

Many pieces of Arts & Crafts casework produced by Lebus feature bevels as a decorative element – on the inside edges of door rails and cornices, or to frame sections of casework. I incorporated bevels here in the form of trim above and below the doors; I varied the dimensions to produce proportions typical of a Lebus piece at the turn of the 20th century.

Leave your trim stock overlong until you have cut the bevels on the table saw. Rip one side with your blade at 45°, then reverse the cut to bevel the other side. Note: These cuts will leave a small flat at the edges.

Now cut a 45° bevel on one end, then lop approximately 1/8" off the end to match the long flat of the table saw bevels. Determine the final length (add 1/8" for the flat on the other end), then replicate the bevel there.

Glue and pin the beveled trim onto the face of the cabinet, leaving an 1/8" reveal between each piece of trim and the nearest edge of the top and bottom rail respectively.



Bevel up. *Set the blade on the table saw to 45° and rip one side of the trim, then the other. And, of course, use a push stick for this operation.*

Make the Doors

Although you could rabbet the backs of the doors with a router after assembly to accept the leaded-glass panels, the method I use is more traditional for glazed doors and leaves a clean shoulder at the inside corner.

Mill the door rails and stiles now, as well as enough extra stock to use for test cuts on setups.

On the inside of all the pieces, cut a 3/8"-wide x 5/8"-deep rabbet (it must be deep enough to accommodate the thickness of the zinc channel in the glass panels). Then use the rabbeted stiles and rails to guide the layout location of the 5/16"-wide x 1 1/4"-deep mortises.

Cut tenons on the table saw, setting the height of the cheek cuts with a piece of scrap with the mortise chopped all the way out to one end.

Set the table saw fence to produce a full-length tenon – the full mortise depth of 1 1/4" – on the cheeks for the face side of each rail, but for the cheeks that face the interior of the cabinet, reset the table saw fence so the back shoulder of the tenon will fill the groove.

To cut the haunches, leave the table saw fence at the same setting, but raise the dado blades to a height of 1/2" using

Rabbet first. *After cutting rabbets to accept a glass panel, it's simple to see where the mortise needs to be laid out and cut.*

Stepped shoulders. *Show the rail to the stile to mark the location for the stepped shoulder that will fill in the rabbet.*

DOOR CATCHES

The tall doors should be fitted with catches at the top and bottom. You could certainly use brass ball catches, but I used rare-earth magnets.

Because I've had trouble with magnets exerting too strong a pull when mounted on a door's face – something you really don't want with a leaded-glass panel in a tall door – I mounted them in the top and bottom rails.

First, drill holes for the magnets on the top and bottom of the door stile using a Forstner bit.

Mark the position of the magnet on the cabinet floor and top rail, then drill.

Don't recess the magnets completely; leave them flush or just a little proud, depending on the size of the gap around your doors. They need to touch in order to catch.

As the final touch, attach a small piece of oak to the rail at the top behind the doors, to serve as a stop. —NH

the same principle as you did for the case joinery.

Once you're satisfied with how everything fits, glue up the doors.

Get Hinged

The type and installation of the hinges for this piece diverge from much of 20th-century English convention. Most of the casework I encountered in my training and work in England was built with fixed-pin butt hinges mortised into the door alone – not mortised into the surrounding cabinet frame.

But because the doors for this bookcase are relatively large and heavy (which is why you need three hinges per side), I used removable-pin hinges, mortising them into the case as well as the doors to relieve some of the stress on the brass screws.

Fit the doors in their openings, then chop mortises in the door stiles for the hinges. (I typically lay out the hinge location by going no more than 1/2" above or below where the rails meet the stiles.)

Set the doors on shims to create a small gap at the lower edge, then mark the positions of the hinge mortises on the face of each corresponding leg. Chop or rout the mortises in the legs. Now test-fit the doors with their hinges and adjust them until they hang well. Then remove them and get ready to finish.

The Big Finish

The finish I use here produces a classic Arts & Crafts look, but without the danger of ammonia fuming.

First, sand the entire piece to #180 grit then remove the dust. Apply a coat of TransTint Honey Amber dye at the ratio of 1 tablespoon of dye to 1 pint of distilled water.

Using a foam brush, apply the dye liberally with the grain, working quickly to avoid lap marks. Go over each section with a lint-free cloth to even out the dye before you move onto the next area.

After the dye has dried completely, scuff-sand the raised grain with #320-grit sandpaper. Remove the dust, then apply a coat of Minwax Early American stain using a foam brush. The stain will continue to bleed out of the pores, so wipe periodically with a clean cloth over the next couple of hours to remove any excess.

Shellacked. *Here's the case after the coat of amber shellac. (Note: Don't panic after the dye and stain coats…you won't get a good look until after the shellac.)*

Glaze of age. *I mixed Old Masters' Dark Mahogany and Dark Walnut gel stains to get the color I wanted, then added swipes of finish in crevices and corners to mimic age.*

Allow the stain to dry overnight, then apply a coat of amber shellac.

If you're going to apply a topcoat such as oil-based polyurethane, use dewaxed shellac to promote adhesion. Use a high-quality bristle brush and apply the shellac quickly with the grain to minimize lap lines. You can adjust the color or mimic signs of age with a gel stain glaze, in which case you'll want to wait at least overnight before applying a topcoat.

Don't forget to apply a coat of shellac on the underside of the top and floor so that all surfaces are sealed (I used Zinsser Bulls Eye SealCoat).

A final going over with paste wax will produce a low-luster, satin-smooth finish that's easy to renew with additional wax in the future.

I made my own leaded-glass panels, using directions available online and from various publishers. (The learning curve was steep, and the finished product less than perfect, but I find the panels quite attractive and serviceable.)

You can, of course, use plain glass, or have a glass artist make leaded panels for you.

Install the glass panels in their rabbets, then cut thin strips of wood that tuck into the rabbet to hold the glass in place. Miter the corners, then pin the strips in place, sinking the brads into the side of the rabbet (where there is no glass to avoid). Now attach the top and rehang the doors.

The final touch is to install the door pulls – which I do with the doors hanging because it allows you to get them exactly even. The ones shown in the opening photo (from Horton Brasses) are in the Mackintosh style, and come close to the hardware on original Lebus pieces of this vintage. **PWM**

Nancy designs and builds custom furniture at her shop near Bloomington, Ind. Her web site is nrhillerdesign.com.

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/dec15**

WEB SITE: *Visit Nancy Hiller's web site for a look at her other work and to read more of her research on Harris Lebus.*

BLOG: *Turn a cat food can into a sander.*

MODEL: *Download the SketchUp model for this project.*

IN OUR STORE: *"Build a Turn-of-the-Century Baker's Table," a video by Nancy Hiller.*

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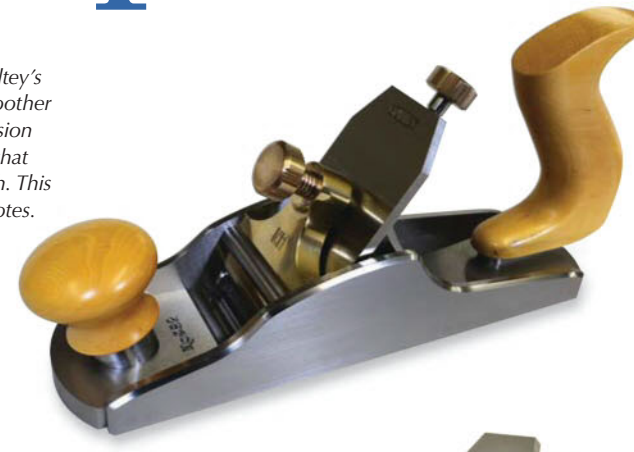
Apologia for the Custom Handplane

BY RANEY NELSON

The best rationale for these ultra high-end tools might not be what you think.



Smooth design. *Karl Holtey's remarkable No. 982 smoother is a masterpiece of precision design and engineering that would make NASA blush. This tool features boxwood totes.*

Style & substance. *Brese Plane's "Winter" series tools combine top-flight engineering and design with custom patination, giving them the stunning aesthetics of a modern classic. This is a Winter Panel plane with desert ironwood totes.*

Over the past decade, I've made somewhere approaching a couple hundred custom handplanes, both for my own enjoyment and (since 2010) as my full-time occupation. I'd like to take some time here to tell you why every woodworker needs a custom handplane in his or her shop.

But I can't do that.

The truth is that most woodworkers need a modern "super" plane in exactly the same way my 6-year-old son needs a jet pack.

So let's get that settled right off the bat. Offerings from Lie-Nielsen, Veritas, Clifton and Old Street Tool have taken the modern handplane into already-rarefied levels of performance. Properly set up and tuned, those companies' tools far exceed the needs of almost any woodworking shop.

For that matter, local flea markets and auctions are sources for classic Bailey pattern and wooden planes, most of which can be tuned to serve a shop's needs with just a little care and attention.

