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April 2014 ■ #210

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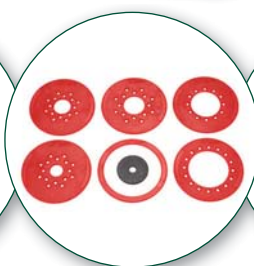
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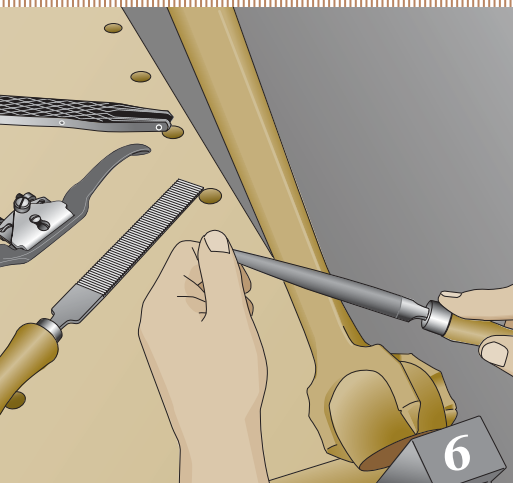
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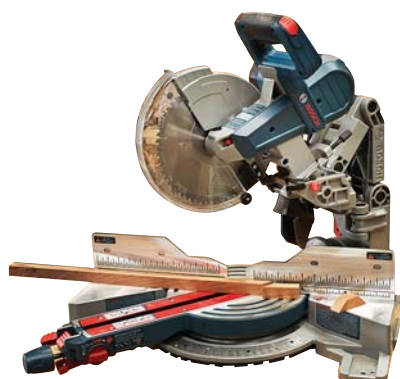
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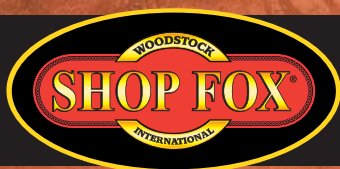
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End-user Expectations

The Victorian bed in which I sleep has been mine since I was 3 years old. It's incredibly high off the ground (40" following a recent pillow-top mattress purchase). At 5'6" (and headed toward the shrinking side of the aging curve), I have to climb into it. As a young (and short) kid, I used to get a running start and jump up onto the mattress (also useful in avoiding the gaping maws of the monsters I was sure were awaiting underneath).

My mother collects antiques. As a child, I spent far more time traipsing through antique malls and stores than I did in front of a television. (I amused myself by looking for hidden drawers in casework ... which I'm sure didn't sit well with the store owners.) While I no doubt complained about my early inculcation in design, it took fierce hold (and is now firmly entrenched).

So when, at age 8 or so, I asked my woodworker grandfather for a set of library stairs to help me get into my towering bed, I knew exactly what I wanted—because I'd seen pricey pieces on display many a time (and they were far too dear to even consider purchasing for a rambunctious kid).

I had my heart set on delicate three-step stairs that spiraled gently around a central post (treads inset with tooled leather, natch) — a post that I would grasp lightly while I gracefully ascended. (I wanted to live in a novel.)

But I neglected to pass my ideas along to my grandfather. I assumed he would know exactly what I meant by "library stairs." I was wrong.

My grandparents were not overly fond of antiques; their aesthetic embraced contemporary American design

trends of the 1940s-'70s. (And I'll note that their home was altogether more comfortable than the one in which I grew up—I was actually allowed to go in every room and sit on every chair and couch.)

So while I had one aesthetic in mind, the builder had another. Instead of graceful, delicate and fit for Emma Woodhouse, I got sturdy, practical and built for ... I don't know ... Harry "Rabbit" Angstrom?

Note: My grandfather also made plenty of pieces I like, such as a Shaker candlestand for each of his children (I'd however asked first was smart enough to

show him a picture), some lovely carvings (of which I'm lucky to have a few) and handy items, including the wooden handscrews and bar clamps I use at home in my shop.

Now, 37 years later, as the staff plans each issue, I find myself in the position of trying to read your minds and winkle out your furniture aesthetics. Are you more Bertie Wooster or James Bond? Scarlett O'Hara or Tom Jones (no, not the singer)? Eddard Stark or Dean Moriarty? (I still want to live in a novel ... and I assume you do, too.)

I suppose I could now make my own "ideal" library steps and share them with you—but how many of you need help to climb into your beds? And how many of you want to live in a Jane Austen novel?

Perhaps I should just build the Empire sleigh bed I've also long coveted—bonus: no room for monsters underneath. **PWM**

Megan Fitzpatrick



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Tools for Shapely Legs

I have plans to build the Queen Anne dressing table from the June 2010 issue of *Popular Woodworking Magazine* (#183). To shape the cabriole legs, I have the Shinto rasp that was pictured in the article, but believe that I still need a couple additional good rasps. I would like to purchase good-quality wood rasps that might make the job of shaping the cabriole legs a joy instead of drudgery.

Would you recommend the one or two tools that you think would make the most sense for the job?

Phil Akers
Holt, Missouri

Phil,
To shape my cabriole legs, the Shinto rasp is the only tool I use (along with an oscillating spindle sander for the difficult end grain of the foot's top).

While I do all the rough shaping with this one tool, some woodworkers use a spokeshave for the job. That's one tool to consider.

If rasps or rasp-like tools are the way you want to go, I do have a couple of tools to recommend that may make the work less of a chore.

A few years back, I purchased a set of three Auriou rasps. Of those, I use the 7" modeller's rasp far more often than the others—it's my rasp of choice to clean up rough cuts and to level small imperfections prior to sanding.

Another tool I'd take a look at is a float. These hand tools have come on quite strong in the past few years. Robert W. Lang, executive editor, is a proponent of floats, and I've been known to borrow one of his on occasion—it's on my short list of tools to buy. A float works more like a scraper as it flattens or shaves off material. It's great for mortise touch-up, too.

Again, these tools are not necessarily used just for shaping legs, but in my opinion, each would be a useful addition to your tool collection.

Glen D. Huey, managing editor



Where Glue Should Go

In the article "Cabinetmaker's Tool Chest" from the December 2013 issue (#208), Robert W. Lang writes, "Then I brushed liquid hide glue ... into the dados and on the end grain surfaces of the dovetails" Is he referring to the land between the dovetail pins, or on

the pin and tail end grain? If it's the area between the pins, I understand. The other area puzzles me. Please clarify.

Les Winter
Califon, New Jersey

Les,
I should have worded that better. I meant the end-grain areas between the pins and

tails that are in contact with other surfaces when the joint is together.

I often see the advice given that it isn't necessary to glue those surfaces because they are end grain and not as strong as a long-grain-to-long-grain joint. I've found that sizing the end grain surfaces in any joint makes for a pretty good connection after the glue has dried.

Robert W. Lang, executive editor

A Hearty Laugh

I thought I would send you a "well done" on Roy Underhill's article in the December 2013 issue. I think reading "Mechanical Marvels or Steampunk Sporks" was the first time I laughed out loud while reading a woodworking magazine. "Like brushing your teeth with a duck." Nice. It's also nice that you published something just for the benefit of the readers—no one is going to make any money off that article other than whatever you paid the author. I know *Popular Woodworking Magazine* does that regularly, and I appreciate it. Keep up the good work.

Bob Jones
Hernando, Mississippi

Little but Fierce Router Plane

I enjoyed your article on router planes, but you missed one of the mightiest router planes in the family. Lee Valley offers a Veritas miniature router plane (#05P82.01) that is only 3" wide, but looks just like its bigger brothers. I'm sure many see it as a joke, but it's an important and powerful tool in my woodworking arsenal.

I do a lot of inlay work in the style of early 19th-century Kentucky furniture makers, and the miniature router plane is the perfect tool for excavating the material for inlaying the vine and leaf ornamentation which was iconic in this area at that time—the plane iron is a scant 1/8"-wide.

David Hermetet
Lancaster, Kentucky

David,
You're right—even though I have that little plane, it didn't occur to me to include it

CONTINUED ON PAGE 8

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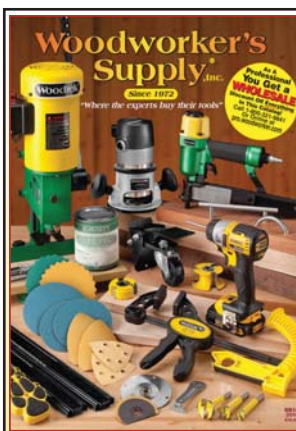
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in the article. While I've played around with it and it works, I've not yet used it on a project. But using it for inlay is an excellent recommendation—I'll give it try.

Note, too, that I wish I'd had more pages available; off the top of my head, I can think of at least 10 more uses for the router plane that I had no room to address.

Megan Fitzpatrick, editor

Stanley No. 92 Shoulder Plane

I'm interested in improving my hand-tool skills. I acquired a new Stanley No. 92 shoulder plane about a year ago, with which I am pleased. I'm quite uncertain, however, about an easy and quick way to set the exposure of the iron. When centered, the iron protrudes around 0.001" from each side.

I own a feeler gauge and a flat granite plate, but I need suggestions as to what is the best way to set the exposure correctly for right- or left-handed work. At what depth should the blade be positioned, and is there an easy adjustment method to adopt?

Russell Pitner
Hixon, Tennessee

Russell,
I'm afraid you might be over-thinking things. Just push the blade over tight to the sidewall. Yes, it will be ever so slightly skewed, but not enough to affect the joint. The joint has to close—not be measurable with a feeler gauge.

Sometimes our measuring tools paralyze us. Just use the plane until you get the hang of it.

Christopher Schwarz,
contributing editor

Two-part Epoxy or Spiders

I need to repair a 1940s dining-room table built in the style of Duncan Phyfe. As with many tables on which legs join a pedestal, the legs, which are attached with dowels, are spreading at the post. The joints had been repaired in the past. At that time, nails were driven through both the legs and dowels. The legs, however, are still spreading.

The dowels are 7/8" in diameter, and there is not much space left between

the dowel hole and the edge of the leg, so a larger-diameter dowel is not a possibility in this case.

As I understand, epoxy has better gap-filling properties than other adhesives. I hate to make a purchase without some guidance. Do you have any tips about using epoxy to repair furniture?

Ian Jay
Logansport, Indiana

Ian,
The first thing I would do is make dowels appropriately sized to fit into the current holes. (You could also drill the holes to a uniform size, so you don't have to make dowels to fit each opening.) Epoxy the dowels into the legs. I suggest an epoxy with a long open time, such as System 3's T-88 which attains tack in four to six hours. These epoxies are pliable when cured; quick-set epoxies contain catalysts that make them brittle when cured. Trim the dowels flush with the base and feet.

Into the plugged dowel holes, mark and drill for new dowels that are slightly smaller in diameter. This time use yellow or hide glue to make the new connection, so any future repairs are made easier.

To gain a bit more time and strength between repairs, you could purchase table spiders. Spiders are iron devices that screw or nail to the bottom of the legs and column to help hold everything together. They cost \$30-\$50 per spider, depending on the size. You would need one spider for each base. PWM

Chuck Bender, senior editor

ONLINE EXTRAS

Letters & Comments

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Highly Recommended

Here's a cheap and easy-to-find "tool" that should be in every workshop: paraffin. (Most grocery stores stock it in the canning section; for about \$3, you get a pound of the stuff).

I use it to: Lubricate screw threads and wooden pegs for easier seating. Wax the soles of planes, the plates of saws and other tools that slide through or on wood. Slick any surface on which wood slides—planer and jointer beds, the table saw's table, etc.

And no; none of these uses will interfere with your finish. — 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.



*The Classic Look
of Hand-Cut
Dovetails.*

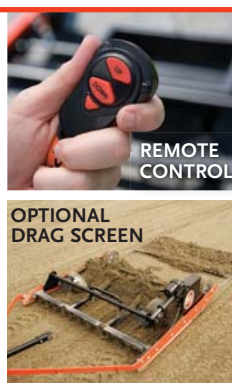


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THE WINNER:

Golf Ball & Socket Clamping Device

Occasionally while wood-working, we all find the need to work on tapered parts. But how do you hold those parts in a vise or with a clamp in order to do the work?

I saw a product in a catalog that used the age-old concept of a pivoting jaw mounted to a sphere to clamp a tapered piece. It occurred to me that I might be able to use some type of ball to make a similar device in my own shop. After careful consideration, I decided to try a golf ball.

At first, I considered cutting the golf ball in half to mount it to a block of wood using a screw, glue or both. Cutting a golf ball in half seemed rather dicey considering that some golf balls have liquid centers under pressure, so I had to find another solution.

I'm not a wood turner, but I recently saw a jig for turning a sphere where the ball was held in place by friction. The jig basically consisted of a piece of wood with a hole slightly smaller than the diameter of the sphere to be turned. The partially turned ball is jammed into the hole then turned to completion in the "jam chuck."

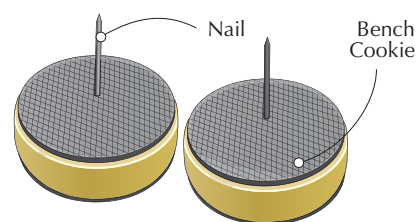
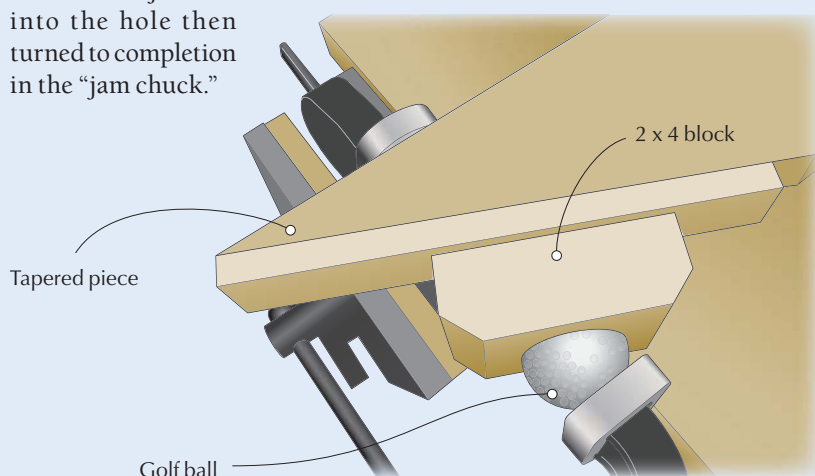
Taking the concept and applying it to my needs, I measured the golf ball and decided on the dimension of the hole that I thought would work best. I used a 1⁵/₈"-diameter Forstner bit to drill a hole 3/4" deep into a piece of 2 x 4 stock.

The golf ball was then pressed into the hole with a clamp. It worked like a charm to securely hold the sphere in place. I found that the resiliency of a golf ball is very forgiving. It held tight in the hole; no glue required.

To improve the grip of the jig, I attached a piece of #220-grit sandpaper to the back of the block using double-sided tape.

By putting together the two concepts—pivoting on a ball and holding the ball in a jam chuck—I came up with my version of a taper-clamping device. Now I'm more than ready to take on projects that require clamping tapered parts, or even compound-tapered parts.

John Cusimano
Landsdale, Pennsylvania



Anti-skid Finishing Aid

When finishing projects, I previously used Painter's Pyramids to elevate my work. With them, I could apply finish to both sides to save time. But one thing I noticed with the pyramids was that they tended to slide along my plywood finishing benches.

Eventually, I purchased Bench Cookies. The rubber padding on the disks stopped the sliding. They did not, however, provide the minimal point of contact like the pyramids, so I lost the time savings of finishing both sides at once.

My solution was to take a small-diameter drill bit and drill a hole through the center of the disk. (Because the core of the cookies is made of wood, drilling is easy and does not undermine the normal use of the cookie.) I then inserted a finish nail.

The nail gives me the same pin-sized contact point as the pyramids, and the great thing is that the nailed cookies raise the work off my finish bench, so I can once again finish both sides. When I'm finished, I remove the nails and the cookies work as originally intended. Who says you can't have your cookies and finish with them, too?

Adam Petersen
Sioux Falls, South Dakota

Glue Preserves

For PVA glue, I use a 4-ounce Rubbermaid container for both use and storage. Drill a 1/4" hole through the center of the lid for an acid brush, so you're ready to glue at a moment's notice. Only put what you need in the container for a few days' use, and it stays fresh.

Chuck Bender
Senior Editor

Broken Screw Repair

I was recently working on a wine rack for a customer when I over-torqued one of the small brass hinge screws. Of course, the head broke right off.

Usually I chisel around the broken screw and use pliers to extract the screw remains. This leaves a hollow under the hinge, and can sometimes damage the face of the project.

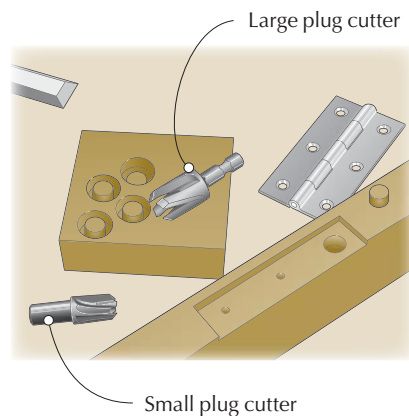
Looking for a better solution, I grabbed a $\frac{1}{4}$ " plug cutter (without a center pin) and cut a plug around the

broken screw. As I snapped out the plug, the screw remains came out, too.

The hole created by my $\frac{1}{4}$ " plug cutter is slightly less than $\frac{1}{2}$ " in diameter, so I simply sanded a plug from my larger cutter to fit into the hole.

Once glued into place, the plug can be flushed off with the bottom of the hinge gain. This leaves a solid surface below the hinge and doesn't reduce the strength of the hardware.

Jared Tynes
Savannah, Georgia



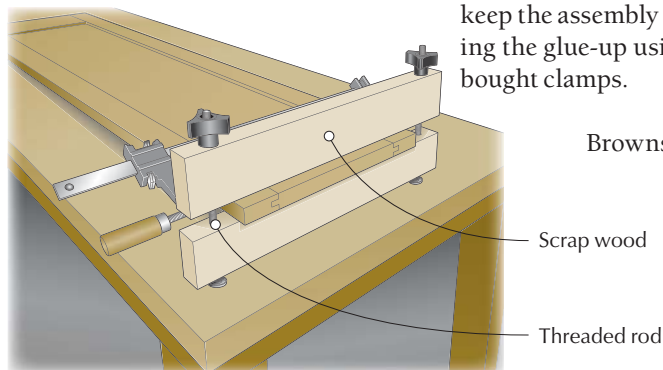
Parallel Clamp from Scraps

I have a small shop, and not a lot of clamps. When I'm gluing up doors, I

use two pieces of threaded rod and two pieces of scrap wood to make a parallel clamp that keeps the door frame flat.

My shop-made device allows me to keep the assembly flat while completing the glue-up using only two store-bought clamps.

Leonard Harrison
Browns Mills, New Jersey

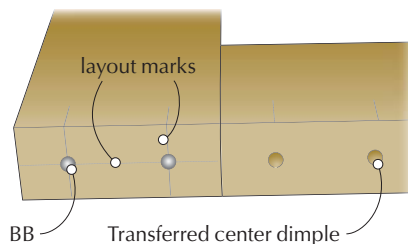


Dowel Center Ammunition

Here's an old-timer's trick I learned to accurately transfer dowel joint locations using BBs.

The process is simple: Mark the placement of the dowels for the joint on one of the two pieces being joined together, use a common center punch to provide a dimple that's used to seat the round steel balls, insert the BB then tap it into position with a hammer – you want the BB buried halfway into the board.

Align the mating piece of wood with the first, use clamps or firmly hold the two parts in place and strike one part with a dead-blow hammer. This ensures a clean dimple in the mating piece.



Drill the appropriate-size holes in both pieces (make sure to first remove the BBs) and you're ready to insert the dowels to complete the joint.

I think this is a versatile marking process that can be adapted to many applications. **PWM**

Fr. Chrysanthos Agiogregorites
Etna, California

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Each issue we publish woodworking tips from our readers. Next issue's winner receives a \$250 gift certificate from Lee Valley Tools, good for any item in the catalog or on the web site (leevalley.com). (The tools pictured below are for illustration only, and are not part of the prize.)

Runners-up each receive a check for \$50 to \$100. When submitting a trick, include your mailing address and phone number. All accepted entries become the property of *Popular Woodworking Magazine*. Send your trick by e-mail to popwoodtricks@fwmedia.com, or mail it to *Tricks of the Trade*, *Popular Woodworking Magazine*, 8469 Blue Ash Road, Suite 100, Cincinnati, OH 45236.



Bosch CM10GD Glide Miter Saw

Bosch does it again, only smaller, with its CM10GD Dual-bevel Glide Miter Saw. Like its big brother (the GCM12SD), this saw has a hinged-arm system that creates a smooth, gliding action when extending the saw for a cut. While the similarities don't end there, you will find some differences.

On the surface the 10" version looks identical to the 12" saw. Both share the same footprint, but the rotating table is smaller on the 10" tool. This probably won't impact the overall performance of the tool, but I like the large worksurface

on the 12" model. Occasionally on the CM10GD, with just the right size piece, it's easy to tip the work during a cut.

One feature from the 12" version I wish had made it to the smaller is the built-in stock support extensions. You can put the saw on a stand with shop-made stock supports, but it's nice not to have to take up the extra room.

The 10" miter saw is powerful and the glide mechanism is smooth and saves shop space. The detents are accurate and, with the addition of the crown and baseboard stops, this saw can do everything the larger version does for around \$50 less.

The most compelling argument for the 10" model is blade compatibility. Most of us have 10" table saws in our shops. The fact that I can buy readily available (and cheaper) 10" blades that



will work on both my miter and table saws is a huge plus.

Overall, the CM10GD is gutsy, easy to use with a glide mechanism that makes cutting effortless. The size is far less intimidating than the 12". The CM10GD dual-bevel glide miter saw could easily find a home in my shop.

— Chuck Bender

Bosch 10" Glide Miter Saw

Bosch ■ boschtools.com or 877-267-2499

Street price ■ from \$699

■ **BLOG** After cutting miters, learn the trick on how to glue and assemble them easily.

Prices correct at time of publication.

Senco FinishPro 23LXP Headless Pinner

Fasteners that use 23-gauge pins have been around for quite some time. What stands out with all 23-gauge pinners is the almost non-existent hole left behind. Senco's new FinishPro 23LXP headless pinner is a highly refined piece of work. Driving 23-gauge pins up to 2" in length makes this one versatile fastener.

The 23LXP is the culmination of Senco's evolution of its pin-style fasteners. Senco has been making changes to its pinners for some time now, and this latest version is the best yet.

If you compare the company's previ-

ous model, the FinishPro 11, to this new one, you'll instantly see some of the modifications, but other changes are less apparent.

Out of the box, you'll notice the head of the 23LXP is slimmer and more streamlined. With this change, you're able to get the tool into tighter places than you can the FinishPro 11.

The 23LXP drives pins as short as 1/2", and still manages to drive 2"-long pins—earlier models had a minimum pin length that began at 1".

A not-so-obvious feature is weight. The 23LXP is lighter by a few ounces, which causes less fatigue when using the pinner over long periods of time.

Another fatigue-fighting change is the handle. The earlier Senco fastener—as with many competitors' tools—has a straight handle. The 23LXP has an angled handle to make the tool more



comfortable to use, and it reduces wrist and arm strain.

Senco also increased the pressure range from a maximum of 90 pounds per square inch (psi) on the previous model to 120 psi on the new fastener. The FinishPro 23LXP has plenty of power to drive the longest pins in the hardest woods. And the pin hole remains nearly invisible.

— CB

FinishPro 23LXP Pinner

Senco ■ senco.com or 800-543-4596

Street price ■ from \$210

■ **IN OUR STORE** Learn how to use a headless pinner to build part of a Shaker Lap desk.

Prices correct at time of publication.

CONTINUED ON PAGE 14

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Calvin Brodie, Spanaway, WA



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Magnetic-mount LED Work Light from Lee Valley

I have a perfectly good light for my workbench, on an attachment that slips into the dog holes. And, it has a magnifier, which is becoming increasingly useful. However: My bench is against a wall, so the articulating arm of the light limits how it can be positioned, there's a pesky cord and it uses a fluorescent bulb, which hums when lit. Plus, I tend to smack my head on the light with distressing regularity—so it has been relegated to use only when I need magnification—or have a lengthy need for illumination.

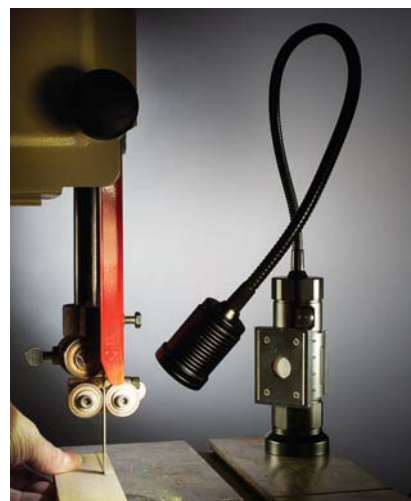
Instead, for many bench tasks I'm

now using the “Magnetic-Mount LED Work Light,” available from Lee Valley (#15J77.01), which is powered by three AA batteries. With the optional mounting plate (\$3.50) and $\frac{3}{4}$ " dog-hole post (\$2.50), I can affix it anywhere on my bench that I've a hole drilled for a dog or holdfast.

The magnet on the base of the light makes it easy to remove from the plate for use as a machinery light, too. Plus, it comes with a handy side-mount clip (you can see it in the picture) that attaches to any ferrous surface via a rare-earth magnet.

The flexible 18" neck makes it easy to position the (extremely bright) illumination precisely, plus the housing on the business end telescopes, allowing the beam to be focused in and out.

My one complaint is that, with continuous use, the three sets of batteries I tested lasted on average just a few minutes more than 5 hours, and my re-



chargeable batteries don't fit (a problem mentioned in the product instructions). So, if I'm planning a long session of dovetailing, for example, I revert to my plug-in light (and do my best to position it out of the way of my head).

—Megan Fitzpatrick

LED Work Light

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

Street price ■ from \$34.50

■ **BLOG** Read about the base Christopher Schwarz made to fit his 1" dog holes.

Price correct at time of publication.

‘Eye Muffs’ by Sells Safety

I know safety isn't a topic that evokes that “must read” feeling in most of us, but when something new and innovative comes along, you might just want to stop and take a look. That's exactly what Eye Muffs are – new and innovative.

When I work in the shop, my safety glasses and ear protection seldom remain tied together. The minute I take them off, they grow legs and run their separate ways. As a result, I often end up running equipment wearing one or the other, but seldom both. Eye Muffs solve that problem.

Over extended periods of time, I

also find it uncomfortable to wear both ear protection and safety glasses simultaneously. Eye Muffs combine the two into an extremely comfortable piece of safety equipment. Incorporating safety glasses into the headband of the muffs is a stroke of genius. The glasses are large and provide plenty of coverage. If you wear prescription glasses, Eye Muffs should easily fit over them without affecting comfort.

One of the things I dislike about most safety glasses is that they often have a “fish-bowl” effect where things at the periphery tend to appear curved, and that gives me a headache. This is not a problem with Eye Muffs.

If I have a complaint about Eye Muffs, it is that when I remove them and place them on a flat surface. I tend to put them back on upside down—colorful marking on the top of the muffs



would help instantly identify the top from the bottom.

Having worn the Eye Muffs in the shop on a regular basis, I'm struck by how comfortable they are. With personal safety equipment this comfortable, it's easy to forget you have them on – so there's no excuse for working unprotected. **PWM**

—CB

Eye Muffs

Sells Safety ■ sellssafety.com or
317-985-6757

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■ **BLOG** If you're the ear-plug type, read about a combination product just for you.

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Secrets from a Swan

Add graceful notes to your furniture with cyma curves.

The first sign of spring in northern Ohio appears while the wintry landscape is still cased in snow. Ice-covered lakes give way to patches of open water and along with it the arrival of migrating trumpeter swans. My wife, Barbie, and I celebrate the first glimpse of their majestic wings flashing white against the blue sky. Swans have been an inspiration for millennia and designers have taken cues from the swan's graceful form and interpreted it into countless objects from jewelry to furniture to architecture.

No doubt a biologist could expound on how the swan's neck is a perfect match for its wetland environment, yet this functional masterpiece takes a back seat to its sheer elegance of line. Designers in the 18th century played with a curved form to crown a doorway or cabinet that today is known as a swan's-neck pediment (also known as a broken-arch pediment). Regardless of your preference in furniture styles, this iconic composition holds a few valuable lessons about how to visualize and create a natural flowing curve. Just beneath the surface are some clues that can help your eye unpack a curved line.

Lessons from Design Tradition

This swan's-neck form shows up in countless variations—from a compact vertical crown atop a skinny tall case clock, to a broad horizontal form capping a library bookcase. It's also noted that some of the compositions are better than others. Some have a clunky mechanical look and lack a seamless flow between convex and concave curves (think 20th-century mass-produced "Early American" furniture), while others seem to sing from across the room with a sense of life and vitality.



Graceful curves. This graceful swan's-neck interpretation by Brooke Smith shows a mastery of the curved line.

While researching historical pattern books, I stumbled upon a drawing showing how to lay out the curves with just a straight edge and compass (page 18, top). I breezed past this drawing many times because the garish carvings drew my attention away from the simple layout behind the curves. This is one of the many layouts in historical design guides with no explanation in the text. The author assumed any artisan already knew it, or would grasp it with just the few clues hidden in the drawing.

After a closer look at this key, I understand how artisans were able to adapt a graceful swan's neck on a myriad of architectural and furniture forms.

To the informed eye this simple layout shows the artisan the three most important points to generate this large,



The inspiration. "Delight" is the word that comes to mind from this inspiration supplied by nature.

CONTINUED ON PAGE 18

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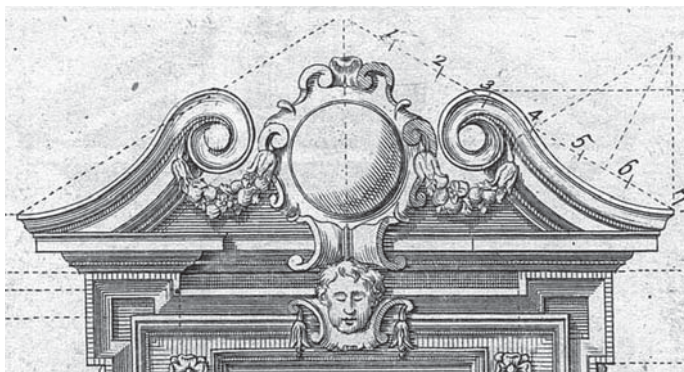
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by Barnes & Noble

Logic. This layout is not meant to be formulaic but rather to convey the simple logic behind the form.



sweeping compound or cyma curve. A cyma, or wave, is a complex curve that pairs up both the convex and concave curves flowing seamlessly together. The beginning point starts at the outer tip of the cornice flowing up from a horizontal plane.

This concave curve flows up to the second point where it transitions into the convex, which is also where the curved line crosses the diagonal on the layout. Finally, the cyma ends when the convex curve runs tangent again with a horizontal plane.

From that horizontal plane, the form may continue and flow into a volute, or terminate with a carved rosette (as shown in the opening photo), or simply turn a corner and return the moulding toward the rear of the case.

Aside from these practical layout points, this deceptively simple drawing also contains some valuable clues

to visualize and compose a pleasing cyma curve.

First note that diagonals are used as baselines for the concave and convex curves. Using a straight line as a reference helps the eye to quickly assess two important characteristics of our curves. First it helps us visualize how “fast” or “slow” our curves are. A fast curve is dramatic, the kind that might force you to hit the brakes so you can keep your car on the road. A slow curve is a gradual, gentler curve.

Differences in fast or slow curves are much easier to discern when paired together with a straight line. A straight line also makes it more apparent that the two curves often play off each other in a hierarchy, with the smaller minor convex curve complementing the larger major concave curve.

Pairing major and minor curves together brings a sense of naturalness to

the flowing lines, while pairing identical curves often appears static to my eye. This mirrors the way designers often organize rectilinear shapes into major and minor pairings to create harmony.

Finally, notice that the convex and concave flow seamlessly into each other without a hitch or a pause. In fact, at the transition point the two opposing radii touch and become one straight line.

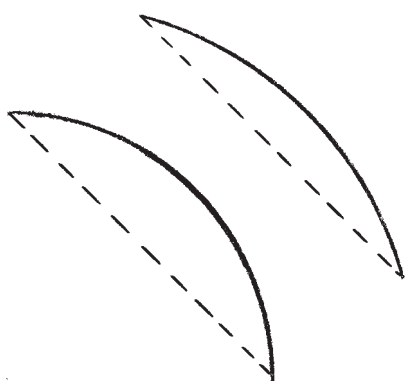
Practice Trains Hand & Eye

Once you comprehend that there is an imaginary straight line connecting the beginning and end of every cyma curve, you can unpack it. Regardless of whether it's a tiny profile on a moulding or a large swan's-neck pediment, the designs that I find appear most pleasing tend to combine major and minor curves, and contrast slow and fast curves.

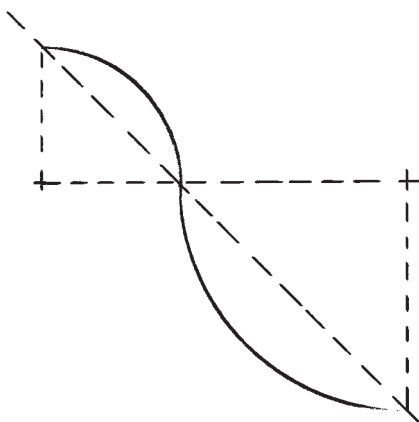
Practice drawing cyma curves with a compass combining slow, fast, major and minor. Then repeat the exercise, still using straight lines as a reference, but instead draw the curves freehand.