On top of that, there is a whole range of vital handplanes that have no justifiable alternative in the custom plane world. Scrub and fore planes, the jack plane, fillister and plow planes – not to mention moulding planes of all variety.

And yes – this is my standard sales pitch.

Now that I've shot my business in the foot, let me tell you why I remain committed to tools I've just seemingly relegated to the land of unicorns and altruistic stockbrokers – and why some woodworkers still have good reason to desire custom handplanes the way my son pines after Spaceman Spiff couture.

First, allow me to debunk a few myths about the appeal of high-end custom planes.

Myth: Shelf Jewelry

One of the most basic assumptions about custom planes is that their main

HOLTEY CLASSIC PLANES PHOTOS BY KARL HOLTEY; BRESE PLANE PHOTOS BY RON BRESE

A refined Brit. *My Daed Toolworks index planes are an outgrowth of classic British infill thumb planes, refined for dramatic ergonomic improvements. Shown here are African blackwood infills.*

Moving sculpture. *Wayne Anderson's (Anderson Planes) unique designs include a wealth of artistic touches and careful ergonomic details that make the planes as lovely to use as to behold. This panel plane features rosewood infills.*

New approach. *The Sauer & Steiner K13 is a radical ground-up rethinking of the traditional panel plane. This one has African blackwood infills.*

appeal is their appearance – that they're made not so much for users as collectors.

In my experience, while the aesthetics certainly count for a lot, any modern maker will tell you that when exhibiting at events and shows, it's not the seeing that ends with a commission. It's the using.

My entire marketing strategy, soup to nuts, consists of "try the plane." There's something about how the tools work that simply calls out some woodworkers. (More about how they work in a bit.)

Myth: Dampened Spirits

Another common misconception holds that infill planes in particular have an advantage over other designs because the wooden bed dampens vibration. This one is just plain nonsense – and in fact, is 100 percent opposite of reality.

This myth won't last a second when one considers the woods most commonly used and desirable for plane-making. Rosewoods, boxwood, ebony – almost to a one, these are woods valued for their hardness, stability, low elasticity and high density.

In fact, nearly all these woods are considered tonewoods, and are primarily prized for their ability to carry vibration, not dampen it. This is not an accident.

Myth: Mass Appeal

There is a surprisingly prevalent notion that high-end planes are especially effective because of their high mass, and the corollary improvement in momentum of the planes in use.

This is a fairly recent (and oddly enduring) idea. For the overwhelming majority of written woodworking history, and for the vast majority of modern woodworkers, unnecessary weight is considered 100 percent detrimental to plane function.

Let me say this as clearly as possible: All else considered equal, less weight is almost always more desirable in a smoothing plane.

Finishing First

At this point, I think it's important to acknowledge that the vast majority of custom-made planes are unabashed one-trick ponies. They're made to do one thing – and one thing only – extremely well: perform final smoothing. Period.

Because they don't have to meet a wide range of purposes, they can be fastidiously optimized for this one task, and the maker can tune a plane to suit a specific set of needs and circumstances.

For most of the planes in the custom world, the materials costs are on the order of perhaps 10 percent of the total price of the plane; the overwhelming majority of the cost is in the labor that goes into making the tool.

When you buy a custom plane, then, what you're paying for first and foremost is the technical skill and extensive time from the maker. From a

DAED TOOLWORKS PHOTOS BY THE AUTHOR;
ANDERSON PLANES PHOTOS BY WAYNE ANDERSON; SAUER & STEINER TOOLWORKS PHOTOS BY KONRAD SAUER

performance standpoint, what you're getting is ground-up technical expertise and tuning from someone who eats, sleeps and breathes these tools all day, every day.

The standard features of a well-made and tuned plane – flat soles, careful bedding, fine mouth etc. – are all taken to the highest levels here.

One aspect that I think is underappreciated, though, is the remarkable degree of feedback that the best custom planes convey. This (at last) is the "how" in "how they work" that attracts so many people at a gut level – and to my way of thinking, that might be the most important performance advantage of custom-made tools.

Communications Specialists

To explain what I mean by feedback, let me divide smoothing technique into two categories that I see over and over again at trade shows, gatherings and in my own shop.

> "Education consists mainly of what we have unlearned."
>
> —*Mark Twain (1835-1910)*
> *American author*

Technique One is what I call planing for speed. In this method, the woodworker is almost throwing the plane through the wood – often making good use of a plane's inertia to keep it in a cut, and to move very quickly and smoothly through the chore.

This approach is good when one has a lot of ground to cover, and when wood selection has been carefully considered. Straight-grained and relatively figure-free woods are incredibly forgiving when approached with a well-tuned sharp tool.

I also think this accounts for much of the fascination with mass – because as the woods get harder (think African and Australian timbers) it is tempting to trade on the increased momentum a heavier tool can bring to bear. This is the exception to the rule that lighter is better for some woodworkers.

Technique Two is what I refer to as planing for sensitivity. It comes into play in work where the work surface is not straight-grained, is highly figured, or where tear-out would be more than inconvenient – it would be catastrophic.

Consider high-end furniture, where a premium is often placed on highly figured and interlocked-grain woods such as crotch mahogany, quilted or bird's-eye maple – not to mention expensive figured exotics.

Planing these materials often requires a degree of finesse that is pointless in most handplane work, and this sort of work benefits from a dedicated tool made to carry out the task.

Planing for sensitivity relies on the woodworker's senses to adjust the angle, speed, direction and skew of the plane to compensate for shifting grain, and smooth the surface to optimum effect – and to avoid the devastations of tear-out.

Sight and hearing both come into play in this arena, but more than anything else, the talented woodworker familiar with his or her tool is in this case literally feeling the changing grain of the board and compensating on the fly.

That heightened sense of physical contact with the wood is where the highly tuned custom plane shines, because the construction and operation of the tool is intimately concerned with providing information to the woodworker's senses – particularly the tactile sense.

What exactly is it about these planes that makes them such good communicators?

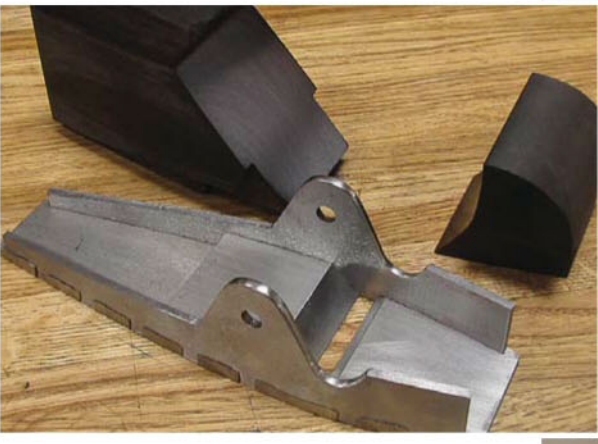
Strong tradition. *Made with bronze sidewalls and a steel sole, the traditional dovetailed construction on this Sauer & Steiner XS No. 4 coffin smoother becomes readily apparent.*

Secured forever. *On the No. 983 block plane, Karl Holtey mills integral pins into the sole pieces to mate with the sidewalls. When finished, they'll be peined to secure the assembly permanently, forming an incredibly rigid and powerful structure.*

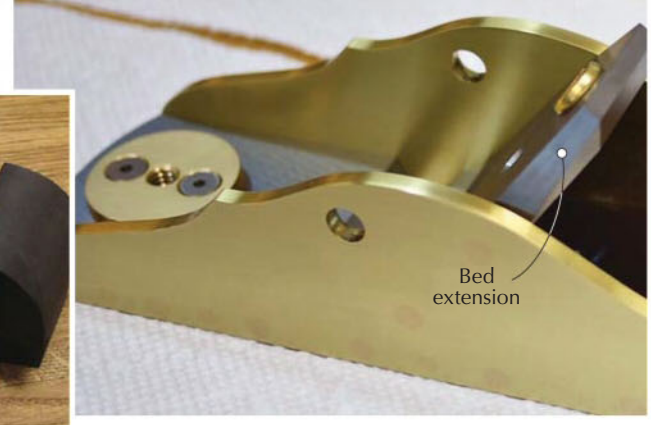
Monolithic Baby

Above all else, the greatest structural strength of today's custom planes is due to the methods and designs used to build their shells. There are two common methods used to join the sidewalls and soles, but fundamentally, each ends in a shell that's cold-forged into a single structure.

On more traditional infill planes



Bedded down. *The thick mouth block on my Daed Toolworks coffin smoother is riveted and peined directly to the plane's sole. The matched wooden portion of the bedding will be secured to the sidewalls with peined through-rivets on assembly.*



Real steel. *The bed extension in this Brese Winter Smoother is steel, and riveted directly to the sidewalls of the plane.*

Unmoved. *In order to mitigate the possibility of wood movement, Holtey uses a pair of full-depth brass posts to serve as the bed extension of his A1 plane.*

(where the shell's interior is entirely filled by timber), the sidewalls and sole are usually joined by a double-dovetail joint, while more modern designs often use a series of peined bolts or pins for joinery.