One bonus to this compass practice is that it spills over into your ability to draw fair curves freehand. This practice puts you one big step closer to the ability to judge and shape a fair curve with a spokeshave or rasp. **PWM**

George is the host of two design DVDs (Lie-Nielsen Toolworks) and co-author (with Jim Tolpin) of “By Hand & Eye” (Lost Art Press).



Fast & slow. One of these curves is “slower” (gentler) and one is “faster” (steeper). Comparing each curve with a straight line helps the eye perceive the speed.



The real thing. A true cyma curve will have a point at the transition where the two opposing radii touch end to end.

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Period Clamping Techniques

Did traditional workholding involve fewer gadgets?

In my fledgling years as a woodworker, I had a large collection of clamps. I literally bought in to the belief that you could never have too many clamps. I had pipe clamps all the way up to giant 5 footers. I had multiple F-style clamps, boxes of spring clamps and about a dozen wooden handscrews (with metal screws).

Several years ago, I reassessed my clamping needs, wanting to free up as much space as possible. To do so, I looked to period shops and inventories for guidance. I wondered how early shops handled the tasks that we do today – tasks that seem to require so many clamps.

Clamps & Period Practices

There is historical evidence that clamps made of iron and/or wood have been used since at least the 17th century (I haven't researched the topic any farther back than that). Several period texts and paintings speak of, or picture some kind of clamp. It is unlikely, however, that clamps as we know them were as heavily relied upon for assembly as they are in today's modern shops.

Traditional joinery, such as dovetails and drawbored and/or wedged mortise-and-tenon joints, assembled with traditional hide glue don't require the use of clamps for assembly. In fact, drawbored and/or wedged mortise-and-tenon joints can actually be assembled without glue (and frequently were in 17th-century joined work) and will stay together indefinitely. The mechanical connection of these joints imparts the primary strength. Glue is a secondary measure.

Modern joinery methods, such as biscuits, dowels and cope-and-stick joinery, have no such mechanical advantage. These joints rely on the glue



No clamps required. I assembled these two sample joints without glue several years ago. They're still just as tight as the day they were cut.

alone to hold things together, and need clamp pressure to keep wood-to-wood contact until the glue cures. Further, if the glue degrades, these joints will fail as a result.

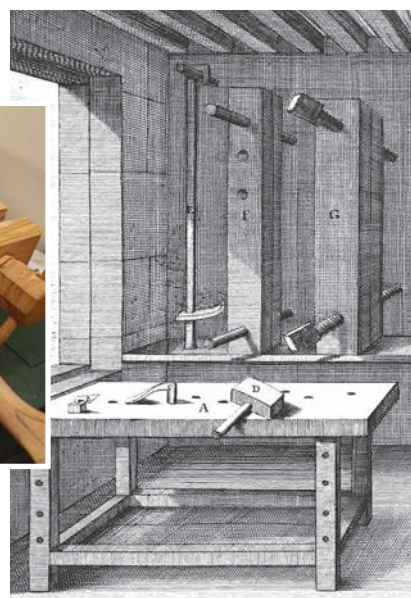
Types of Period Clamps

One of the more useful jobs of period clamps was holding stock while it was being worked. Wooden handscrews were one of the more common types of clamps used for this task. Some period handscrews are very similar to

a modern handscrew. In the wooden screw version, however, both holes in one jaw are threaded while the holes in the other jaw are oversized (the front screw pulls; the rear screw pushes). Modern metal handscrews use more complicated screws with threads that reverse direction half way down the shaft, and special left and right hand threaded nuts.



Félibien had it first. The "Moxon" vise (first shown in André Félibien's "Principes de l'architecture...") is a form of handscrew clamp with the screws on the same side. The later-style handscrew has the screws coming through the jaws from opposite sides.



CONTINUED ON PAGE 22

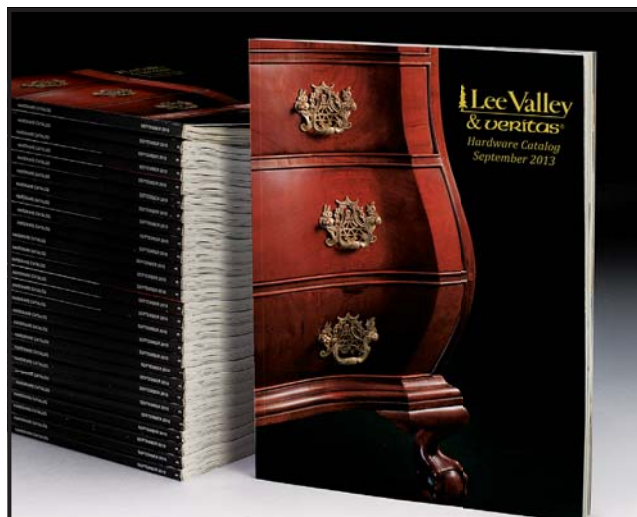


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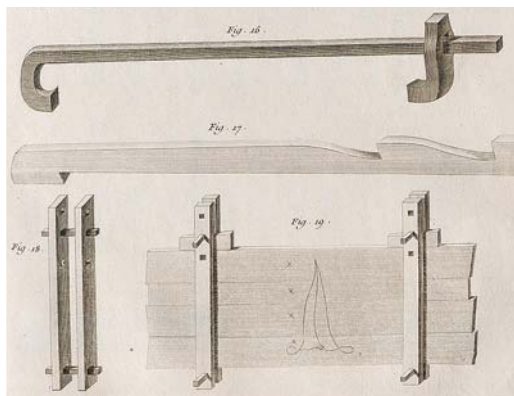
Benchless holdfast. The mechanics of these iron bar clamps are similar to those of a holdfast.

Handscrew clamps are fantastic workholding devices. Their design makes them capable of exerting enormous pressure. The jaws may be angled toward each other so they do a good job of holding tapered stock, too. By sawing a notch in the jaws, they can be used to hold round work. They can also be secured in a bench vise for holding awkward parts for shaping or carving.

Another common period use for clamps was to secure multiple boards in a wide panel while the glue dried. The simplest of these clamps was the iron staple or pinch dog, which is simply driven into the end of adjacent boards.

André Félibien and André Roubo both pictured another type of iron clamp in their books. These iron clamps are secured with a blow from a mallet and hold tight as a result of the flex and offset of the iron bar in the slightly oversized hole of the movable jaw. I bought a pair of reproduction clamps from Stephen Shepherd and blacksmith Mark Schramm (available at fullchisel.com) and they work surprisingly well. They're particularly good for tasks such as holding a frame together while transferring drawbore locations to the tenons.

Félibien and Roubo also show a simple version of a wooden panel clamp. It's nothing more than two boards connected by a couple of pins. The pins can be moved to one of several holes, depending upon the width of the panel. Pressure is applied by driving two opposing wedges between one pin and the edge of the panel.



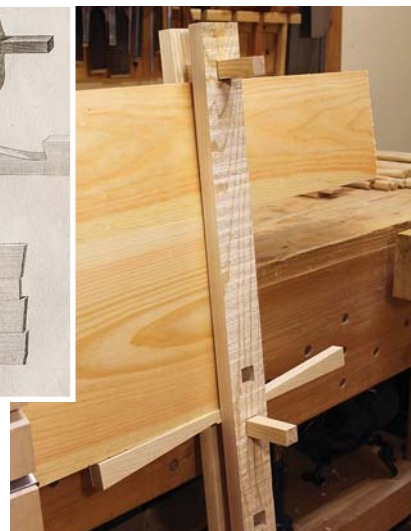
Give it a wedgie. Wedge-style panel clamps (shown here from André Roubo's "L'Art du Menuisier" and in my shop) are such a simple design. Who needs expensive commercial clamps?

I've also seen examples of a more complex wooden panel clamp in a painting of an early 1800s English joiner's shop, and the shops at Colonial Williamsburg have a few reproductions. There's a heavy wooden bar, with notches along its backside. A movable jaw is positioned by an iron loop that seats into the notches. At the fixed end is a wooden screw that applies pressure to the edge of the panel. The design is similar to modern pipe and bar clamps.

I've tried all of these period-style



Colonial pipe clamp. These wooden bar clamps would be right at home in most shops today.



clamps, and they work every bit as well as commercial clamps. I'm not sure that they have any significant advantages over modern clamps. The real lesson I learned by dumping all of my modern clamps and working with just a few period versions is that I really don't need clamps in as many situations as I once thought. Maybe you actually can have too many clamps. **PWM**

Read Bob's hand-tool blog and listen to his podcast at logancabinetshoppe.com.

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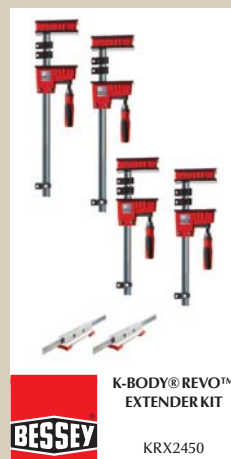
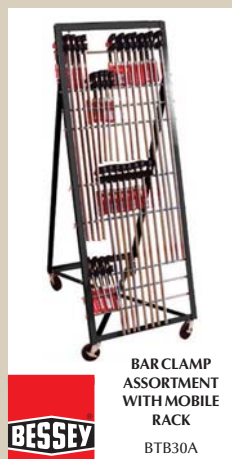
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William & Mary Chest

BY CHUCK BENDER

Mortise-and-tenon joinery and side-hung drawers make for a simple but impressive build.



Early in my career I met an avid antiques collector whose focus was objects from the William & Mary period. Like many people, my first reaction was, “That stuff with those big, ugly ball feet?” Under his guidance I began studying various periods of furniture and their corresponding decorative and fine arts. Learning about the furniture, metalware, paintings and other decorative objects from the periods surrounding William & Mary helped me to understand how crucial and pivotal this period is to furniture design and construction.

The more I looked at Pilgrim, Queen Anne and Chippendale furniture, the more I began to like the sheer simplicity of the William & Mary designs, including those “big, ugly ball feet.” After looking at countless examples, I no longer consider them big or ugly, and have come to appreciate the variety of designs.

The best thing about making a William & Mary chest of drawers is that it provides great skill-building exercises for the novice woodworker, yet enough challenge for an experienced builder. Whether you make ball feet (sometimes referred to as bun feet) is entirely up to you. This chest looks just as good with bracket feet as it does with bun feet.

The carcase is made up of two end frames with flat, floating panels that are joined with a few structural members. Once the case is together there are applied mouldings that dress it up. The dovetailed drawers are supported using an early method – side-hung drawer

runners. You may not have tried this technique before, but give it a whirl – you may come to like it more than other traditional methods.

Lay it Out

Even with a detailed computer model, the first thing I do when building any piece of furniture is make a layout stick. It helps me mentally build the piece before I've even selected the lumber. With a layout stick I can work out joinery problems before they become real, and I can double-check all my sizes because I'm drawing everything at full size. Plus, it helps identify the areas where I might need to pay particular attention.

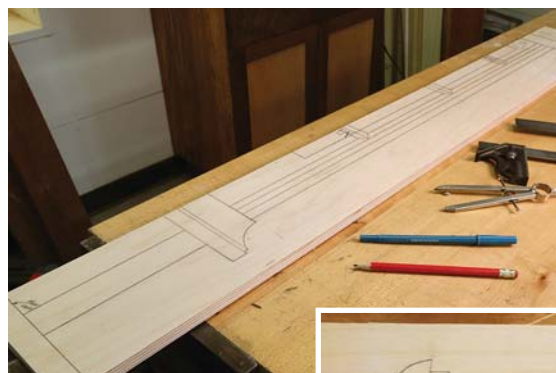
In case you've never heard of a layout stick, it's a simple sectional, full-sized mechanical drawing of each of the three views of a piece: height, width and depth. Occasionally, I'll do special detail layouts as well, but for this project a three-section view is more than sufficient.

Another great reason to use a layout stick is that once you've double-checked all your measurements, you won't need to use a tape or rule again during the construction process. Every time you measure, you introduce opportunities to cut things to the wrong dimensions.

Begin with a scrap of wood that exceeds the longest measurement on the chest, but is only as wide as necessary to draw the detail of a large part, in this case the width of a stile.

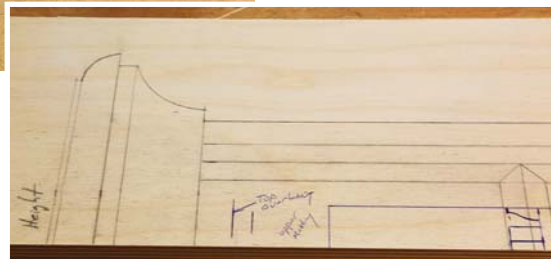
I begin with the height view by drawing a line that represents the floor, then I measure up and mark the overall height (here, that's $38\frac{3}{4}$ "). Measure down the thickness of the top and put a mark then do the same for the foot height, mouldings and all of the drawer blades. I also like to detail my layout sticks with moulding profiles and other pertinent details (parts that are hidden from view are represented by dashed lines).

It's best if you make your layout stick as detailed as possible – without making it confusing. Sometimes, if you try to include every detail, the sheer number of lines can become so overwhelming that you render the layout stick useless. A good rule is to include



Layout stick. Using a full-sized sectional layout helps you avoid errors and visualize potential construction problems.

Info needed. Put as much detail on your layouts as you need, but keep it understandable. I use different colors for each of the three views (below).



each detail on at least one view; everything doesn't need to be on all three. After the height layout is finished, I move to the width and depth layouts.

Figure it Out

My next consideration with any project is wood selection. This is particularly important when building anything with frame-and-panel construction. I like to use straight-grained or quarter-sawn material for the stiles and rails to visually outline highly figured panels – but that's not where the process ends.

Consider the visual balance of the individual pieces as well as how they will be part of a whole. I like to orient figure to give the piece a sense of symmetry and to draw the eye to various features.

This concept is particularly important when it comes to drawer fronts. If, for example, you're using curly or striped material, you don't want all the stripes angled in one direction because that would make your piece look as though it leans to one side.

While you can use highly figured material throughout an entire piece, that tends to visually homogenize the wood rather than accentuate the grain. When composing with wood, it's worth taking the time to get your

materials properly laid out before you start building.

Frame it Up

With your lumber milled to rough size, the best place to start is to make the frames for the case ends. Working directly off the layout stick, you can quickly and easily mark all your parts to final dimension. Joint the edge of your stiles and rails then take them right to the layout stick; if you line up the jointed edge with the appropriate mark on the layout stick, you can directly mark the width of the pieces. At the table saw, rip them appropriately.

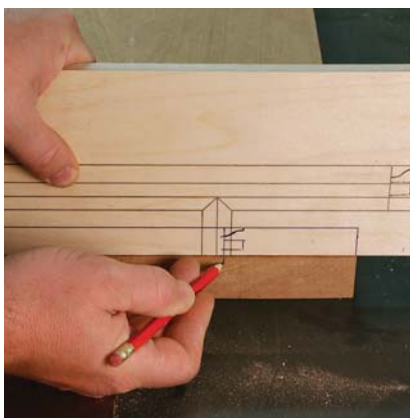
To cut them to length, square one end and use the layout stick to transfer the final length before you cut. Whether you're working with power tools or only hand tools, having a single benchmark (your layout stick) from which to mark multiple parts increases your accuracy.

Now that the stiles and rails are cut to size, I "stick" the edges of the pieces. ("Sticking" is the term used for running a moulded edge.) There are a couple of ways this can be done; I prefer a router.

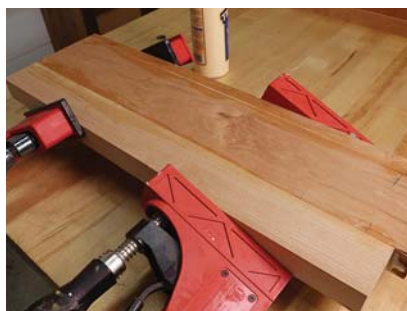
This chest has a cyma recta mould-



Figure match. Take the time to carefully lay out your materials to obtain optimal use of figured woods. Sometimes this means removing usable material to get the best match.



No measuring. Transferring dimensions directly from the layout stick to the material reduces the potential for miscuts.



Add a little. Sometimes the materials just don't cooperate. In this case, the lumber for the bottom rails wasn't wide enough. I scabbed on one strip that will be covered by the base moulding at the glue line, and another for the sticking, in which the seam will fall at the fillet.

ing along the edge of the stiles and rails. Most commercial router bits are too exaggerated to provide the proper look. But if you think of your router as a motorized version of a set of hollows and rounds, the moulding is easy to make.

Begin by sketching the profile onto the end of a scrap that's milled to the same thickness as the stiles and rails. If you're not good at drawing, use tracing paper and copy the profile from the drawings provided (on page 29). Whether you are using hollows and rounds or a router, you can benefit from cutting rabbets and chamfers to remove the bulk of the waste. This step helps ensure more uniform mouldings throughout.