In either case, once fully assembled and peined, the results are often invisible and end in a singular structure which is irreversible and extremely strong and rigid.

The structural integrity extends also to the bedding. The most common bedding solutions include a thick "mouth block," which is generally joined directly to the sole with peined through-rivets. The bed is extended from the mouth either with wood or metal, which is in turn through-riveted directly to the sidewalls.

Stripped & Streamlined

To carry information from the cutting edge to the user's hand, vibration must be very carefully transmitted through a certain path, and in custom planes, that path is usually much simpler than a modern Bailey-style plane.

With no adjustable mouths, moving frogs and often no adjusters at all, there is simply much less opportunity for the lost rigidity and feedback that carry information to the hand.

Handled with Care

The greatest loss in feedback transmission in most Bailey-pattern planes comes from the totes.

I couldn't venture to guess how often

The art of work. *Subtle details, including texturing, chamfers and graceful curves, not only look beautiful, they have a significant impact on ergonomics. The Art Deco-inspired profiling on this chariot plane by Wayne Anderson is visually stunning, and the texturing gives the wedge and bun improved grips.*

Hidden strength. *In the traditional infill technique, the tenon of the handle extends all the way to the sole, as on this Sauer & Steiner K18. After fitting and shaping is done, two steel pins will run through the sidewalls, surrounding infills, and tote tenon for a stiff, permanent and invisible fit.*

It's a Brese. *This Brese plane uses custom-made two-part bolted brass lap hardware to secure the rear tote invisibly and securely.*

I've seen loose totes on old Stanley and Millers Falls planes – but I can tell you that it's epidemic by any standard.

Even when properly secured, the inclusion of a tote is often one of the primary points for reduced feedback in the plane if the mating and securing aren't carried out extremely well.

Where totes are employed, most modern planemakers mitigate the issue by attaching totes using methods that are much more secure and substantial than line-manufactured planes.

The technique of securing the tote is often one of the most interesting parts of a plane design – with many makers using extreme ingenuity and engineering to accomplish the task.

Unhandled with Care

A remarkable range of custom planes are designed with no tote at all, returning to once-ubiquitous coffin smoother designs, or using wedges (or even the blades themselves) as handholds to provide as much feedback as possible.

Generally, the tote is most important not on the cutting stroke, but on the return stroke – and it is usually only really necessary on larger and heavier tools. Many smaller designs, then, forego the tote.

The coffin smoother, a fixture of pre-industrial cabinetmaking shops, is still a thriving design in the custom-plane world, and with just a single chunk of wood between the blade and hand, its simplicity makes it a spectacular conveyor of feedback.

In fact, for many small planes I design the blade itself to be used as a handle – giving what I feel is the ultimate signal path for feedback.

Simple sensitivity. *There's no tote like no tote. Coffin smoothers are one of the oldest and most effective forms for sensitive planing. (This one is my design.)*

Blade runner. *On smaller planes such as my M2, I often make use of the blade itself as part of the handling strategy for the most direct tactile feedback possible.*

Summing Up (Up & Away)

As I've said, the pitch for custom planes from a need or cost-benefit stance is a non-starter. They're simply not significantly better at core performance than today's best mass-manufactured planes. Their highly tuned, feedback-friendly and lovely designs, though, will still always have appeal to some woodworkers.

There's no denying that for me – or rather, my son – there is no objective need for a 1,600-horsepower impulse-propulsion jet pack. The minivan, bicycles, skateboards and the occasional plane ticket get us everywhere we will ever need to go. But that doesn't mean that I won't be saving every penny for the day the Google jet pack gets released. I will.

Because for me (I mean my son), the appeal of a cutting-edge device that raises the hairs on the back of my neck in use – or even just lets me drop water balloons on my neighbors – is well worth the expense.

Now please – turn the page before I start ranting about what I spend on wood. **PWM**

Raney is an infill planemaker and woodworker at Daed Toolworks (daedtoolworks.com); his shop is located near Indianapolis, Ind.

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/dec15**

WEB SITE: *Visit the author's web site.*

ARTICLE: *"Test-driving Exotic Infill Handplanes," by Christopher Schwarz.*

WEB SITE: *Visit the web sites of the other makers featured in this article: Sauer & Steiner Toolworks; Holtey Classic Handplanes; Anderson Planes; and Brese Plane.*

IN OUR STORE: *"Handplane Essentials," by Christopher Schwarz.*

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Japanese Sliding-lid Box

BY CHRISTOPHER SCHWARZ

This clever and simple piece is great for storing tools, toys or a kimono.

While picking though a table of vintage Japanese tools for sale in 2013, I spotted this sliding-lid box under the vendor's table; it was blackened by age, soot and rust. Despite its scars, however, the box was still graceful and functional.

The owner, a Japanese carpenter, wouldn't part with it. But he let me measure and photograph the piece both inside and out so I could make a respectable version for myself.

The carpenter said it was a toolbox, and it would indeed fit a small kit of tools. But other experts in Japanese furniture said it was more likely a generic storage box that could be used to hold anything – wooden Tupperware, if you will.

The original was made using Douglas fir. For this article I made versions in both vertical-grain fir and Port Orford cedar, another wood preferred by Japanese joiners. The biggest chal-

LEAD PHOTO BY AL PARRISH; STEP PHOTOS BY THE AUTHOR;
ILLUSTRATIONS BY DAN PESSELL FROM THE AUTHOR'S MODEL

Make the socket. *Hand-cut finger joints are more demanding than dovetails. To ensure you are sawing square and plumb, first make several warm-up kerfs in the waste area before sawing the walls of the socket.*

A quick sweep. *A coping saw will quickly remove the waste in the socket. Then chop and pare the remaining waste away with a chisel.*

No measuring. *No matter how good a sawyer you are, every corner joint will be different. Transfer the shape of each socket onto its mating end piece using a knife.*

Flat & square. *Work to the baseline with a chisel. Take light cuts and confirm the end grain is flat and square to the faces using a square.*

lenge of the project was finding the dome-head nails. I settled on using No. 5 dome-head tacks (called "taiko byo") for Japanese drum making, though upholstery tacks with a head 1/2" diameter or smaller are a more economical choice. (Both choices are listed in the "Supplies" box.)

Construction is simple, yet achieving perfection is difficult thanks to all the small details. The corners of the box are joined by finger joints. Everything is reinforced by the dome-head nails.

Finger Joints

The finger joints at the corners of the carcase are quite large. This makes the layout simple, but the execution a challenge. I first laid out and cut the single socket on the side pieces, then transferred that shape to the ends to cut the single pin.

Don't forget that the sockets are 5/8" deep in 1/2"-thick material. This creates an 1/8" overlap at the box's corners and creates nice shadow lines.

After sawing the socket on the side pieces, remove the waste between with a coping saw and a chisel.

After sawing all the sockets, transfer their shapes to the end pieces to cut the single pin on the end of each end piece. To ensure the baseline of the side pieces is mated perfectly with the ends, tack a wooden ruler to the baseline of each side piece. This makes the transfer process foolproof.

Cutting the single pin on the end pieces is a chisel challenge. Saw and cope the waste. Then use a chisel to level the end grain. A square and a little patience will pay off.

Now fit the joints together. If you have never cut finger joints by hand before, read this next sentence with care: Hand-cut finger joints have to be assembled like dovetail joints.

What does that mean? You can't just hammer the end pieces down into the side pieces. Unless your sawing was perfect – 90° in all directions – they won't go together easily, or at all. Instead, slide the end pieces into the side piece sockets to pull up "one way." This might sound confusing until you cut the joint. But it's really no different than realizing that the tailboard and pinboard of a dovetail joint go together in only one way.

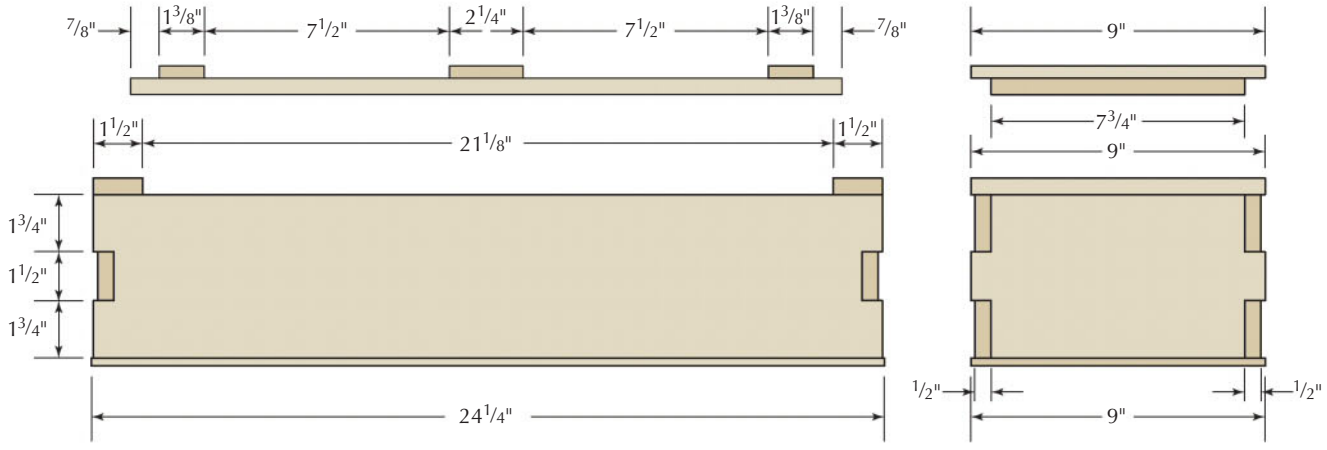
The last bit of work before assembly is to chisel a 1/16" x 1/16" chamfer on the corners of the finger joints. Lay out the chamfers in pencil, then use a chisel to remove the pencil lines.