Using an appropriate core-box or round-nose router bit, run the hollow portion of the cyma curve. To cut the convex or round portion of the curve, I find a shoulder plane easier to use to achieve the shallow arc than using a commercial router bit—a No. 6 hollow plane does the trick nicely as well.

After running the sticking, head to the table saw and use a dado stack to run a $\frac{3}{8}$ "-wide x $\frac{5}{8}$ "-deep groove for the panel in all eight frame pieces. The groove does several things; most importantly, it gives me a place to align my mortises, and it serves as a haunch on the inside edge of the frame parts.

The top rail tenons are haunched 1" off the outside edge; the bottom rails are

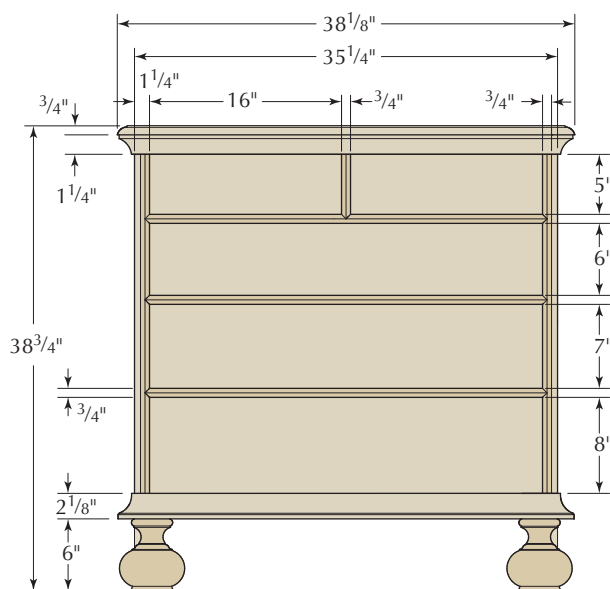
haunched at $1\frac{3}{4}$ ". With the mortises laid out on the stiles, grab your favorite $\frac{3}{8}$ " mortise chisel (mine fits into a hollow-chisel mortiser) and chop them. Once you're set up, it makes sense to cut all your mortises at the same time. So use your layout stick to mark the mortise locations on the stiles for the drawer blade and the vertical drawer divider mortises, then cut them, too.

Now cut the drawers blades and center divider to final dimensions before moving onto the tenons—as with the mortises, it's more efficient to cut those in one session.

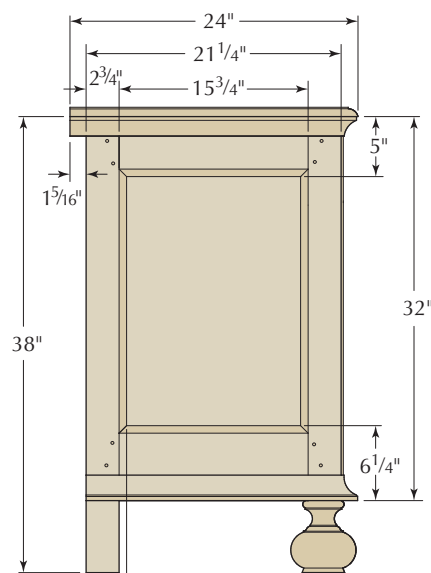
I use a dado stack to make my tenons. It's quick and cuts the cheeks and shoulders in one motion. After cutting the tenons, the miter cuts (that allow the stuck moulding to meet nicely in the corners) need to be marked. Forego using the layout stick for this. At several



Paring. Use a chisel to clean up the shoulder after you've cut the haunch.



FRONT

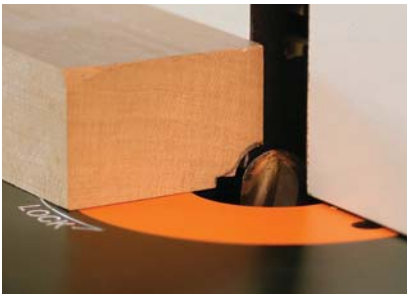


SIDE

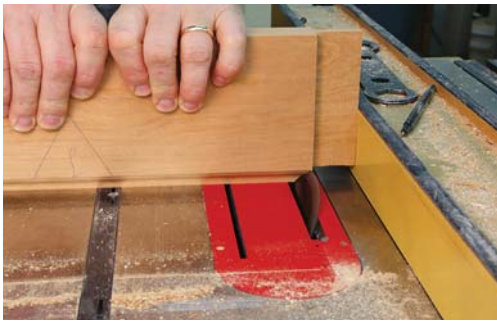
points in any build, using the layout stick becomes counter-productive. The layout is theoretical; the real parts give you actual dimensions. Always go with the actual dimensions when you can. I align the stiles and rails, then transfer the miter locations directly from one frame member to another.

Tilt the table saw blade to 45° and, using the rip fence as a stop (one position for the rail cuts and a second for the stile cuts), cut the miters. Set the stop to leave the miters a little heavy. They are easily adjusted by passing a hand-saw through the assembled miter to remove minute bits of excess material until the tenon shoulders and miters come together.

With the miters cut on the frame moulding, you still need to remove excess sticking material from the stiles. My preferred method is to use the jointer. I set the depth of cut to match the



Half cyma. Using a round-nose router bit to make the concave portion of the cyma recta moulding allows you to get the proper shape without specialized tooling.



Stop miter. Use the rip fence as a stop to make accurate miter cuts a breeze. (Use the miter gauge to guide the workpiece.)

width of the sticking (on some frames this could be considerable, so be careful when using the machine). In one deep pass, I remove the waste, stopping just short of the cutline. Then I clamp the stile in a vise and pare away the remaining waste.

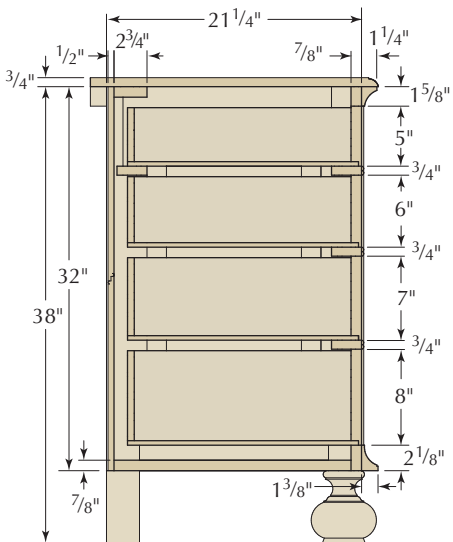
Dry-fit the frames and cut the panels to size, using the actual frames for the

dimensions, not the layout stick. Then bevel the inside face so the panel fits into the stile-and-rail grooves. Now it's time to prepare for assembly.

Begin by marking the peg locations on the stiles (see the drawing at right). Drill $\frac{5}{16}$ " holes for the pegs at the drill press. Dry-fit the mortise-and-tenon joints, making sure to transfer the peg-



Make it easy. You'll get a cleaner cut off the router bit if you rabbet and chamfer the workpiece prior to running the profile on the stiles and rails.



SECTION

William & Mary Chest

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
2	Front stiles	1 1/4	3 3/8	32	Cherry	
2	Back stiles	1 1/4	3 3/8	38	Cherry	
2	Top rails	1 1/4	5	19 3/4	Cherry	2" TBE*
2	Bottom rails	1 1/4	6 1/4	19 3/4	Cherry	2" TBE
2	Panels	3/4	15 3/4	22	Cherry	
1	Case bottom	7/8	19 3/4	34	Poplar	
1	Top front rail	7/8	1 5/8	34 1/4	Cherry	3/4" TBE
1	Bottom front rail	7/8	2 1/8	34 1/4	Cherry	3/4" TBE
3	Drawer blades	3/4	2 1/2	34 1/4	Cherry	3/4" TBE
1	Back drawer blade	3/4	2 1/2	34 1/4	Cherry	3/4" TBE
1	Drawer divider	3/4	2 1/2	6 1/2	Cherry	3/4" TBE
1	Back cleat	7/8	2 3/4	35 1/4	Poplar	1 1/4" DBE**
1	Runner support	3/4	6	17 3/8	Poplar	
1	Top	3/4	24	38 1/8	Cherry	1 5/16" back overhang
2	Cove mouldings	1 3/8	2 1/8	96	Cherry	Base mould cut down
6	Double-arch mould	3/16	3/4	36	Cherry	Cut to fit
2	Drawer fronts	7/8	5	16	Cherry	
1	Drawer front	7/8	6	32 3/4	Cherry	
1	Drawer front	7/8	7	32 3/4	Cherry	
1	Drawer front	7/8	8	32 3/4	Cherry	
10	Drawer runners	1/4	8	19 1/4	Oak	Nailed to stiles
1	Back	1/2	32	34	Poplar	Multiple pieces
2	Foot dowels	7/8	7/8	6 7/8	White oak	
2	Feet	5 1/2	5 1/2	6	Cherry	Glued up

*TBE = Tenon both ends **DBE = Dovetail both ends

hole locations onto the tenon cheeks. Disassemble the frames to drill the same size holes in the tenons. Offset the holes about $\frac{1}{32}$ " toward the shoulder to take advantage of drawboring the joint.

You'll need to make some pegs out of straight-grained cherry. Rip the stock to $\frac{5}{16}$ " x $\frac{5}{16}$ " and cut pegs that are slightly longer than the thickness of the frame parts (about $\frac{1}{4}$ " longer should do). Use a chisel to sharpen the pegs to a blunt point (a pencil sharpener also works well for this).

With the joints ready to go, I use a cabinet scraper to remove all the machine marks on the interior and exterior

surfaces. After I have all the parts of the frames scraped, I sand the outside faces of the panel and frame, as well as the sticking. Slather up the mortises and tenons with your favorite glue and assemble the frames. Lock the joints in place by driving the pegs home; a little beeswax on the peg sides helps them glide through the offset holes.

Get it Together

While the glue dries on the frames, mark out and cut the center waste on the three drawer blades' double tenons. Hold the drawer blades in place on the end assembly and transfer marks from the inner face of the mortises to the ends of the blades. These become the inner cheeks of the double tenons. I find it best to cut these on the band saw. A little paring with a chisel is usually needed for a perfect fit.

Also fit the single tenons of the top and bottom front rails, and the double tenons on the drawer divider, which fits into both the top front rail and the drawer blade immediately below.

With the frame glue dry, level the

"It is the eye of other people that ruin us. If I were blind I would want, neither fine clothes, fine houses or fine furniture."

—Benjamin Franklin (1706-1790),
American statesman & author

mortise-and-tenon joints with a cabinet scraper, plane or sander. Set the frames inside up on a worksurface and lay out the $\frac{5}{8}$ " x $\frac{5}{8}$ " stop rabbets for the backboards, and the $\frac{5}{8}$ " x $\frac{7}{8}$ " rabbet for the case bottom. I use an edge-routing jig and router with a straight bit to make these cuts.

The next step is to dovetail the back cleat into the top end of the rear stiles.

Dry-fit the entire case to determine the dimensions for the drawer runner support. (Its sole purpose is to hold the drawer runners on which the top two drawers slide.) In typical early 18th-century fashion, this support piece is notched around the drawer divider and top rear cleat. It's then nailed into place at the front and back after the case is glued-up. Prep all the case parts and glue up the carcass.

Dress it Up

While the glue dries on the carcass, all the case mouldings can be made. It's fairly common on early pieces to find upper and lower mouldings that use the same plane in different ways. For the upper and lower mouldings, I've used the same radius, but modified the overall size by making the lower moulding taller and deeper than the upper moulding by adding a $\frac{3}{32}$ " step and a vertical flat (see the pattern at right).

Because the coves are made at the table saw, there is a single setup to make the foundation of both the upper and lower mouldings. Use tracing paper to draw the profiles on the ends of the blanks to help orient things properly. Position and attach an angled fence on the table saw, then run the blanks diagonally through the saw to create the coves. (For more on how to make cove moulding on the table saw, see the online extras.) Use the drawn profiles to set the saw to the various angles needed to complete both mouldings.



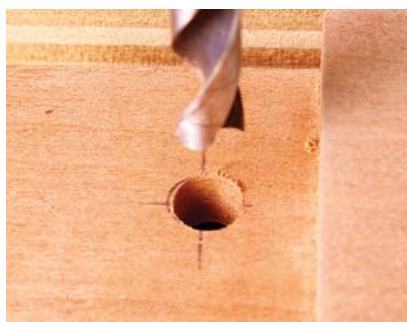
Waste removal. At the jointer, a single pass to remove the sticking waste is fast and accurate.



Clean it up. After jointing off the waste, use a sharp chisel to pare the shoulder to the miter.



Transfer the mark. With the frame dry-assembled, it's easy to transfer the location of the peg holes to the tenons.



Offset the hole. At the drill press, offset the tenon's peg hole about $\frac{1}{32}$ " toward the shoulder to drawbore the joint tight.

SUPPLIES

Ball and Ball Hardware

ballandball.com or 800-257-3711

8 ■ W&M A73 backplates with A69 drops
#A73-009

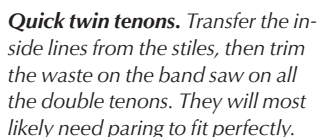
3 ■ W&M chased escutcheon
#L63-004

Horton Brasses

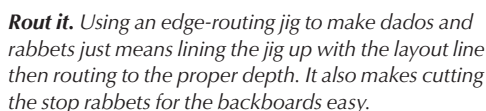
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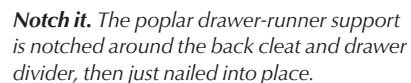
Call for pricing.



Quick twin tenons. Transfer the inside lines from the stiles, then trim the waste on the band saw on all the double tenons. They will most likely need paring to fit perfectly.



Route it. Using an edge-routing jig to make dados and rabbets just means lining the jig up with the layout line then routing to the proper depth. It also makes cutting the stop rabbets for the backboards easy.



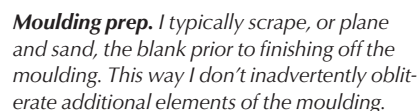
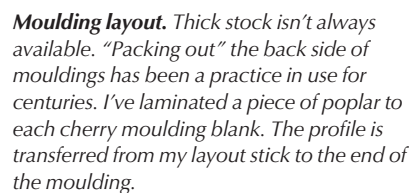
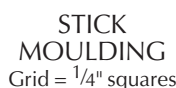
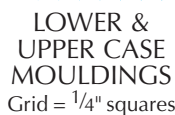
Notch it. The poplar drawer-runner support is notched around the back cleat and drawer divider, then just nailed into place.

The double-arch moulding can be made using a stock $\frac{3}{8}$ " bead cutter or moulding planes. (You can use short sections of stock here; no need to stick a continuous 18' run.)

Run the double-arch mouldings on the edge of a wider blank; that makes

it easier to hold the workpiece in a vise for sanding before you rip the moulding free.

Before attaching the upper and lower mouldings, cut the top to size and install it. Measure the dimensions of the carcass and add the appropriate overhang for the sides and front ($1\frac{7}{16}$ "), and the back ($1\frac{5}{16}$ "). Yes, I said back. Another fairly common practice on period furniture is to have the top overhang the back. When the piece is pushed against the wall, the top clears the baseboard and chair rail, preventing



After the glue dries, level the joints (if needed) and remove any clamp damage to the case then attach the top. Simply align it properly and drill through the top into the stiles. The pegs on this chest are $\frac{5}{16}$ " square. It's better to drill that size hole through the top and a slightly smaller hole into the framework. (I reduced the diameter by about $\frac{1}{32}$ " for this cherry. In pine I'd reduce it more.) This allows for the compression of the fibers in the peg as it passes through the top.

If the holes in the top and frames were exactly the same size, there's a chance that the pegs might not grip the stiles. If you want a removable top,



Double-arch mark. Hold the double-arch moulding in place to mark off the position of the drawer blades.



Bevel it right. Once the location marks are in place, draw the miters to ensure a proper cut.

this is the way to go, but I like mine permanently attached. Once the top is pegged in place, wrap the upper and lower mouldings on the carcass then fit the double-arch mouldings around the drawer openings.

The double-arch mouldings align to the inside of the chest sides and are flush with the drawer blades. The mouldings on the blades are mitered into the stile mouldings. The drawer-divider moulding is mitered into the

BRUSH IT OFF

I'm often asked how I apply my finishes. While I'm not opposed to spraying, most of the time I find myself brushing. My finish of choice is shellac, so brushing is easy and quick.

Whether you color your pieces or go *au naturel*, you are going to need something to stop the wood from becoming soiled and damaged. That's what a top coat does – protect the wood. Many believe that brushing finishes is a skill that takes a lifetime to acquire. I believe, with a little practice and a few tips, you can be successful in short order.

To brush shellac you'll need a decent brush. I prefer a badger hair brush to other types. While they are not the cheapest brushes on the market, they aren't the most expensive, either (a 2" brush can be had for around \$15). A good brush makes all the difference to me in how the final finish looks.