Assemble the Carcase

The original box was unfinished – its surfaces were left straight from the plane. Even if you want to apply finish to your box, the overlapping joints at the corners will make cleaning up glue squeeze-out difficult.

So the best thing to do is tape off the joints so that glue squeeze-out will end up on the tape. This takes only about 10 minutes and makes a world of difference.

Also, I use liquid hide glue, so clean-



ELEVATION PROFILE

Japanese Sliding-lid Box

NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑ 2	Sides	1/2	5	24 1/8	Port Orford cedar
❑ 2	Ends	1/2	5	9	Port Orford cedar
❑ 1	Bottom	1/4	9	24 1/4	Port Orford cedar
❑ 1	Lid	1/2	7 3/4	21 3/4	Port Orford cedar
❑ 2	Small lid battens	1/2	1 3/8	9	Port Orford cedar
❑ 1	Large lid batten	1/2	2 1/4	9	Port Orford cedar
❑ 2	Case battens	1/2	1 1/2	9	Port Orford cedar

"Water which is too pure has no fish."

—Ts'ai Ken T'an
from "Vegetable Roots Discourse," compiled by Hong Zicheng

up is easy, even if the clamps prevent you from scouring every nook and cranny. After the clamps are off, a little hot water and a toothbrush can remove remaining bits of glue.

After the glue has cured, remove the clamps and the tape, then add the dome-head nails. The drum nails have a thin shank that is square in section. While you could drive these in without a pilot hole, I prefer to bore a 1/16"-diameter pilot hole for each nail to prevent its shaft from wandering.

As you can see from the photos below, the nails on the side pieces are not centered; they are "cheated" a bit toward the top and bottom to add holding power to the joint. Drill each pilot hole 1/2" in from the long end of each side piece. The nails through the end pieces are centered on the pin.

Now add the battens to the case that will capture the lid. These battens are glued and nailed to the ends.

Add the Bottom

The bottom of the box is thin, nailed on and overhangs the assembled carcase just a tad. Plane up the bottom piece, then attach it to the carcase with

Tape & clamp. *Painter's tape protects your planed surfaces from glue. Clamps press the corners tight.*

Decorative security. *These dome-head nails don't hold as well as a cut nail, but they do add strength and prevent the wood from getting scuffed.*

Here's the point. *To prevent the battens from sliding around, drive the dome-head nails into each batten so the tips protrude just a bit. Add the glue. Then press the batten in place. The tips of the nails will prevent the batten from sliding.*

Look close. *The 2d brads are angled just a bit to add some wedging action. This keeps the bottom on through years of service.*

2*d* headed nails (1" long). I used cut brads. Again, a 1/16" pilot hole is good insurance to prevent the nails from wandering.

The other detail about these brads is that each one is angled a bit – about 7° – to wedge the bottom on the carcase. This is sometimes called "dovetailing" your nails.

After driving the brads in, set the heads 1/32" below the surface to prevent the heads from scratching up a nicely finished tabletop.

Make the Lid

The lid slides and locks thanks to the battens that are fastened to the lid and the carcase. The dome-head nails alone do not offer enough holding power, so the three lid battens also are screwed to the lid.

I used 7/8" #4 roundhead screws to attach the battens from the inside of the lid. I chose roundhead screws because their heads' shape mimicked the shape of the dome-head nails.

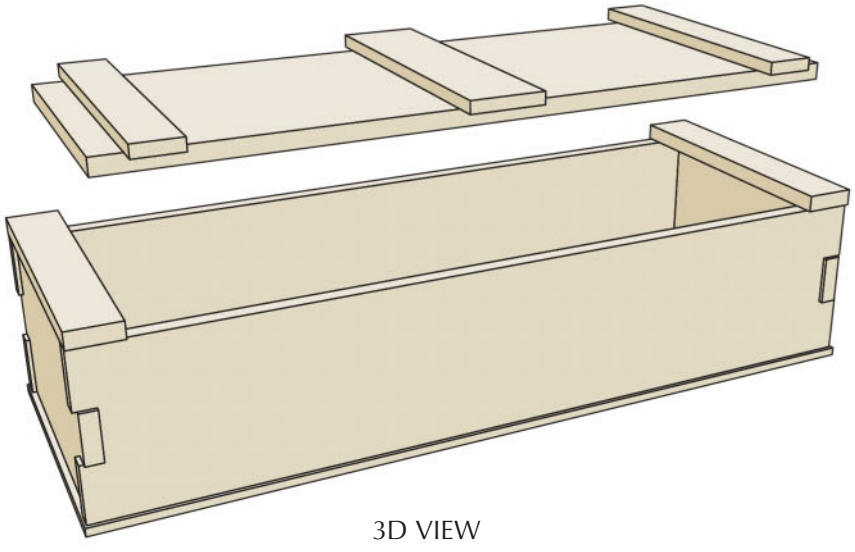
Reinforcements. *The screws ensure the battens won't come loose years from now. My stock is perfectly quartersawn, so there isn't much of a concern with wood movement. If your lid will move a lot, you might want to ream out the screws' clearance holes in the lid to allow for movement.*

Screw the lid to the battens – two screws per batten – then flip the lid over and add the dome-head nails. Note that the dome-head nails are located a bit more toward the center of the lid than the remainder of the nails on the box. I put them 1 1/2" from the ends of each batten.

Add the pull to one end of the carcase and the box is complete. I left my boxes unfinished, though you could add a coat of wax to the exterior to give it some protection.

While the boxes look nice and crisp now, I look forward to seeing them in 20 years when their scars will make them look even better. **PWM**

Christopher is the editor at Lost Art Press and the author of "The Anarchist's Design Book."



3D VIEW

SUPPLIES

kaDON
kadon.com

1 ■ #5 taiko byo (tacks)
$115/1,000

Van Dyke's Restorers
vandykes.com or 800-237-8833

1 ■ burnished brass tacks
#02362511, $7.99/100

1 ■ shiny nickel tacks
#225060, $10.99/100

Tremont Nail Co.
tremontnail.com or 800-835-0121

1 ■ 2*d* standard brad
#CRB2, $23.47/1 lb. box

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

2 ■ tansu steel handles
#00D55.50, $7 ea.

Prices correct at time of publication.

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PLAN: *Download a free SketchUp model of this project.*

WEB SITE: *Learn more about Port Orford cedar.*

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Toshio Odate

BY JOHN KELSEY

As the twig is bent, so grows the tree.

In his unusual life, Toshio Odate, now 85, has not only stepped from one continent and culture to another – from rural Japan to urban America – but also from one historical epoch to another, from the feudal era to modern times.

Along the way he became a skilled wood craftsman trained in the old ways, then a student, artist and thinker participating fully in the art movements of the late 20th century, and finally, a teacher.

And in a way, Odate has traveled full circle because he came to understand in the middle of his long life that he has a unique responsibility to represent Japanese craft traditions to Westerners. To demonstrate and teach; to write books and magazine articles; to be photographed working; to explain not only what he is doing, but why and most important, why it matters.

Full circle because Odate's sense of responsibility, yea of moral duty, comes directly from those feudal craft traditions he absorbed as a boy.

"Absorbed," hah – as he recounts in his second book, "Making Shoji" (Linden, 2000), the traditions were beaten into him by a fierce master.

An epochal passage might take a human culture several centuries of war and revolution, whereas this infinitely resilient man has done it in a single lifetime.

Today, Odate seems comfortably at ease in each of his roles, even as he now lives much as he began: a modest shokunin who starts the day by making tea and rice on a wood-burning stove, looking out at his garden.

The new world. *The young Toshio Odate teaches modeling in clay at the Brooklyn Museum Art School in 1960, two years after arriving in America.*

Mystery inside. *Odate was working in a commercial cabinet shop in the 1960s and drew inspiration from new materials he saw there. This piece, Blue Island Monarch, is from 1965.*

To appreciate Odate, one must start with the Japanese craftsman, the shokunin.