Regardless of whether you make your own shellac from flakes dissolved in alcohol or pour it out of a can, the key to getting a good finish is using it at the proper viscosity. More layers of thinner material are better than a few thick layers. Shellac's thickness is measured by how much is dissolved in the solution. A 3-pound cut, for example, is 3 pounds of flakes dissolved in 1 gallon of alcohol; a 2-pound cut consists of 2 pounds of flakes dissolved in 1 gallon of alcohol, and so on.

I usually start by putting on a washcoat (a.k.a. seal-coat) that is around a 1- to $1\frac{1}{2}$ -pound cut. The idea is to apply a thin coat of finish to seal the wood so additional coats build on top instead of soak in. The first coat will raise the grain of the wood regardless of how well you sanded prior. If you are worried about rubbing through the color as you sand between coats of shellac, you can raise the grain on the piece with water then lightly sand prior to coloring it. This reduces the amount of grain rais-

ing that takes place with the washcoat of shellac.

After the washcoat has dried, lightly sand with #280- to #400- grit "A" weight sandpaper. You can tack the surfaces clean or not. The dust left behind from sanding is primarily shellac that will re-dissolve as the next coat is applied.

Subsequent coats are applied at a thicker viscosity (I tend to use about a 2-pound cut). On this chest I ended up applying an additional five coats of shellac. If your shop is warm and dry, you can easily apply two or three coats per day without any trouble.

As I mentioned, I apply very thin coats. Regardless of the viscosity, I work with a relatively dry brush, dipping the tips of the bristles about $\frac{1}{8}$ " into the liquid then wiping them on the side of the container. The most important part of brushing shellac is to cover as much of the surface as quickly as you can. By keeping the entire surface wet with shellac you can use the tips of the bristles to flow out the finish and reduce brush marks.

When applying shellac to large, flat surfaces, begin brushing a few inches in from the edge and brush outward off the end of the board. Always brush along the length of the grain, not across it. Once you have the two ends of the surface brushed, you can flow everything in between without worry about runs or sags on the ends.

After the final coat is applied, my favorite way to complete the job is to rub out the surface with #0000 steel wool, mineral oil and pumice. Dab some oil onto a steel-wool pad then sprinkle a little pumice on it. Use your finger to knead the pumice into the oil-soaked steel wool, then lightly pass the pad across the finished surface. You'll need to frequently add oil and pumice to the pad until it becomes saturated. A light, deft hand will leave a silky-smooth finish.

—CB



Miter it right. Cut the double-arch moulding miters on the bandsaw. Leave a little extra to be trimmed off before installation.



A little help. Make a 45° guide block to accurately trim the miters on the double-arch mouldings.

drawer blade below. Attach these pieces with glue and pins.

Half-lapped and beaded backboards complete the case. But don't attach them yet; you'll find the next steps easier without them in place.

Hang 'em Up

Unlike drawers where the runners are underneath (you're likely familiar with this type), side-hung drawers literally hang on a runner that mates with a groove on the drawer side. The runner is nailed to the inside of the case.

When planning joinery for side-hung drawers, the primary consideration is groove placement for the runners. The dovetails need to be laid out so that these grooves fall into a tail. This avoids having to remove end grain of a pin and allows the drawer front to act as a stop.

The grooves are $\frac{1}{4}$ " deep x $\frac{3}{4}$ " wide. I make the runners from $\frac{1}{4}$ "-thick material that is about $\frac{23}{32}$ " wide.

The runners are nailed into the stiles of the case at the proper position. To find that location, I dry-assemble the drawers and place them into the openings. Working from the backside of the carcass, transfer a mark for the top of the groove to the case side. I bump the line up about $\frac{1}{32}$ " or so toward the top of the opening to ensure the drawer bottoms don't drag on the drawer blades. Use a large square to strike the line across the inside face of the case sides and the center divider.

With the locations marked, tack the runners in place using small brads. This allows you to test the position. Once the drawers are complete, make any adjustments then nail the runners. Rosehead nails were commonly used in period work to secure runners. If you go

this route, be sure to drill countersink holes to allow the heads to be set flush.

The drawer construction is straightforward. The fronts are rabbeted and the bottoms are nailed to the bottom of the sides and back, and into the front rabbet.

And Now the Feet

Because the feet are of a large diameter, you may be hard pressed to find stock of the appropriate size at your lumberyard. To achieve the proper diameter for these feet, I milled two faces of a 16/4 board flat and square. To these faces, I glued a flattened piece of 6/4 material with matching grain and color. This allows the foot to be turned the proper diameter while hiding the glue joints as much as possible. Once the foot is turned, rotate the two patches to the inside and back of the foot. No one will notice your laminated feet.

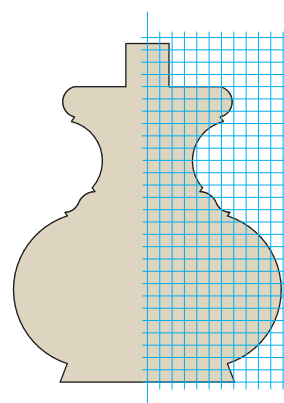
The bun feet are attached with $\frac{7}{8}$ " oak dowels that extend through the foot and are glued into matching holes in the case bottom.

Wrap it Up

Before installing drawer bottoms and backboards, I color and finish the chest. This does two things: It helps to avoid unsightly drips on the secondary woods, and it allows you to install the brasses without having the drawer bottom interfere. This is particularly important if you are using brasses attached with wires (or "snipes," as they are often called).

After your finish dries, all that remains is to install the hardware, and decide in which room you're going to display the fruits of your labor. **PWM**

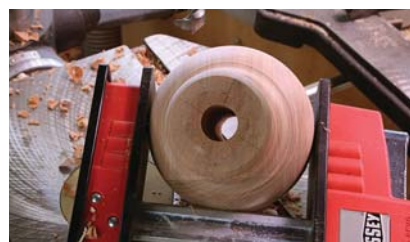
Chuck is senior editor at the magazine and can be reached at chuck.bender@fwmmedia.com.



BUN FOOT
Grid = $\frac{1}{4}$ " squares



Scabs. Adding extra stock to the core material for the feet allows you to get a larger-diameter foot from readily available material. When complete, orient the glue lines so they are not apparent from the front of the chest.



Holey feet. Clamp the feet to get a grip on them while drilling. The peg holes go all the way through.

ONLINE EXTRAS

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BLOG: Learn how to quickly clean up cove mouldings made on the table saw.

VIDEO: Watch Glen D. Huey make cove mouldings at the table saw.

ARTICLE: Read more about the William & Mary period in the April 2010 issue (#182).

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Chipbreaker: *Theory & Use*

BY KEES VAN DER HEIDEN & WILBUR PAN

Most bench planes come equipped to eliminate tear-out.



Handplanes are great tools for creating a smooth, finish-ready surface on a board without the dust and noise from a sander. If the board is straight grained and the blade is sharp, it is easy to use a plane. But if the board has some figure, such as that commonly found in curly maple, figured cherry or knotty pine, there is a risk of tear-out.

There are many strategies that can be used to reduce or eliminate hand-plane tear-out on tricky surfaces. A tighter mouth, a higher bed angle or, if you're using a bevel-up plane, a steep secondary bevel, are all ways one can attack the problem. But there is a device that comes standard on many bench planes that is equally effective: the chipbreaker.

The ability of the chipbreaker to reduce tear-out can be seen in the photo at left. The cherry board shown was deliberately planed against the grain with a Stanley No. 4, using a stock blade and chipbreaker.

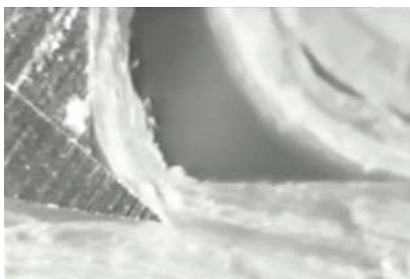
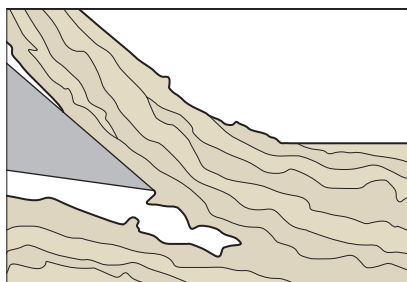
On the near side in the picture, tear-out can be seen, which is expected. On the far side of the board, tear-out is nearly nonexistent. The same plane and blade were used to produce both surfaces. The only difference is that the chipbreaker was set up properly when planing the far side.

Chipbreaker Theory

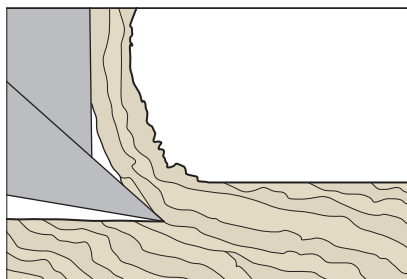
If a board is straight grained, planing is easy when you're going with the grain. But nearly all boards have areas where



Blow out. A still from the video by Yasunori Kawai and Chutaro Kato shows the mechanism of tear-out when planing against the grain. As the shaving comes up over the blade it levers up the fibers ahead of the cutting edge, which results in tear-out.



The bends. As the shaving comes up over the blade, it runs into the chipbreaker and bends over. The shaving loses structural integrity and cannot lever out wood ahead of the cutting edge, reducing tear-out. Here the chipbreaker is 0.02 mm ($1/128$ ") from the cutting edge.



Tight is right. The chipbreaker needs to mate flat to the back of the plane blade in order for it to work. Otherwise, shavings lodge in the gap and interfere with the plane's function. An excellent way to check the fit is to hold the chipbreaker and the blade up to a light source.



the grain reverses, so you're forced to plane against the grain. If the board is figured, the grain can switch back and forth over a short distance. In spots where the plane is cutting against the grain, instead of cutting fibers, the blade acts as a wedge that splits them. Eventually these fibers will break and a small divot of wood comes off, which leaves an uneven surface that we know as tear-out.

In this situation, if there is a way to alter or break the fibers so there's no leverage to cause the divot of wood, tear-out can be reduced. Chipbreakers work by making the shaving deflect so the fibers in the shaving lose their integrity, either by bending or breaking. Therefore, the shaving loses the ability to pry the divot out of the board ahead of the plane blade, which reduces the tear-out.

Chipbreaker History

The oldest written evidence we found of a chipbreaker is from a 1767 advertisement by Philadelphia planemaker Samuel Caruthers. He describes the availability of "double-ironed planes, of a late construction, far exceeding any tooth planes or uprights whatsoever, for cross-grained or curled stuff." Those chipbreakers were probably imported from England, and were likely in use before this first written record.

Other references to and explanations of how the chipbreaker works have appeared in books and articles over time. But it wasn't until professors

"Have patience! In time, even grass becomes milk."

—Charan Singh (1916-1990),
Indian mystic

Yasunori Kawai and Chutaro Kato, at Yamagata University in Japan, made a video that showed a chipbreaker in action on a microscopic level that we could see the exact mechanism of how it works to prevent tear-out.

In the video (available online; see the Online Extras at the end of this article), a sharpened plane blade with a microadjustable chipbreaker was filmed planing a board against the grain to see what factors impacted the performance. Kawai and Kato were able to show that the face of the chipbreaker did indeed bend the shaving over as the plane was advanced on the wood. The effect was greater the closer the chipbreaker was to the edge of the plane blade – distances on the order of 0.1-0.3 mm (about $1/128$ "). In addition, the angle of the face of the chipbreaker changed the optimal distance that the chipbreaker needed to be from the edge of the blade. It appears that the bending of the shaving causes the shaving to be unable to lever out wood fibers ahead of the cutting edge, thus reducing tear-out.

Chipbreaker Setup

Setting up a chipbreaker is a fairly straightforward procedure. The first step is to flatten the back of the plane blade and sharpen the blade as much as possible with your favorite sharpening regimen.

Next, the chipbreaker should be adjusted so it mates tightly to the back of the blade. (If there is a gap between the edge of the chipbreaker and the back of the blade, shavings will find their way under it and clog the mouth.) If the chipbreaker and plane blade are pressed together and held up to a light, no light should be visible between the two components.

If there is a gap, it is often because the edge of the chipbreaker is not completely flat. If this is the case, flatten the mating surface of the chipbreaker the same way that you would the back of a plane blade. Luckily, the steel in a chipbreaker is not usually hardened to the same degree as the plane blade, so flattening that surface should be relatively easy.



Get it tight. Flattening the edge of the chipbreaker is straightforward. In this photo, a standard Stanley chipbreaker is being flattened on a waterstone, although any sharpening medium can be used for this task.



Little by little. With an aftermarket chipbreaker, a small secondary bevel – created by holding the chipbreaker at about a 45° angle during the last step in your sharpening regimen – provides the “wall” against which the shaving bends. The angle doesn’t need to be exact and the bevel can be quite small.

Finally, if you are using an aftermarket chipbreaker (one that doesn’t have a hump like the Stanley), a secondary bevel of about 45° should be honed on the leading edge (the exact angle is not critical). The curve of the front edge of a stock Stanley chipbreaker provides this angle. This secondary bevel provides the wall that bends the shaving.

Set the chipbreaker on the back of the blade and tighten the chipbreaker screw with finger pressure only. The goal is to place the edge of the chipbreaker as close to the cutting edge of the plane blade as possible, in the range of $\frac{1}{64}$ " or less.

From a practical standpoint, this distance is not easily measurable in the workshop, but it can be achieved. Turn the blade assembly around until it reflects the light. Now push the chipbreaker forward to the edge and see how close it is by watching the reflection of light change in size. This will take some practice. When you are happy with the result, tighten the screw.

Using the plane also provides feedback on the position of the chipbreaker. If you still get tear-out in reversing grain, the chipbreaker is likely positioned too far from the edge and not doing its job of bending the shaving before it tears the wood.

If the shavings are wrinkled, the chipbreaker might be positioned a little

too close to the edge; you also may feel more resistance when using the plane. Move the chipbreaker back to alleviate these issues. When the chipbreaker is in the right spot the shavings straighten out and you’ll have a surface relatively free from tear-out.

This technique is not only useful for smoothing planes, but also for jointer and jack planes. Because these planes are often set up with a cambered edge, it may not be possible to set the chipbreaker as close as you can on a smoothing plane. In this situation, tear-out may not be eliminated, but it will reduce the depth of the tear-out, so it will be easier to clean up the damage with a smoothing plane afterward.



Show me the light. For the chipbreaker to work best, you need to put its edge $\frac{1}{64}$ "- $\frac{1}{128}$ " from the edge of the iron. Shine a light on the assembly and look at the reflection as you adjust the position. Despite the appearance of the reflection, this chipbreaker is less than $\frac{1}{64}$ " from the edge of the blade.

Try making adjustments on the location of the chipbreaker in your plane to see what works best in your shop, on the woods that you commonly use. Do some planing against the grain and feel how and where setting the chipbreaker in this manner gives you an advantage. It won’t take long to get the hang of using this approach to good effect.

Do You Need a Chipbreaker?

Obviously, there are other ways to achieve a surface free from tear-out when planing a board. In fact, one of the first sequences of the Kawai and Kato video shows that a chipbreaker isn’t needed when planing against the grain, if taking a shaving that is sufficiently thin. As mentioned before, a tight mouth, a higher bed angle or a steep secondary bevel are all valid approaches. These methods all work by causing the plane shaving to fail before it can lever a chunk out of the wood ahead of the cutting edge.

All these approaches have their advantages, although many times the only way to take advantage of these features is to buy a new plane (or a high-angle frog if you can find one to fit your tool). The benefit of knowing how to set up and use a chipbreaker is that the vast majority of bench planes that woodworkers already own have a chipbreaker that is just waiting to be used. **PWM**

Special thanks to Yasunori Kawai, professor, and Chutaro Kato, honorary professor, Faculty of Education, Art and Science, Yamagata University, for the use of material from their video in this article, to Mia Iwasaki for translation help, and to Bill Tindall, who facilitated the use of the video.

Kees is a woodworker from the Netherlands. Wilbur is a woodworker from New Jersey. Both geek out over hand tools.

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/apr14

VIDEO: Watch the Kato and Kawai video showing the effect of the chipbreaker.

BLOGS: Visit the authors’ blogs.

IN OUR STORE: “Handplane Essentials,” by Christopher Schwarz.

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Inlaid Jewelry Box

BY AUTUMN DOUCET

Shell and wood combine to decorate this delightfully detailed piece.



I lie in bed sometimes, my eyes closed and my mind letting go of the details of the day, when out of the darkness comes a shape. If I overlay the shape with the sparkle and chatoyance of mother-of-pearl and paua abalone, it becomes an idea. I've been known to jump out of bed and run out to the shop at moments like that, spreading out dozens of pieces of shell material, excited in the attempt to clarify the col-

ors of the image and match it all to a particular wood. That's how this jewel-in-the-crown box began.