"A craftsman, from the bottom of his or her heart, is to serve society. Every profession has social obligations and responsibilities. The craftsman's social responsibility is to fulfill society's demands as best they know how," Odate has written.

From this perspective, though the craftsman and the artist each play an equally worthy role in society, one difference is critical: "Unlike craft, society does not ask the artist for what it needs. The artist's social responsibility and obligation is to find a valid concept and execute it, then share it with society… whether society likes it or not."

Stages of Growth

To understand Odate, one might see that his life has been divided into three stages, each marked by a gut-wrenching transition:

- Boyhood, apprenticeship and education in old Japan, culminating at age 28 with the opportunity to spend a year abroad as a two-way cultural ambassador, then to return home and teach what he had learned.
- The young shokunin/designer tastes freedom in New York City, then bathes in it, fulfilling his secret dream of becoming an artist and declines to return home. Along the way, he raises hell, makes many friends, marries and divorces twice, and has a son.
- After 20 Bohemian years, the mature sculptor and Pratt Institute professor of modern sculpture realizes that because of his unusual life, he has a moral obligation to teach Westerners about traditional Japanese craft. The focus of his attention and the direction of his career changes dramatically, and with it, his art practice.

Today, despite his age, Odate continues to be a man in a hurry who is still on his life mission. He's always planned to live to 100, and despite recent illnesses, there remains much to do. In his quiet, steady and inexorable way, Odate gets on with it.

Getting to America

Toshio Odate was born in rural Japan in 1930 during the run-up to the Second World War. Following the atomic flashes that leveled Hiroshima and Nagasaki, postwar Japan fell into chaos and hardship.

> "Making money, or not, from the work has nothing to do with the work of being an artist. Craft is a servant. Art is a volunteer."
>
> — *Toshio Odate*

The young Odate found himself training for a year as a welder in a shipyard, then another year learning how to sand-cast molten metal, then at age 16 apprenticed for five years to a woodworker who specialized in sliding doors (shoji) and household furniture.

But through all that, the young craftsman sneaked away at evening – at first without his master's knowledge, and then against his master's wishes – to attend high school then university, where he studied industrial and interior design.

"To my master, too much thinking theories, not enough doing," Odate recalls. "My master was right to be afraid that I would become like that, but I was driven."

Did it matter that he was apprenticed to his own stepfather, who from the first moment treated him not in a fatherly way but as the flinty samurai, disciplined and stern? It must not have been easy for his poor mother, and Odate writes movingly about this period of his life in "Making Shoji."

Because he already had acquired unique knowledge and skills, in 1958 Odate was chosen by his professor to be a cultural ambassador for postwar Japan, sent to New York to study and teach. He was expected to stay only a year, then go on to Denmark to study Scandinavian modern furniture design and production, then return to Japan and teach.

But how you going to keep them down on the farm after they've seen New York? The young designer was gobsmacked by the Bohemian freedom that beckoned in Greenwich Village – "Nobody care what I do!" – and he bolted from his pre-ordained path.

Odate found he could make a living as a commercial woodworker, while continuing to teach industrial design and modern art.

Meanwhile, he jumped headlong into the art movements of the day, carving monumental abstracts in wood.

At first he made assemblages, but soon began to carve whole logs, implying mysterious interiors by gluing brightly colored Plexiglas disks onto end-grain stubs.

PHOTOS BY LAURE OLENDER EXCEPT WHERE NOTED;
YOUNG ODATE PHOTO, PHOTOGRAPHER UNKNOWN; BLUE ISLAND MONARCH PHOTO BY TOSHIO ODATE

The inspiration for that came, he acknowledges, from the then-new Formica countertops he had encountered in the cabinetmaking trade.

By the end of the 1960s, abstract sculpture felt like a sterile dead end and Odate fell into a deep depression, sustained mainly by the energy of his students. He briefly shifted focus to construct geometric sculptures made of fiberboard and plastic resin, but seeing his work alongside commercial airliners on the one hand and Hollywood model-making on the other, made that too seem pointless.

In 1968, he closed a one-man gallery show by destroying the work and turning instead to conceptual art – ideas that didn't have to be made.

In Odate's mind, that meant ideas which could not easily be constructed – such as a plan for a giant polyhedron that changes into another polyhedron in a strict geometric order while suspended almost four miles above the George Washington Bridge.

Odate described these conceptual sculptures by writing detailed specifications using stick-on letters on large Plexiglas sheets.

In 1969, he conceived and began "Toshio Odate's Collection Project," consisting of objects that were meaningful to him (electrical insulators, flatirons) that he separated from the world by preserving them inside clear plastic boxes, with written descriptions of the artist's relationship to each.

The project was to continue to the end of his life, when his own corpse was to be sealed inside a plastic box. But life intervenes: a big move from Brooklyn to Connecticut, the birth of his son, Shobu, in 1975 followed by divorce, single parenthood, commuting to teach…projects evolve, and some fall by the wayside. Continuing the collection was just too much and it tapered away, though he still has the coffin-size box.

Echoes of Japan

Before 1970, Odate's sculpture had not referred in any obvious way to Japan.

But then it must have dawned on him that his origins would become his future, because when he was invited to join a major sculpture exhibition, he made a large freestanding traditional Japanese cabinet with sliding doors and cast bronze hardware.

The show was "Attitudes," opening July 27, 1970, at the prestigious Brooklyn Museum, featuring such luminaries as Donald Judd, Claes Oldenburg, Robert Smithson, Dale Chihuly and Wendell Castle.

What made Odate's cabinet notable was his photographs of the many people who somehow participated in building it.

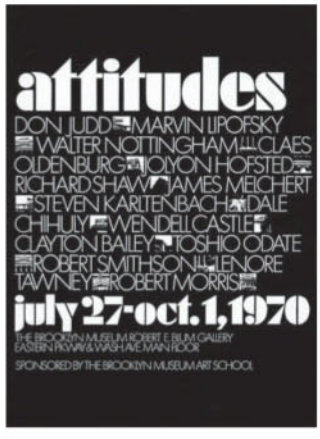
For the first time he drew heavily on Japanese aesthetics, and for the first time he made process, not product, the center of the work.

After 1970, once he had accepted his unique destiny, Odate became a tireless teacher and demonstrator of traditional craft skills, delivered along with passionate lectures about the responsibility of the craftsman to work well and ultimately to serve society by making what people need and request.

He even showed Martha Stewart how he makes shoji, in a charming video still available on her web site.

He wrote and illustrated his first book and, what to my mind, is his most far-reaching work, "Japanese Woodworking Tools: Their Tradition, Spirit and Use," first published in 1984 and still in print today (Linden). Despite great waves of Japanese culture that have washed across the Pacific, Odate's book remains the most authentic and detailed account available.

Any woodworker would find it a mesmerizing treat to watch Odate work. He is direct, precise and extraordinarily deft.



Peer review. *Odate found himself in good company in the "Attitudes" exhibition, which featured work by fine-art sculptors along with leading craft artists.*

Look homeward. *"To Make a Japanese Cabinet by July 27, 1970," also featured Odate's metalworking skills (above).*

Creative process. *By photographing each of the people involved in making the cabinet shown above – students, suppliers, helpers – Odate made process and community the center of his work (at left).*

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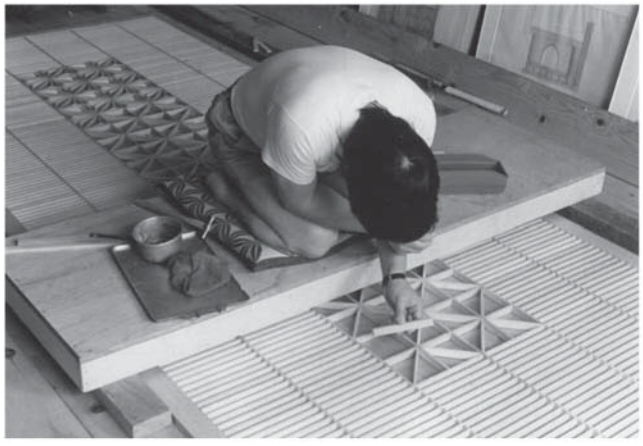


The traditional way. *Odate makes the decorative screen for one of his Peace sculptures in the 1970s. Now 85, the craftsman is no longer able to work kneeling on the workshop floor.*

He doesn't talk while he demonstrates; his concentration is so intense that he can't. Instead he saves explanations, remarks and questions for the moments between operations.

Odate explains his concept of "human nuance," how the craftsman's intention and emotions transmit through the tools to the wood, making each person's work subtly unique.

When he describes the conditions of his own apprenticeship, you realize how difficult being on display must be for him.

"It's totally opposite to here," Odate explains. "For the first year, the apprentice doesn't touch tools, just scut work. You couldn't stand and watch, you had to steal everything by peeking out of the corner of the eye with a beating if you got caught." Truly, it was learning by osmosis.

Odate continued his art practice, but this, too, changed. His sculptures became more expressive and more sharply meaningful, and Japanese themes began to emerge, not exclusively, but always appropriately.

His Melting Wood series warned people not to accept everything they see.

His Peace series of monumental sculptures, long in storage and now reassembled on platforms outside his Connecticut home, reflect Japanese techniques and aesthetics in the service of contemporary issues surrounding home and hearth.

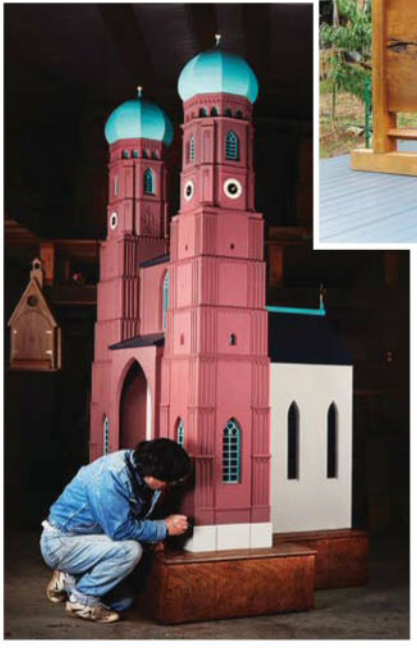
Odate's Votives series examines religious faith while taking a wry poke at contemporary values through churches and temples housing icons of prayer and desire – but these reliquaries are scaled so that you have to kneel to see inside.

And meanwhile, his concern with home and family comes to the fore in the form of an excellent cabinet to display dinner pottery near a massive dining table alongside powerfully sentimental montages made from the detritus of childhood.

Odate's son, Shobu, doesn't see anything unusual in his father having kept every pair of sneakers that Shobu wore

Homeward bound. *During the energy crisis in the late 1970s, Odate made his Peace series, explicitly Japanese constructions creating calming spaces. Homage to Professor Koike, 1980.*

Don't believe it. *Wooden Block Melting on Aluminum Plate, 1974, positioned Odate on the cutting edge of contemporary sculpture in wood.*



Scaled-down religion. *Odate's Votives series from the 1990s features scale models of places of worship.*

Still useful. *For Odate, almost anything can be raw material for his art. Sneakers was made in the 1990s.*

WORKSHOP PHOTO, PHOTOGRAPHER UNKNOWN; WOODEN BLOCK MELTING PHOTO BY ODATE

out as a boy. Odate made them into a sentimental and moving sculpture, a wall piece displaying the destroyed shoes in size order, as metaphor for his son's growing up.

Says Shobu, "He keeps everything, and he always knows where everything is. Then he makes it into amazing art."

Now 40 and married with two children, Shobu works as a pharmaceutical researcher, but Odate holds him close too, and Shobu often visits to lend muscle and encouragement to projects.

Thinking Ahead

The artist's career might look like a straight line with one work logically following the next.

Art doesn't work like that, and neither does Odate. In fact, he works on more than one piece at a time, and he is always thinking about what comes next, and what's after that.

He says that he somehow always knows when it is time to stop thinking and start building, and he always knows what log he will saw up, what long-hoarded materials he will use.

Along the way, Odate has had a long-running battle with oak, a wood about as tough as he is. This titanic struggle has included waiting for enormous logs to materialize, freehand chainsawing 11' slabs, tearing shoulders then returning to fight again another day.

At Home in Woodbury

At home in Woodbury, Conn., Odate lives a simple yet rich life.

He makes tea and rice on the kitchen wood stove, eats with chopsticks at a massive table that he made, surrounded by his own furniture and home improvements, useful pottery and small wall sculptures by Laure Olender, his third wife.

Olender, a photographer and filmmaker, met Odate when she sought out a traditional woodworking apprenticeship in Brooklyn. Along the way, perhaps following Odate's lead, she has documented her progress by collecting plane shavings, chips and sawdust and trapping them in frames behind glass.

In years past, Odate gardened extensively, kept chickens and relished the trout he caught and smoked from the nearby Pomperaug River. But recently he has turned his attention to building platforms over lawns for permanently displaying his own outdoor sculptures.

Odate's farmhouse is simple and rustic. He doesn't have a computer, though Olender does, and he doesn't have a smartphone, though he does enjoy bellowing into his landline.

Behind the house there is a deceptively complex structure that looks like an outsize garage, but inside it's a warren of spaces that includes a modern and fully equipped woodworking shop surrounded by parts and materials of every description, buried in sculptures and mementos.

The complex includes a small lean-to on one side of the building that houses a Japanese-style hand-tool woodworking shop that Odate uses for teaching, for photography and as a retreat where he can center himself.

Chisels, saws and planes are ranked on the walls in graduated racks. There's a narrow planing beam, low trestles that serve as a bench, and tatami mats where the shokunin kneels to work.

Not long ago he built a porch alongside the shop, with lovely sliding doors featuring his family's hanging wisteria crest.

Full circle, indeed. **PWM**

Worthy adversary. *Odate uses mirrors (not shown) and an inked line to guide him as he freehand cuts an 11' oak slab using a chain saw with a 7' bar.*

Comforts of home. *Odate begins each day with a mug of hot green tea, sitting at the massive ash table he made for his own kitchen.*

John is a retired publishing executive, a former editor of Fine Woodworking, *and an avid amateur woodworker currently cultivating a new interest in homegrown bamboo.*

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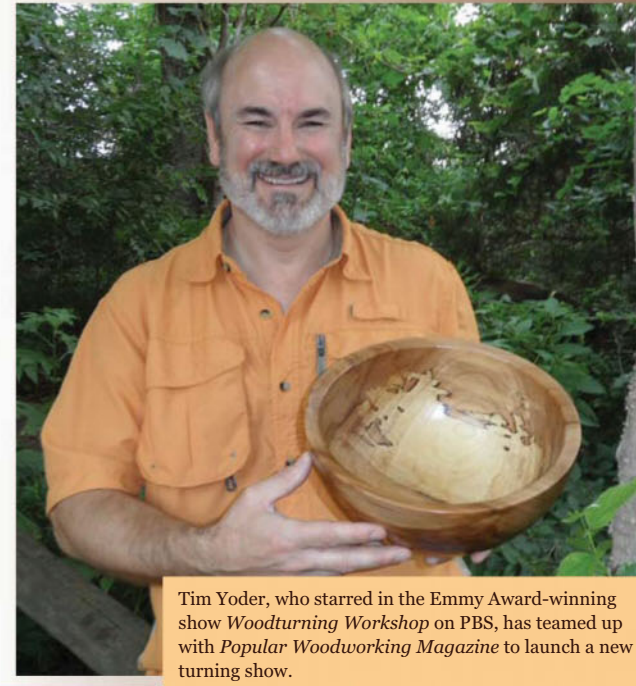

Tim Yoder, who starred in the Emmy Award-winning show *Woodturning Workshop* on PBS, has teamed up with *Popular Woodworking Magazine* to launch a new turning show.

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A Disappearing Favorite

Will our grandchildren ever get to work with lightweight, versatile ash?

My kids are often telling me that this or that toy is their favorite, but it seems that there are several that get this descriptor. Maybe they are rubbing off on me, but I find that I have more than one "favorite" wood.

As long as I have worked wood, I have worked with the local ash tree, in my case white ash (*Fraxinus americana*). In fact, the very first attempt I ever made was an axe handle, with a riven quarter of an old, dry piece of ash supplied by a neighbor.

The instructor in the night-school workshop looked at me like I had two heads when I brought in a piece of firewood and a spokeshave, and asked him to help me make an axe handle. I didn't go back to the next session.

After my aborted attempt at that first axe handle, I was lucky enough to meet up with several practitioners of what we called "green woodworking." As I began to focus at first on chairs, ash was a timber I often used.

Crush & separate. *The ash strips for these types of woven baskets are from pounding apart the annular rings of* Fraxinus americana.

Riven & turned. *This three-footed turned ash and cherry chair has interlocking round and square tenons.*

Straight-grained clear ash is a wonderful material. For Windsor chairs, ash is great for the spindles and bent parts; strong and flexible, it's well-suited for the task. For a ring-porous wood, ash turns remarkably well. Early New England chairs were often made with it; its light weight is a plus for the over-scaled 17th-century style.

Shock Absorber

While hickory is an all-time favorite wood for tool handles involving impact (such as axes and hammers), other tools can be well-served with ash handles. Its straight grain, high tensile strength and light weight make it an excellent choice.

It is these same properties that led to its once singular position as the wood for baseball bats. Early 20th-century bats were sometimes hickory, but as pitchers got faster, lighter bats became a must for getting around quicker.

Toward the end of the century, some hitters began using maple bats. I remember wondering about the shock factor in batters' hands – maple doesn't absorb impact like ash does. But I then realized that the heros of my youth were bare-handed hitters; a thing of the past.