I know; we all love wood. That's why we read this magazine. But for the time being, set aside your visions of wood grain and joinery and join me on a trip to the exotic land of mother-of-pearl.

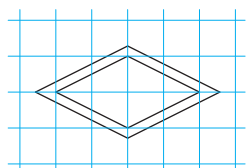
We're going to take six small pieces of mahogany, add the shell inlay and some simple wood inlays then turn it



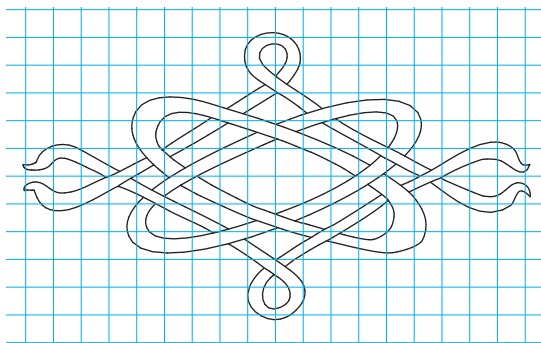
all into a box that causes heads to snap around. It may be awhile before you arrive at the point of actually making the box because to cut mother-of-pearl you need patience, time and an attention to detail. So we'll set aside wood prep until later and start by making the inlays.

Proper Inlay Preparation

Before you begin, make sure you have all of the necessary supplies at hand. When sourcing the mother-of-pearl and abalone, buy blanks the same thickness. Having 2 ounces of each gives you the opportunity to select pieces for their best effect.



DIAMOND PATTERN
Grid = 1/4" squares



MEDALLION PATTERN
Grid = 1/4" squares

"I've been called many names like perfectionist, difficult and obsessive. I think it takes obsession, takes searching for the details for any artist to be good."

—Barbara Streisand (1942),
American singer, composer, director

Continue your prep by making a dozen laser-printed copies of the top medallion and shell border, and the diamond designs used on the front and sides. Set aside one copy of each as a master to use for assembling the cut shell inlay pieces. For the 3/16"-wide shell border inlay, draw two rectangles: one at 7 3/8" x 4 1/2" and a second that's 7" x 4 1/8". Center the border around the medallion on the box lid.

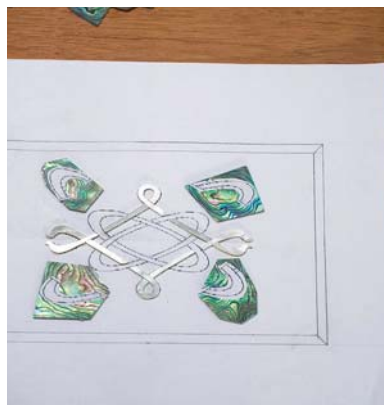
Both types of shell have chatoyance – a glimmering, reflective effect that makes them sparkle or appear dull depending upon their aspect to available light – so it's good to have a

dish of water to wet the pieces. When they're wet, it's easier to determine the blank's best side, and to judge which way to affix the pattern pieces so they best catch the light.

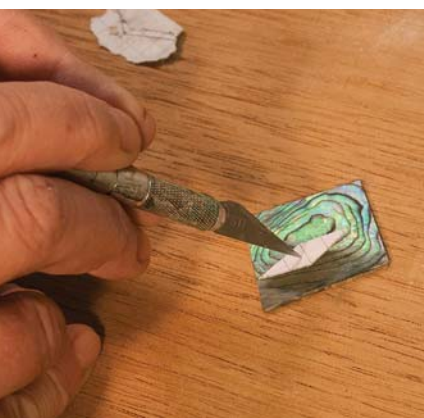
Make a bird's-mouth cutting support out of plywood or scrap and clamp it to a workbench or table. (This approach is the best when cutting small parts and accuracy is a must.) I like to stand when I'm cutting, so I attach it to the table of my scrollsaw. Whether you sit or stand, make sure the work is at chest height, and that you have good lighting.

Let the Cuts Begin

From your printed copies, cut the individual pattern pieces then position and glue each piece onto the shell inlay. Use ample amounts of glue-stick paste, taking note of how each piece looks in the finished design. For the abalone, use the largest pieces first. Position the patterns onto the blanks so the swirls in the material face inward toward the center.



Wet is good. Wet the paua abalone then select pieces that have their curves oriented toward the center of the design.



Get to the point. Little pieces of paper are most easily held and transferred on the tip of an X-Acto knife.



Guided cut. To begin a cut, align the pattern line and the blade with the edge of the beak opening. It's not cheating to use a small clamp to help hold down the shell pieces.



Danger, Will Robinson! The diamond medallions for the box sides are easily shaped with a disc sander, but please, if you do this, use the eraser ends of a couple of pencils to hold your work.

Does mother-of-pearl dust contain toxic poisons? No. Do you want insoluble shell dust in your lungs? Probably not. Consider wearing a dust mask.

To get started cutting your shell, put a blade in the jeweler's saw with the teeth facing down. Begin cutting the pieces for the top medallion. As you cut, hold the saw vertically and aim for splitting the line. Keep the work supported on both sides of the cutting support. Cutting mother-of-pearl is slow, meditative work; forcing a blade or cutting too fast causes the blades to heat up and snap.

A death grip on the saw handle is also counter productive; keep a loose grip and let the blade do the cutting. Because it's inevitable, in the beginning, that you'll break a lot of blades, use those instances as opportunities to learn how much pressure to use. Don't become discouraged.

As you cut each piece, attach it to the master pattern with glue-stick paste.

Now repeat the same process to make the diamond-shaped abalone pieces. These are 1" in length and 1/2" in height. (The white strips that wrap these are later added.)

Make Shell Strips

To make the strips needed for the shell border, attach the remaining mother-of-pearl and abalone blanks atop a piece of plywood scrap with double-sided tape. (The shell is brittle; the plywood is a backer to keep it from snapping while cutting.) Load a fine-toothed metal-cutting blade on your band saw, then set the cut for just over 1/16".

Create a zero-clearance tabletop by running another piece of plywood against the fence, cutting about halfway down its length. Clamp it in position. This saves your tiny strips from becoming property of the dust collector or from falling to the inside of your band saw.

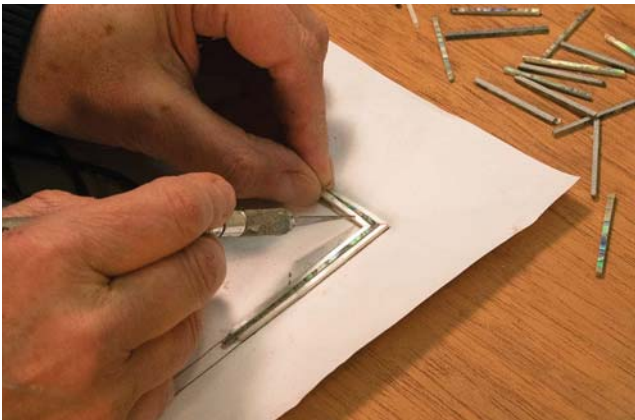
To look best on the box, the abalone should be oriented for cutting so the blade cuts at a right angle across the swirls as much as possible. Orient the mother-of-pearl so you'll end up with long pieces. The trim on the box top and around the abalone diamonds requires



Save some money. Mother-of-pearl and paua abalone strips cost significantly more when pre-made. It's a snap to cut them on the band saw.



Easy does it. Pry the strips away from the double-sided tape by sliding an X-Acto knife between them.

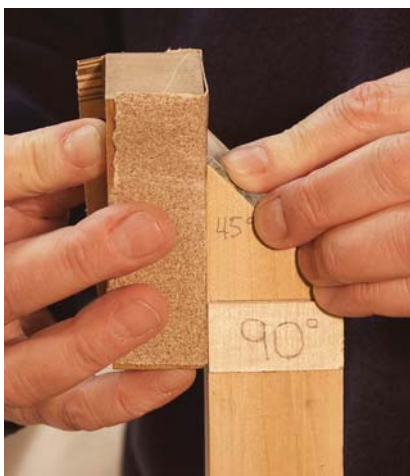


Take your time. Glue the three 1/16" strips of abalone and mother-of-pearl onto the master pattern in an alternating configuration.

Inlaid Jewelry Box

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
❑ 2	Box sides	3/8	2 1/4	6 11/16	Mahogany	
❑ 2	Box front/back	3/8	2 1/4	9 1/2	Mahogany	
❑ 1	Box bottom	3/16	5 1/2	8 3/8	Mahogany	
❑ 1	Lid panel	3/8	6 1/4	9 3/32	Mahogany	
❑ 4	Lid corner splines	1/16	1/2	1	Ebony	
❑ 4	Box splines	1/8	1/4	2 1/4	Mahogany	
❑ 4	Rim bands	1/16	3/8	10	Ebony	
FRAME & FEET STICKING						
❑ 4	Outer bands	3/8	1	20	Mahogany	
❑ 5	Middle bands – thin	1/8	1	20	Ebony	Feet*
❑ 5	Middle bands – wide	1/4	1	20	Leopardwood	
❑ 5	Inner bands	1/16	1	20	Ebony	
TRAY						
❑ 2	Long pieces	1/8	1	8 3/4	Mahogany	Mitered corners
❑ 2	Short pieces	1/8	1	5 5/16	Mahogany	Mitered corners
❑ 1	Divider – long	1/8	7/8	8 5/8	Mahogany	
❑ 1	Divider – short	1/8	7/8	2 15/16	Mahogany	
❑ 1	Bottom	1/8	5 13/16	8 5/8	Mahogany	

*The fifth "stick" is used to make the feet



Mini shooting jig. Make clean joints in seconds by sanding the profiles.

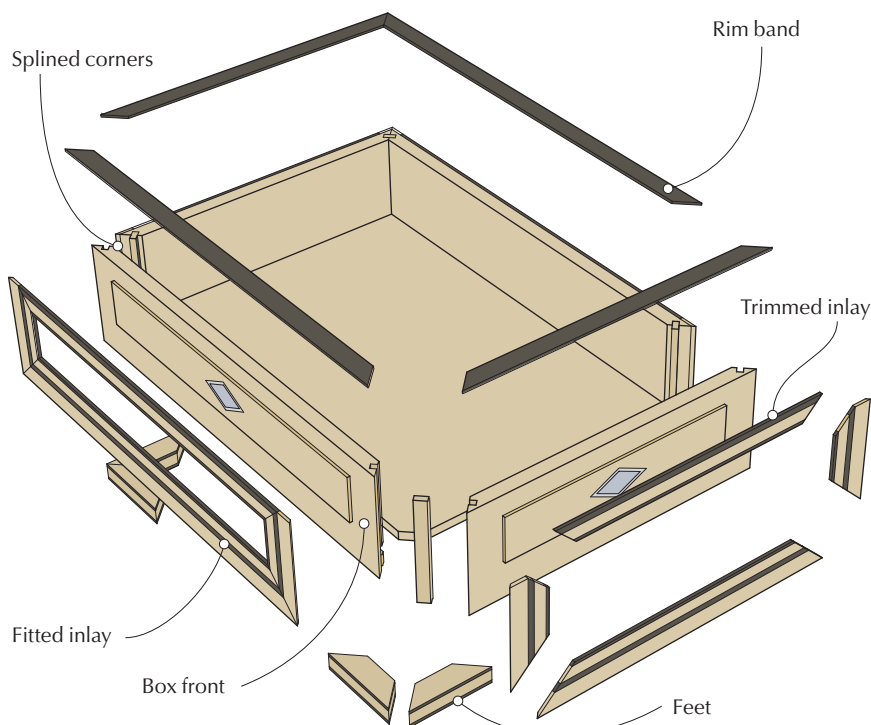
a total of 60" of white mother-of-pearl strips and 24" of abalone. It's best to cut more pieces than you need so you have plenty with which to work.

Remove the sawn shell strips from the plywood by sliding a knife between the shell and its backer.

Assemble the Shell Border

Carefully select the locations of the $\frac{1}{16}$ "-wide strips of abalone and mother-of-pearl, then glue each onto the master pattern, mitering the corners where needed. The seams of the white mother-of-pearl stand out, so line up the joints for a pleasing appearance. Because you cut most of the paua abalone across the swirls, the seams will be almost invisible – as long as they

It's a match. Saw one of the sticks into $\frac{1}{16}$ " slices to use as inlay on the front, sides and back.



BOX – EXPLODED VIEW

are matched closely in color from one piece to another.

To produce accurate mitered corners and clean seams, make a mini shooting board with a 45° cut on one end and a thin strip of wood glued onto the side at a 90° angle. Hold a piece of mother-of-pearl up to the edge then sand the profiles with #80- or #100-grit sandpaper wrapped around a flat sanding block.

After putting together the border inlay, use the white mother-of-pearl strips to trim out the diamonds you cut for the front and sides. These miter angles can be tricky to make, so a quick shooting board for sanding them is the best way to go.

Time to Touch Wood

The lid is composed of a center panel (in which you'll install the medallion and border inlay) and a surrounding frame that's assembled from glued-up strips of mahogany, ebony and leopardwood. I call this strip "sticking." From the same sticking, I resaw the wooden inlay for the box front, back and ends. A separate sticking glue-up, without the mahogany, is used for the feet.

To make the sticking, lay up, glue and clamp together four sticks for the lid frame and the inlays (see the cutlist for sizes), and another stick for the feet. After removing the clamps, clean up and joint one side of each of the sticks.

Take two of the assembled 1"-wide sticks and rip them in half across the laminations. You'll use these pieces for making the frame of the lid. You'll have a couple of extra salvation pieces, so



It's a wash. Soak the inlays in a shallow dish of water for a couple of minutes and the paper floats off.



Glue & score. With the medallion centered and cemented on the top panel, score around the edges of each piece with a knife then remove the pieces. A drop or two of acetone can help break the cement bond.



Outstanding outline. Scrape a piece of light-colored chalk over the design, then rub the dust into the scored lines to make them more visible.

you don't have to swear after making a miscut; just reach over, grab another stick and try again.

Resaw another of the 1" sticks on the band saw into 1/16"-thick strips for inlay on the front, sides and back of the box.

And the fourth stick? Yep, that's reassurance that everybody makes mistakes. If you need more inlay pieces, you're covered.

Cut the stick for the feet into 1 13/16"-long pieces with opposing 45° angles cut on each end.

Finally – The Box Itself

Ready to make a box now? Go ahead – prep all of your wood and cut the pieces to size. No assembly, please – there's inlay work yet to do.

To hold together the completed mother-of-pearl and abalone inlays, press clear packing tape on them. Cut around each piece, removing it from

the larger pieces of paper; a quick soak in water removes the paper without releasing the shell pieces from the tape.

Repeat the same steps for the shell border. Leave the rectangular border as one piece, or you can cut it apart at the miters.

Accurately center the medallion for the top on the panel piece, then glue it down with Duco cement. (Do the same with the border.) After the cement dries, score around all the parts with a knife to set the design into the lid. (I prefer an X-Acto knife.) Carefully pry up the medallion after scoring, but don't remove the remaining clear tape that holds the pieces together. (You may

need a drop or two of acetone to loosen the cement.)

Chalk dust is a great way to highlight the scored lines. This helps when excavating the inlay areas.

Excavation Education

A couple of good options exist for excavating the background to accept the pearl inlay: a rotary tool (Dremel) fitted into a routing base, or a trim router with a collet that accepts 1/8" bits. I prefer the former setup because it better allows a clear view of the work area.

Whichever router you use, set the depth of cut to the thickness of the thinnest shell pieces (sometimes thickness-

SUPPLIES

DePaule Supply

luthiersupply.com or 541-607-8971

2 oz. ■ white mother-of-pearl, large blanks #0711-w, \$20/ounce

2 oz. ■ paua abalone, select #1 blanks #0740-P, \$50/ounce

Rockler

rockler.com or 800-279-4441

1 pr. ■ solid brass hinges #25802, \$4.59

Prices correct at time of publication.



Slow & steady. Pencil in the area to be removed, then excavate using a 1/16" bit while moving counterclockwise. Work slowly toward the white line until the chalk falls off.

Test-fit. Check each inlay piece for fit; if there is any resistance, slice along the edge of the recess with the knife until the piece easily drops in.



es vary slightly) and rout at the slowest speed setting. Cut counterclockwise only, turning the panel when necessary. Slowly work your way up to the chalked score lines and cut until you see the chalk fall away. For clearing out tighter places, such as at the tips, use a knife or smaller-diameter router bits.

Test-fit all the parts. Trim the wood with a sharp knife until the inlay pieces drop in easily. Don't stress over gaps; there's an easy fix for that – fill them with colored epoxy.

This is important: Do not use short-set epoxy (15 or 30 minute) to glue in the mother-of-pearl. You don't want to be in the middle of arranging the pieces when the epoxy heats up and hardens. Long-set epoxies (such as Epoxy 22) provide an hour of open time before starting to thicken. That's plenty of time to get the inlays installed and clamps in place.