PHOTOS BY THE AUTHOR

Shattered bats are no joke, and maple tends to splinter into jagged pieces, while ash breaks in a less exciting way. Recently, a fan in Boston was struck and badly injured by a shattered maple bat.

By now, we've heard a range of predictions about the future of ash trees in the United States, due to the infestation of the emerald ash borer. None of them are good.

I have a cover for one of my oilstones made from American chestnut. For many years, this little 3" x 8" scrap of was all I knew about this once-ubiquitous wood. Later, I ended up working some reclaimed chestnut during a furniture restoration project and got to work with some larger sections.

As I worked this chestnut, I thought about ash and baseball bats. When one of the most notorious uses for a wood is a fleeting and finite product so often broken, where will the "reclaimed" ash come from for our grandchildren?

I'd like to suggest that those who are inclined might pursue some work in ash with an aim toward making something with more lasting power than a big-league bat.

Pound it Apart

One of the most amazing uses of ash is as basket material. While the preferred tree for New England baskets is black or brown ash, the white ash will yield basket stuff, too. These woods have a unique property that allows them to be pounded apart along the annular rings. The ring-porous nature is such that the spring, or "early," growth is quite fibrous and the summer, or "late," growth is more dense.

When pounded with a heavy maul or sledgehammer, the spring wood crushes, leading one annular ring to separate from the previous one. You can literally take the tree apart year by year. (It's not as easy with the brown, but in a pinch, needs must.)

I like to split a log open and produce billets I then pound apart, resulting in the "splints" that are woven into the basket's body.

Split. *Here's a section of an ash log that I've split into billets.*

Shaving billets results in some wasted material, but gets you many splints faster than pounding the whole log. It also means you can make baskets from part of the tree, and chairs, tool handles and other products from the rest of the log.

When I have pounded whole logs, I've been reluctant to use sections for chairs, because I've felt that the shock I've subjected the wood to might result in it delaminating later.

As I've been making basket splints lately, I've also rived out and shaved some rakes for my wife's garden. Lightweight ash works well for the head, handle and bows, but I used oak for the teeth.

We're so accustomed to plastic rakes these days that we sometimes lose sight of the fact that this can be an all-wooden tool. I like to have some of these wooden examples, figuring that I'm a woodworker, so I should take advantage of my understanding of this material.

Bust it Up

For the basket stuff, I make the billets about 1" thick, maybe 1½" wide. The length is whatever is practical, usually around 4' for me.

I carefully shave this section along the growth-ring planes, aiming to end up with an even layer along the entire growth ring on each wide face.

I then hold one end of the billet flat on my stump, and begin pounding with a 3-pound sledgehammer. Overlap each blow of the hammer with the previous one and work down the whole length. As you work, feed the billet along under the falling blows of the hammer.

Once you've worked your way down the whole billet, hang about 6" of its length off the edge of the stump, and give that a good solid whack. The growth rings all will begin to spring apart.

Keep shifting the billet out into space, and as you pound the unsupported section, it should delaminate

Pound. *Overlapping blows with a 3-pound sledge will begin to crush the spring (early) growth in ring-porous ash.*

And again. *Now smack the billet again, this time shifting the billet so the area you're hitting is unsupported.*

CONTINUED ON PAGE 53

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SUPER COUPON

5 FT. 6" x 7 FT. 6" ALL PURPOSE WEATHER RESISTANT TARP

LOT 69136/69248 69128/69210/953 shown

SAVE 57%

Customer Rating

$2.69 comp at $6.38

33818271

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WOW SUPER COUPON

12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW WITH LASER GUIDE

SAVE $264

NEW

LOT 61776/61969/61970/69684 shown

CHICAGO ELECTRIC POWER TOOLS

$134.99 $194.99 comp at $399

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SUPER COUPON

50" CLAMP AND CUT EDGE GUIDE

PITTSBURGH

Customer Rating

LOT 66581

Tools sold separately.

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CENTRALPNEUMATIC

SAVE $349

Customer Rating

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$149.81 $179.99 comp at $499

33825082

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SUPER COUPON

3-IN-1 PORTABLE POWER PACK WITH JUMP STARTER

CENTECH

NEW

LOT 38391 60657/62376 62306 shown

Customer Rating

SAVE 33%

$39.99 comp at $59.99

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$99.99 $144.99 comp at $199.99

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SUPER COUPON

26", 4 DRAWER TOOL CART

US★GENERAL

Customer Rating

★ WINNER ★ – Truckin' Magazine

LOT 95659 shown 61634/61952

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SAVE $250

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SUPER COUPON

WARRIOR

29 PIECE TITANIUM NITRIDE COATED HIGH SPEED STEEL DRILL BIT SET

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SUPER COUPON

CENTRAL MACHINERY

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Customer Rating

LOT 62390/62520/60238 shown

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$59.99 comp at $126.47

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LOT 69675/69728 CALIFORNIA ONLY

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CONTINUED FROM PAGE 51

ASH & OAK GARDEN RAKE

There are many formats for traditional garden rakes; the ones I've been making have steam-bent bows that serve as braces between the head and handle. I shaved these bows to just over 3/8" in diameter and steamed them for a while to make them pliable enough to bend into a half-circle. I didn't bother with a form to bend these; they aren't as critical as bending stock for chairs.

I slightly flex the steamed bow by grabbing each end and gently limbering it, slowly increasing the amount I pull the ends inward. I watch the outer fibers to see if they are beginning to lift. If so, I apply pressure out there, usually wrapping my hand and forearm against the tearing fibers. Fast-growing ash bends better than slow-growing stuff; it's stronger too.

Once the bows have for dried a few days, I shave them down to fit through a test hole bored in a piece of scrap. When I have them shaved to size, I cut them to length and wind them through the two holes I've bored in the handle, then press each end into corresponding holes on the inside edges of the rake head.

I don't bore these holes all the way through the rake head, thinking that the bows' ends will press against the bottoms of those holes and keep things tight. That may or may not actually work. One could bore the holes in the rake head all the way through and wedge the bow's ends (as I do with the rake teeth).

I form the teeth for these rakes using a dowel plate. (I don't use a plate for most round joinery, but for rake teeth it works just fine.) I split white oak blanks and roughly work them down to just larger than the finished dimension, then drive them through the plate. The teeth are 3/8" in diameter and about 4" long.

After cutting the teeth to length, I drive them from the top through holes bored in the rake head, leaving about 1/8" or more protruding from the top.

That bit gets split with a chisel, then I drive in a wooden wedge from above. (Both the teeth and wedges should be dry stock.)

We're not farmers, and our garden plot is quite small. But for me, a rake like this is a pleasure to make and use. When I work a project like this, I feel a connection to history; it's one of many examples of tools made on the spot, in which the maker is also the user. —PF

easily. I often take the billet with an end in each hand and bend it across my knee. This helps loosen any growth rings still stuck to their neighbors.

I am always astounded at the ingenuity of pounding this tree apart, whether I pound the billet or the log.

I was once pounding billets of ash when my friend Brian came by and saw what I was doing. He remembered helping his grandfather pound splints when he was a little boy. His family are Mi'kmaq, the First Nations people of Atlantic Canada, and they used to make potato baskets and work the harvests in Maine. So he held and fed the billet while I swung the hammer.

After a while, he stopped me, and said, "You're doing it wrong – you're not yelling at me!" **PWM**

Peter has been involved in traditional craft since 1980. Read more from him on spoon carving, period tools and more at pfollansbee.wordpress.com.

Splints. *As you crush the softer spring-growth, a billet of will delaminate along its annular rings into "splints."*

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/dec15**

BLOG: *Read Peter Follansbee's blog.*

TO BUY: *"17th Century New England Carving: Carving the S-Scroll" (Lie-Nielsen).*

About this Column

ARTS & Mysteries

"Arts & Mysteries" refers to the contract between an apprentice and master – the 18th-century master was contractually obligated to teach apprentices trade secrets of a given craft (and the apprentice was expected to preserve those "mysteries").

Understanding Wood Finishing

Here are four things you need to know.

Finishing is not hard to understand. As I've pointed out in previous articles, it's made confusing by manufacturers who don't understand their own products, so they make up names and claims they think will help sell their wares.

The manufacturers who are most guilty of this are the ones who target do-it-yourselfers and small shops – you. Finishing will never make sense until you get past this mislabeling.

Here are the four basic topics you need to understand to make sense of finishing.

Oil & varnish. *Thinned varnish ("wiping varnish") is often sold as "oil." The way to tell which one you have is to let a puddle dry on glass or on the top of the can. If it's soft and wrinkled (left), it's oil. If it's hard and smooth (right), it's varnish.*

Oil Finishes

Oil finishes are very popular because they are easy to apply. The two common straight-oil finishes are boiled linseed oil and tung oil. Tung oil takes longer to dry than boiled linseed oil, but dries faster than raw linseed oil (which dries too slowly to be useful as a finish).