If you have dyes handy, tint the long-set epoxy to best match the wood color; err to the darker side. Fill the medallion recess half full with the epoxy then press the pieces in one at a time using a small, stout wooden stick. Rock the inlay pieces side-to-side to work out air bubbles and excess epoxy.

When you are satisfied with the fine mess you've made, scrape off the excess epoxy. Cover the medallion with wax paper, set a piece of wood over it then clamp overnight. The next day, plane or scrape off the excess epoxy until it is flush with the wood.

On the top panel, there should be a $\frac{1}{2}$ " margin of wood outside the border

inlay on all four edges. If not, check your measurements, and make any necessary adjustments.

The $\frac{1}{2}$ " is needed to create the tenon that fits into the groove of the frame. After temporarily cementing the inlay border in place, score the lines, excavate

the channel, check the fit then install each piece as you did the medallion.

Sanding

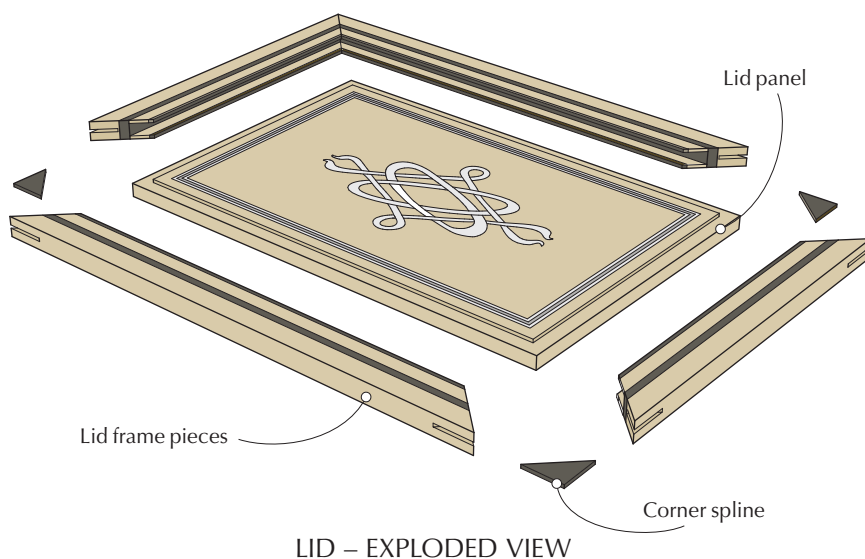
As you complete each shell inlay, sand it with #150-grit paper wrapped around a solid, flat block. If not, the wood sands away faster than the shell, leaving dips around the inlay.

Make the Lid

Measure $\frac{7}{32}$ " out from the edge of the inlaid border and score a line around the panel. Flip the board over and score the other side, too. This measurement is the tenon length. Cut a $\frac{1}{16}$ "-deep rabbet on both faces to complete the tenons.

Run a $\frac{5}{16}$ "-deep x $\frac{1}{4}$ "-wide groove down the center of the frame pieces to accept the panel tenons, and cut the sticking to the required lengths with mitered cuts at the corners.

Before assembling the lid, mix a



Lower the background. Plane or rout around the center island to the depth equal to the thickness of the wooden inlay strips.

50/50 solution of glue and water to use as sizing for the end grain. Apply the sizing, allow it to dry then glue and clamp the frame and panel together. Cut horizontal grooves on the frame corners and glue in ebony splines.

Make the Box Panels

At a glance, the box panels look as if they are frame-and-panel construction, but it's an illusion enhanced by the aspect of the mitered inlays.

Cut the mahogany off one inlay strip (this is used at the top edge of each box piece). Set your marking gauge to the thickness of the inlay strips ($\frac{1}{16}$ "). On all four box pieces, strike depth lines along the outside edges. Reset your marking gauge to the width of the wooden inlays and mark each face. Rabbet these areas down to the thickness of the inlays.

Miter and fit the inlay to the rabbeted areas. Notice that at the top of the vertical inlays of each panel, the miters only extend far enough to match the narrow strip along the top edge.

After completing this step and planing the surface flush, center and inlay the shell diamonds. (The work is completed just as was the other shell inlay.)

Assembly & Finish

Cut corner miters and corresponding spline slots on each box panel, then make splines to fit. Also, cut grooves $\frac{1}{4}$ " up from the bottom on the insides of the box pieces to accept the bottom. Size the end grain of the miters. After the sizing has dried, apply glue to the corners, install the splines then slip the box pieces together. Remember to slip the bottom in place as you assemble the box. With the glue on the box dry, clean the panel faces.

Glue the feet so the miters join at the corners, then attach the feet to the box. To present a clean line at the top edge of the box, glue $\frac{1}{16}$ " x $\frac{3}{8}$ " mitered strips of ebony around the top rim. Sand the box and lid to #180 grit. Polish the shell pieces with #600-grit sandpaper.

All that's left is installing the hinges – the lid fits flush with the back and overhangs slightly on the ends and front – and build the tray.



Fit wood inlay. On the box's front, back and side panels, draw the locations for the wood inlay pieces and miters, then cut each piece to fit.



Perfect miter. In lieu of a shooting board, it's easy to sand the inlay miters using a 45°-guide block at a disc sander.



Shell diamonds. After gluing on the wooden inlays, center and inlay the paua abalone and mother-of-pearl diamonds.

To build the tray, prep the wood to $\frac{1}{8}$ " thickness and round over the top edges with a scratch stock or router. The frame pieces have end miters. For a piston fit, make the tray $\frac{1}{64}$ " smaller than the opening. (If you plan to cover the interior of the box with moiré silk as I did, you'll need to adjust the tray sizes to fit.) Cut a $\frac{1}{16}$ "-wide x $\frac{1}{16}$ "-deep groove $\frac{1}{8}$ " up from the bottom edges to accommodate the tray bottom, then rabbet the edges of the tray bottom to fit.

Divide the depth of the tray in half and cut shallow dados into the ends to accept the lengthwise divider. Divide that space in half, cutting dados to accept the short divider. Glue the tray together as you did the box and add ebony corner splines for strength. For a finished touch, fit the tray sections

with velvet-covered cardboard.

Apply a semi-gloss or satin finish and your masterpiece is complete. **PWM**

Autumn enjoys woodworking and writing; she finds inspiration from living in the foothills of Washington's Cascade Mountains.

ONLINE EXTRAS

For links to all online extras, go to:

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BLOG: Discover other top-notch boxes, including the author's prize-winning design.

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■ ShopWoodworking.com



Shop-made Tail Vise

BY DON WILLIAMS

Transform your workbench with custom-fit workholding – without any fuss.

For many woodworkers, especially those of the Galoot persuasion, a workbench with a tail vise of some sort is a fundamental necessity. These vises are integral to most European-style benches, and there are now extraordinary aftermarket options, some of which I own. But what are your choices if you don't happen to possess one, or if one of the manufactured vises doesn't fit your needs?

One of the great benefits of craft skills, for me, is the ability to change and form my immediate working environment to fit my preferences and expand my productive capacity. The recent addition of a shop-made tail vise to my old torsion-box workbench

demonstrates this perfectly. You can easily adopt and adapt the principles and construction techniques I used to your own situation.

The resulting accessory is sophisticated and elegant, and it transforms your bench. But it does not require extraordinary tools or equipment to make. If you have access to a good table saw and drill press, a few standard hand tools and have reasonable measuring and layout skills, you can knock this out in less than a day.

My workbench was the first major project I undertook after we moved almost three decades ago, with a limiting factor being the small space I had to occupy. The final result was a stout little bench with an incomparable Emmert K-1 vise from an earlier stint as a foundry patternmaker, and a 48" twin-screw face vise. As I gravitated toward more handwork, I became increasingly dissatisfied with the absence of a tail vise with a movable bench dog to hold lumber flat on the benchtop. My solu-



Perfect position. The front edge of my torsion-box benchtop (inset) is the perfect location for a tail vise with a movable dog. The finished vise (above) forever changed the way I work in my shop.

tion was to create a homemade tail vise that's easy to replicate.

In recent years, the proliferation of interest in workbenches and vises has led to an embarrassment of riches along these veins, including several excellent "off the shelf" alternatives. Many, however, require either extreme modifications to an existing workbench, or the construction of a new bench altogether.

My bench has a torsion-box top rather than a solid slab, so most of the available products were not viable. Instead, using mostly parts from industrial supply vendors and some 1/2" Baltic birch plywood, I was able to retrofit my bench with an excellent tail vise. It nestled exactly into the space I had to perfectly serve my needs.

This "add-on" feature employs the long-standing concept basic to all tail

"Progress is impossible without change, and those who cannot change their minds cannot change anything."

—George Bernard Shaw (1856-1950),
Irish playwright

vises – a fixed dog embedded into the top of the bench paired with a in-line moving dog – to provide the holding function for my workpiece. The end result is a bolt-on enhancement that can immediately change both your work habits and capacity.

I had two design considerations. The first was the unalterable dimensions involved. My workbench top is 5" thick, and the length of the space available for a retrofit along the front edge of the bench was 32". Second was my increasing attraction to wheel-handled vises. I decided to give my vise an 8"-diameter recycled wheel handle, which required me to design the vise so the wheel did not extend above the benchtop.

Construction began by cutting the 8" x 32" front and rear plates, and gluing up some quadruple-laminated spacer blocks made from Baltic birch plywood. The blocks are the same width as the plates.

The size of these pieces reflected both the bench thickness and the depth necessary for the hand wheel to fit on the screw that drove the moving carriage back and forth. One of the blocks is used at the business end of the unit as the platform for laying out and assembling the guts of the vise. A second block fits near the mid-point of the unit, as I later describe.

Design & Build the Carriage

The next step is to decide the length of the movable-dog carriage, and how much you want it to move. These are essentially arbitrary choices. I chose a 6"-long carriage with 6" of travel. On the other hand, these are not entirely whimsical decisions because they determine the spacing of the fixed dog holes. In other words, if your carriage travels 4", you need to have fixed dog holes every 4" down the length of the vise. After this was established, I cut the 2"-thick blocks to serve as my dog spacers, and my carriage.

The dimensions of the end blocks were determined after the rest of the structure was laid out and assembled. Prior to constructing the moving carriage block, glue the spacer blocks to either the front or rear plate.

In this tail-vise configuration, the carriage moves along a threaded rod that penetrates horizontally through it. The rod also runs through a nut attached to the carriage. I chose left-handed, or reverse thread, 1" Acme-thread stock because it makes the carriage work similar to a typical end vise.

To install the setup, I first established the top-to-bottom centerline of the wheel handle, and the front-to-back centerline of the carriage block on both ends. I then drilled a hole in one end to accommodate a bronze sleeve bearing for the trailing end of the threaded rod. On the other end I drilled a 1" hole to fit the threaded rod itself.

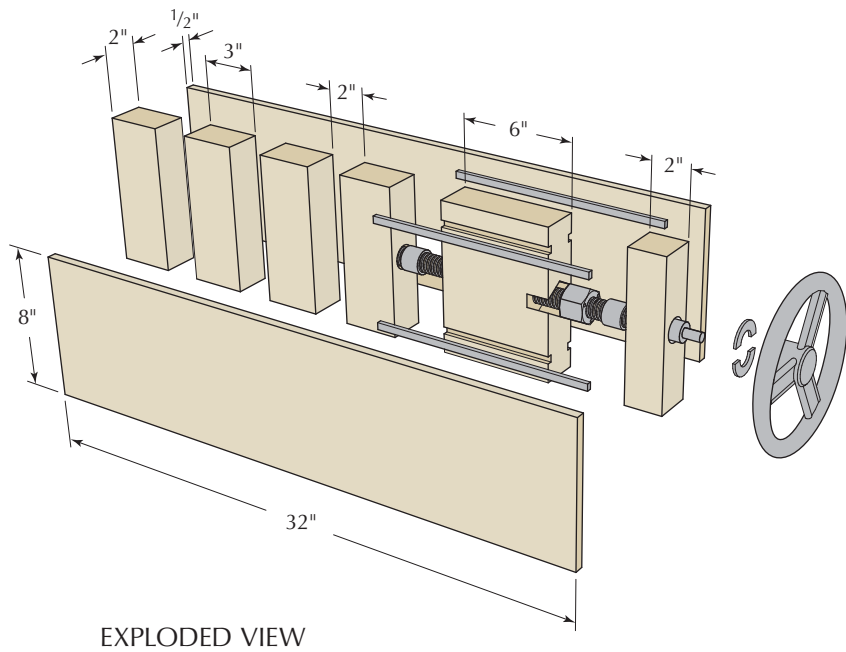
Because my drill press does not have enough travel to do the job in one step, I drilled the hole as deep as the press would allow then retracted the bit. I raised the drill press table to where the drill bit fit inside the workpiece hole, clamped everything in place and



Quad-layer spacers. Blocks of four layers of Baltic birch plywood are glued with hot hide glue and standard shop clamps. All of the wood components in this project are Baltic birch plywood.

Shop-made Tail Vise

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL
		T	W	L	
2	Front/rear plates	1/2	8	32	Baltic birch plywood
1	Wheel end block	2	2	8	Baltic birch plywood
1	Carriage block	2	6	8	Baltic birch plywood
4	Spacer blocks	2	3	8	Baltic birch plywood





Exacting setup. This cross-feed table on my drill press facilitates drilling the concentric holes for the screw and bronze sleeve bushings. Start with the larger hole first, then the smaller hole inside.



Quickly defined. A simple backsaw makes it quite easy to cut the outlines for the cavity into which the nut will go.



Sitting just right. Fitting the nut is perhaps the fussiest part of the whole project. Make sure it aligns with the thread-screw hole and is flush with the surface.

finished the hole through to the opposite side.

I don't own—and hope to never have to purchase—any left-hand thread taps and dies. I needed to install the left-hand thread, 1" Acme nut into the carriage block to serve as the engagement for the threaded rod. I threaded the nut onto the rod, inserted it into the carriage block then marked the outline of the nut on the block.

Using a backsaw I sawed the lines of this hexagonal outline, then excavated the cavity with a hammer and chisels until the nut seated firmly and squarely in the void. I then attached the nut to the carriage with screws through countersunk holes drilled through the nut.

The Carriage Guides

The last phase for the carriage was to create guides or "ways" which keep the carriage riding square while in use. (Almost any hard, smooth material will suffice for the ways, but I chose steel stock from my scrap drawer.)

With a dado stack, I cut $\frac{3}{8}$ " x $\frac{1}{4}$ " grooves about 1" from the top and bottom edges of the carriage, on both the front and back plates. I drilled three small countersink holes into each of the four rectangular rods to allow easy attachment to the inner faces of the front and rear plates.

Locating the ways is easy. Place the carriage against the inside of the rear plate in the correct position, making sure to get the block aligned exactly with the top of the plate. Insert two of the ways into the carriage block with the countersunk side up then attach the ways to the plate with appropriate-sized flathead screws. Repeat on the other plate.

One at each turn. I drilled and countersunk six holes around the perimeter of the nut, then screwed it into the carriage block's hexagonal cavity.

SUPPLIES

McMaster-Carr

mcmaster.com or 330-995-5500

1 ■ 1" x 4 threads/inch, left-handed Acme thread stock, #98935A468, \$45

4 ■ 1" x 4 threads/inch, left-handed Acme nuts, #91808A054, \$8.20

1 ■ 8" cast iron wheel
#6025K13, \$25

2 ■ $\frac{13}{16}$ " inside-diameter washers
#93852A108, \$1.80

Grainger

grainger.com or 330-995-5500

1 ■ 36" x $\frac{1}{4}$ " x $\frac{3}{8}$ " steel bar stock
#2HHA5, \$15

1 pkg ■ 1" x $\frac{1}{4}$ " x 1" bronze sleeve
#3FJT7, \$17

Prices correct at time of publication.

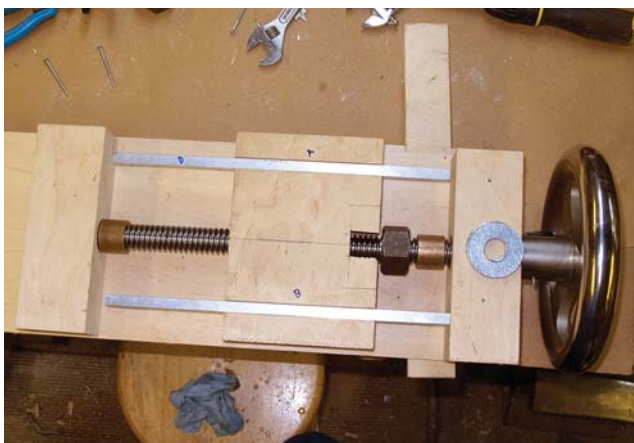
Your choice for dogs in the moving carriage is entirely up to you. Removable doweled blocks work fine as a dog on the top of the carriage, as do rising bench stops or a simple threaded set screw.