Tung oil wrinkles when it dries, even when all the excess is removed. To get a smooth result, you need to apply five or more coats, sanding smooth between each and allowing each to dry for two or three days in a warm room. Coats of boiled linseed oil can be applied every day and the results are always smooth when the excess is wiped off.

Both these oils can be combined with alkyd or polyurethane varnish in any proportion to make an oil/varnish blend. This blend might dry a little harder and be a little more water-resistant than straight oil, but only a very little because the application is so thin.

All these oils are applied the same way: Apply a wet coat, wait a few minutes, then wipe off the excess. Because these finishes dry soft, all the excess has to be wiped off after each application to get functional results. Therefore, you can't get a build that would be better at protecting against liquids.

Film-building Finishes

Varnish, water-based finish, shellac, lacquer and catalyzed finishes all dry hard so they can be built up to a very liquid-resistant film. Just as with oil finishes, these finishes can be thinned as much as you want, but then they will require more coats to reach an equivalent build.

Varnish is often thinned about half with mineral spirits and sold as oil! But it's still varnish, so it can be built up. This mislabeling causes immense confusion in woodworking circles.

Film-building finishes can be grouped into three categories by the way they dry: reactive finishes (picture them as Tinkertoys at a molecular level); evaporative finishes (picture them as spaghetti in a pot); and coalescing finishes (picture them as soccer balls with solid crosslinked cores).

Varnish and catalyzed finishes are reactive. Shellac and lacquer are evaporative. Water-based finish is coalescing.

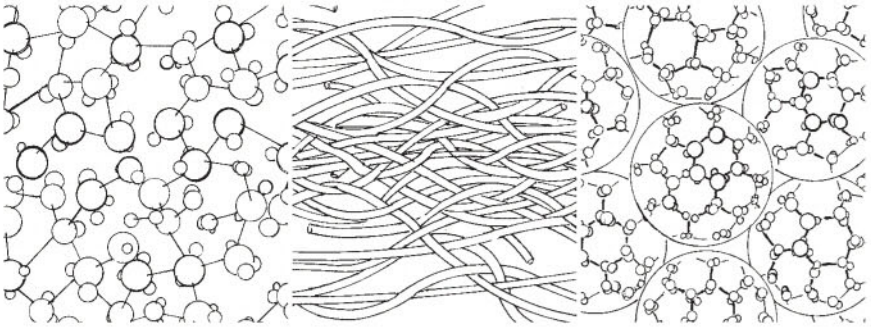
Reactive finishes dry by crosslinking – the sticks of the Tinkertoys connecting the solid resin molecules. This happens in varnish by contact with oxygen and in catalyzed finishes with the aid of the catalyst.

Evaporative finishes dry by the evaporation of the solvent. The long stringy molecules become tangled and hard like dried spaghetti in a pot.

Coalescing finishes, meaning water-based finishes, dry by the evaporation of water, followed by the evaporation of the solvent. As the evaporation progresses, the microscopic soccer-ball-like droplets coalesce and stick together, forming the film.

Reactive finishes form hard, heat- and solvent-resistant films because the crosslinking is so strong. Varnish

PHOTOS & ILLUSTRATION BY THE AUTHOR



Reactive, evaporative & coalescing. *Reactive finishes (varnish and catalyzed finishes) dry by crosslinking (left). Evaporative finishes (shellac and lacquer) dry by solvent evaporation (center). Coalescing finishes (water-based finishes), dry by both crosslinking and solvent evaporation (right).*

dries slowly. Catalyzed finishes dry fast like lacquer.

Evaporative finishes dry fast, but are much more vulnerable to wear, heat and solvent damage because there's no strong connection between the spaghetti-like molecules. These finishes are, however, easier to repair invisibly with the aid of heat or solvent, and they're easier to rub to an even sheen because the molecules can be separated so easily with abrasives.

Water-based finishes are in between. They dry slower than evaporative finishes, but faster than varnish. They are scratch-resistant (more like reactive finishes) because of the solid, crosslinked cores, but vulnerable to heat and solvent damage, more like evaporative finishes. Unlike the other finishes, they raise the grain of the wood, dry totally colorless, and they are less irritating when applying.

All these finishes can be applied with any finish-application tool.

Binder vs. dye stain. *The common stains you buy in stores contain a binder (linseed oil, varnish, lacquer or water-based finish). The binder limits your ability to make the color significantly darker, with the excess wiped off (left). This is in contrast to dye stains (right), which can be made darker with additional coats and the excess also wiped off.*

Stains

Two colorants are used in stains: pigment and dye. Pigment is solid colorant ground very fine. It settles to the bottom of a container and has to be stirred into suspension before use. Dye is a colorant that dissolves in a liquid.

The two large categories of stain are "binder" stains and dye stains. Binder stains are the common ones you find in stores. The binder can be linseed oil, varnish, lacquer or water-based finish. These stains can contain just pigment, just dye or both.

The two large categories of dye stains, which don't contain binders, are water- or alcohol-soluble powders, which you dissolve yourself in the proper solvent, and metal-complex dyes, usually already dissolved. Some are sold as concentrates for you to thin with water, alcohol, acetone or lacquer thinner. Others are already thinned with acetone, ready for spraying.

Unlike binder stains, dye stains can color wood as dark as you want by applying more coats or by using a higher concentration of dye.

The metal-complex dyes are more UV-light resistant than the powder dyes, but this is not significant on any object you want to last for more than a few years. Both types of dye should be kept out of sunlight or they will fade.

Solvents

Solvents, including water, are necessary for stains and finishes to work. Each finish and stain has one or more solvents that it can be thinned with. Sticking with commonly available solvents, it breaks down as follows:

- Oil and varnish – mineral spirits (paint thinner) or naphtha (which evaporates faster).
- Shellac – denatured alcohol.
- Lacquer and most catalyzed finishes – lacquer thinner or acetone (which evaporates faster).
- Water-based finish – water.

Solvents shouldn't be thought of as stronger or weaker. Each has its own corresponding finish or stain it works with. **PWM**

Bob is the author of "Flexner on Finishing," "Wood Finishing 101" and "Understanding Wood Finishing."

Pigment/dye binder stain. *Some binder stains contain both pigment and dye. The binder is most significant for determining the characteristics of the stain. The dye is only significant because it will fade in direct sunlight.*

ONLINE EXTRAS

For links to all online extras, go to:

- **popularwoodworking.com/dec15**

ARTICLES: *You'll find many free finishing articles on our web site.*

IN OUR STORE: *"Flexner on Finishing" – 12 years of columns illustrated with beautiful full-color images and updated, and "Wood Finishing 101."*

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Three Gold Coins

Passing up gold for a treasure with more lasting value.

The holidays are a time for visiting and catching up. While visiting my parents one Thanksgiving, my mother handed me an envelope.

I could tell at first glance that it was old. The acid in the paper had turned the envelope to a coffee-brown color.

"What's this?" I asked.

"Just open it," my mother replied in a low voice.

I turned the envelope over in my hands once or twice, then opened it up. There was only one item inside, also brown with age.

What I found was a savings bond—a bond purchased the same year that I entered this world.

Mom proceeded to tell me that the savings bond was a gift from my grandmother who had recently passed. Grandma had bought a savings bond for each of my sisters as well.

A Few Strings

This gift came with some instructions: My sisters and I were to use the savings bond to buy something to remember our grandma by. We could not use it to pay bills or spend it frivolously.

I put considerable thought into what I could purchase that would be a reminder of grandma.

After considering several possibilities, I decided that I would buy three gold coins. This would be something that I could pass on to my children or possibly grandchildren.

As I was about to pull the trigger and buy the coins, I hesitated. Something kept tugging at my thoughts. The gold coins would certainly meet the requirements that were given and the coins would certainly be beautiful to look at. Most of the time, however, the coins would be hidden in a box and only occasionally removed for viewing.

I don't think something that would be hidden from view is what my grandma had in mind, so I had to reconsider.

But what would fit the bill?

My younger sister bought a nice mahogany dining set. My older sister bought some furniture, but also purchased a computerized embroidery sewing machine.

My family has always worked with our hands, whether that was crafting, baking, sewing, blacksmithing or building things that we needed around the house or farm.

Maybe I could use grandma's gift to help me make things.

Up to this point, my woodworking skills amounted to a crude bookshelf and a table made of 2x4s and 1x12s.

Lifetime of Learning

I changed my course and bought some woodworking tools to see if I could improve my skills. I added some additional funds to my grandma's gift and bought a 6" jointer, 13" planer, a 16" band saw and a wood lathe.

After many years of learning (a lot of it by way of the school of hard knots), I have improved my woodworking skills.

My projects increased in complexity as my abilities grew, and have included blanket chests, a slant-front desk, a butterfly drop-leaf table and the Queen Anne highboy shown here.

I think of my grandma every time that I am in the shop and when I look at the things I have built.

I can definitely see grandma's smiling face when I look at the highboy—and I think she would be proud. PWM

Kenneth lives in Russellville, Ark., and has been building his woodworking skills for 15 years.

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