At some point I'll try to talk myself into installing fancy dovetailed dogs (like those on H. O. Studley's bench) into each end of the carriage, but for now any of the former options work fine, as will a large screw countersunk to be level with the top surface of the carriage.

Final Assembly

Once the carriage was completed, I drilled a hole in the first fixed spacer block to accommodate another bronze sleeve bearing, and glued the block in





Just like this. Here, you can see the complete moving carriage setup prior to final assembly.



Two methods. I elected to use removable dowel blocks and a simple threaded set screw for my moving carriage.

place – this bearing assures a wobble-free performance for the carriage until long after my ashes are spread on the mountain behind my barn. The remaining spacer blocks were glued in place based on the dimensions of the dogs themselves. I chose square cross-section dogs that measure 2"x 2", and are 8" long.

On the back of the fixed block at the wheel end of the setup, I drilled a precise hole to hold a final sleeve bearing.

On the handled end of the threaded screw, I had to grind, file or machine the rod to accommodate the wheel, then dry-fit the assembly, including the movable carriage, its two retaining blocks and the hand wheel.

With the pieces all in position, I noted the outer surface of the fixed-end block on the rod. This locates where to cut a groove around the circumference of the thread stock for a garter.

The fittings to retain the drive screw are standard $\frac{3}{4}$ " inside-diameter washers – to make the connection robust, I used two washers stacked together.

The outside measurement for the drive screw is 1", so I figured an $\frac{1}{8}$ "-deep groove the width of two washers would be easy enough to cut with a file (or with my machine lathe if it came to that).

I marked and drilled the screw holes on my drill press, although a handheld drill would certainly suffice.

After drilling the holes with both washers aligned, I countersunk the holes on the outer washer. Using a

hacksaw, I cut each washer in two, with the cutline turned 90° from the outer washer to the inner washer. This ensured unbreakable strength for the composite garter.



Get the job done. While a lathe makes this step effortless, careful use of a grinding wheel and file can accomplish the same end, although not quite as beautifully.



Ingenuity at work. The split garter is actually a pair of split washers in disguise. The end of the rod is modified to accept the hand wheel.

The only thing left is to assemble the entire unit, attach it to your bench, and get to work. I found my vise to be a bit stiff at first as all the pieces were seating in, but once that happened, it worked smoothly and easily.

By following and adapting the ideas here, I believe you too can add a moving-dog tail vise to the front edge of your workbench. The advantages are to make your bench exactly the way you want, and to avoid making a new bench or radically modify an existing bench. Plus, it provides the undeniable pleasure of making something exceedingly useful. It just might change forever the character and capability of your bench and the way you approach our craft. **PWM**

Don is currently researching H. O. Studley, and has retired to the Virginia mountains where he shares his historic craft and homesteading interests at donsbarn.com.

ONLINE EXTRAS

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Greene & Greene-style Blanket Chest

BY MARC SPAGNUOLO

A simple approach to a sublime design.

I've been enamored of Greene & Greene furniture since my early days of woodworking, well before I possessed the skills to produce such a piece. Since that time, this style has become a regular part of my woodworking vocabulary, and I enjoy making reproductions and interpretations of classic Greene & Greene designs. This blanket chest is a re-imagining of an original piece designed by the Greene brothers (Charles and Henry) for the Thorsen House in Berkeley, Calif.

My wood of choice for this project was khaya, sometimes referred to as African mahogany. The original Thorsen House box was made from red oak—so don't hesitate to use a domestic species

if exotic woods don't suit your taste or budget.

The bottom of the blanket chest is made from $\frac{3}{4}$ " plywood, and you can save a bunch of cash by using a domestic-veneered species instead of seeking out mahogany-faced stock. The ebony trim comes from a 2" x 2" x 12" turning blank, which should provide enough ebony for several projects.

The case panels are glued up from several narrower boards. Take care to arrange your boards in such a way that they complement one another in both grain pattern and color. After cutting to length and width, the wide finger joints are milled on each end with a router and a template.

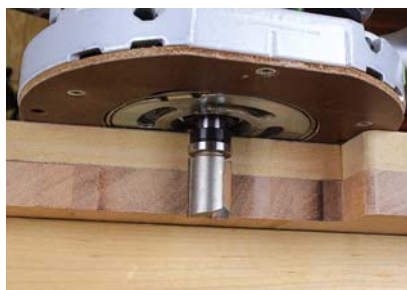
Simple Template

Technically you need two templates: one for the female part of the joint and one for the male. Here's a cool way to make them both in one shot. Cut a piece of $\frac{1}{2}$ " or $\frac{3}{4}$ " sheet-good stock to approximately 16" x 24", making sure the corners are perfectly square. Rip the piece into two 4"-wide strips and one $7\frac{1}{2}$ "-wide strip. With the $7\frac{1}{2}$ " strip in the center, glue the three pieces back together after sliding the center strip out exactly $1\frac{1}{16}$ ". Just like that, you have a two-in-one template that matches the $15\frac{1}{2}$ " width of our case panels.

The protruding fingers of the case joints have $\frac{3}{16}$ " roundovers. Save yourself some extra work later by includ-

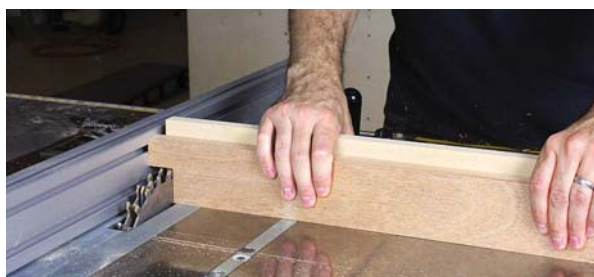


Slide it. Moving the center piece of the template and reassembling it produces mating profiles on each end of the template.



Cut close. Saw close to the pattern lines, then use a bearing-guided bit in the router to create joints that match the template.

Down below. The single fingers on the base can be cut at the table saw.



ing them in the template. I use a no-frills method for making the roundovers; use a $\frac{3}{8}$ " drill bit as a lay-out guide, then use a sanding block to create the actual profile.

Trace the shape of the finger joints on each chest side, then cut away the excess material. Stay at least $\frac{1}{16}$ " off the line. With the template clamped to the workpiece, a router outfitted with a bearing-guided pattern bit creates the finger joints on both ends of each board.

The inside corners need to be squared, then you can dry-fit the case and evaluate each joint individually. In all likelihood, the finger joints will be just a bit too tight. Use a chisel and light paring strokes to allow the fingers to nest into one another with ease.

The bottom panel of the chest rests in a groove that runs around the inside

of the case. The groove is cut using a router outfitted with an edge guide and an undersized plywood bit. (Most $\frac{3}{4}$ " plywood is never truly $\frac{3}{4}$ " thick, so I use a plywood bit specifically designed for this purpose that's $\frac{1}{32}$ " undersized.)

The $\frac{3}{8}$ "-deep groove on the side panels runs from one end to the other. But on the front and back panels, a through-groove would be visible from the outside of the case. Those grooves have to stop before the end of the panel. The router bit leaves a rounded shape at the end of the groove; use a chisel to square it up.

The base for the chest consists of a deck, a finger-jointed base and $1" \times 1\frac{1}{4}"$ cleats installed for additional support.

"I did not always give them what they wanted but always what they liked."

—Charles Greene (1868-1957),
American architect

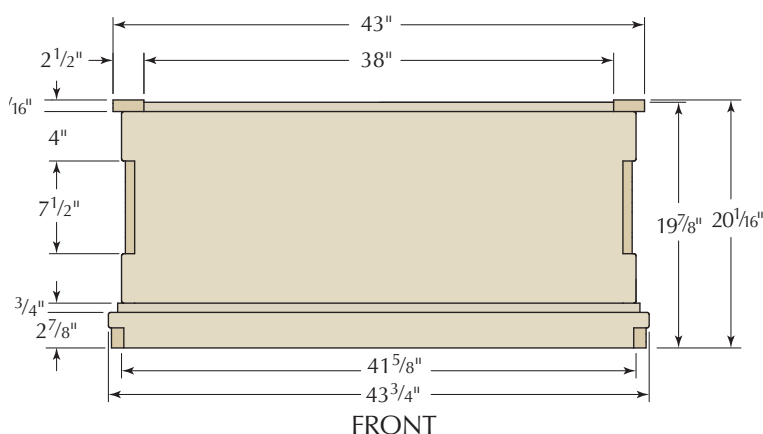
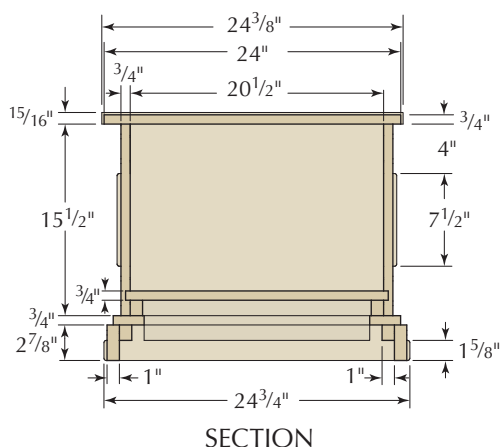
The deck is a large mitered frame. The 45° miters are cut at the miter saw using a stop-block for repeatability. To reinforce the miters, I installed a small loose tenon at each joint. Biscuits, dowels or pocket screws would work, too. Once the glue dries, I use a No. 80 cabinet scraper to smooth the frame and level the joints.

The base parts are milled from $\frac{5}{4}$ stock and have finger joints at each end. There's no need for a template here. Simply measure and mark out the joinery, then cut to the lines. It's a good idea to test-fit the base parts as you go to ensure they fit together perfectly.

I've Got a Secret (Drawer)

As designed, the base structure has a lot of dead space. The optional hidden drawer provides an opportunity to recover that space in a very cool way. The base side becomes the drawer front and a frame structure supports the drawer box. You can make the drawer as large or small as you want. Just make sure you leave room for the cleats used to attach the base to the deck.

Build the drawer and frame, double-checking the measurements against your actual workpieces. This drawer doesn't require the level of precision we usually aspire to, so I err on the side of caution by giving the drawer



some extra clearance. Unlike regular drawers, this one is at the bottom of a heavy case and it won't be convenient to adjust should it ever bind (as you can see in the photo below).

The drawer parts attach to the base side (the drawer front) with sliding-dovetail joints, and the bottom slips into grooves cut in all four parts. The frame pieces are cut to size and fit in dado joints at the base front and back.

The drawer runners are glued into grooves cut in the sides of the drawer compartment. The drawer receives a slightly wider and deeper groove to allow about $\frac{1}{32}$ " extra play as it slides in and out. The key is to cut the grooves the same distance from the top of each piece ($1\frac{3}{8}$ "). This will keep the drawer flush with the top of the framework and prevent binding.

The base is assembled with glue and screws. Once dry, test-fit the drawer. If the drawer binds at all, put on your investigative cap and determine the source, then use a chisel or scraper to relieve the offending material.

Behind the Plugs

The blanket chest is held together primarily with screws. Ebony plugs not only hide the screw heads, they also give the piece that classic Greene & Greene styling. The mortises for the ebony plugs need to be cut prior to assembly. Lay out the mortises as shown in the drawing (at right).

I like to draw each square mortise using a plastic square template. While this may seem like overkill, it actually serves as a sanity check that helps me avoid misplaced plugs. The mortises are then cut into the case and base parts using a $\frac{3}{8}$ " square hole punch.



Under the end. The drawer should slide easily and the drawer front should nest snugly below the base front and back.



Two steps. Mortises for the ebony plugs are created by punching a square hole, then removing the waste with a drill.



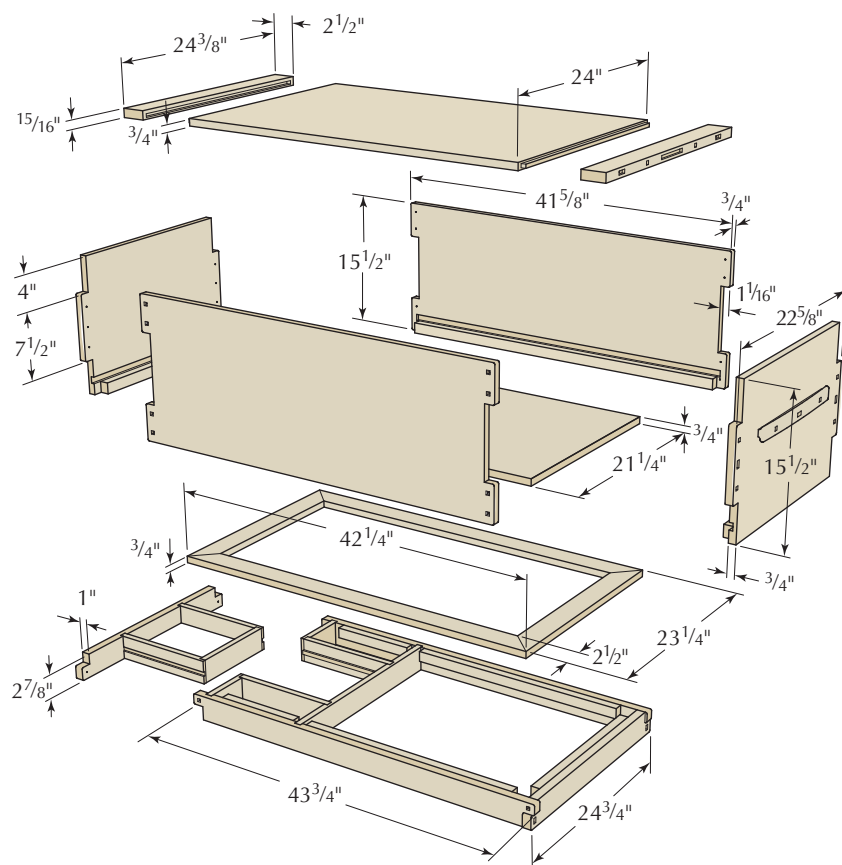
This, not that. Mark the edges to be rounded over with chalk to help prevent shaping the wrong edges.

The chest has $\frac{1}{8}$ " roundovers on all the long edges of the case and $\frac{3}{16}$ " roundovers on the breadboard ends and base. A router can do the bulk of the work but some areas need to be hit with a rasp and sandpaper to complete the profile.

The Parts Become One

With the blanket chest case dry-assembled, measure and cut the $\frac{3}{4}$ "-thick ply-

wood bottom panel to size. The panel can then be glued into the groove on the case front and the rest of the case pieces will come together easily. Using glue on the wide finger joints is optional because the unit is held together with screws. Clamps hold the assembly together as you drive screws. Be sure to check the case for square. Use a diagonal clamp to make any necessary corrections.



EXPLODED VIEW



Simple assembly. Screws located under the ebony plugs hold the case together.



Second time around. Another set of cleats help hold the base firmly to the deck and case.

Attaching the deck and base to the assembled case is easiest to do with the case upside down. A set of cleats are glued to the case then flushed to the bottom edge. The cleats provide extra support, as well as a safe zone for driving screws. The deck is then centered on the case, and screwed into position through countersunk holes.

Before permanently attaching the base to the deck, it's a good idea to drill, countersink then screw and glue the cleats to the base. Trying to do this

work later proves difficult. With the cleats attached, the base is then centered on the deck and attached with #8 x 1 3/4" screws.

On Top of it All

The blanket chest lid has breadboard ends that stabilize the lid panel and add depth and interest. The breadboards are joined to the panel with a long tongue-and-groove joint. The groove is cut into the breadboards using a drop cut at the router table; make sure to stop

prior to the blowing out the ends. The tongue, with its end notched to fit the groove, is routed on the lid panel. Look for a snug fit.

The ends are then screwed into the lid panel through several mortises created for the ebony bars and plugs. The long center bar isn't functional, but it certainly wins style points. The 3/8" x 3/8" mortises are made using the 3/8"



On the end. The groove in the breadboard end fits over the tongue of the top panel. Screws in oversized holes hold the two pieces together.



Undercover. Ebony plugs will cover the screw heads after the breadboard ends are attached.

Greene & Greene-style Blanket Chest

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
❑ 2	Case front/back	3/4	15 1/2	41 5/8	Khaya	
❑ 2	Case ends	3/4	15 1/2	22 5/8	Khaya	
❑ 1	Case bottom	3/4	21 1/4	40 1/4	Plywood	
❑ 2	Deck front/back	3/4	2 1/2	42 1/4	Khaya	
❑ 2	Deck ends	3/4	2 1/2	23 1/4	Khaya	
❑ 2	Base front/back	1	2 7/8	43 3/4	Khaya	
❑ 2	Base ends	1	2 7/8	24 3/4	Khaya	Optional drawer front
❑ 2	Handles	7/8	1 3/8	14 3/8	Khaya	
❑ 1	Lid panel	3/4	24	39	Khaya	1/2 TBE*
❑ 2	Breadboard ends	15/16	2 1/2	24 3/8	Khaya	
❑ 1	Plug material	2	2	12	Ebony	

OPTIONAL DRAWER PARTS

❑ 2	Drawer sides	3/4	2 3/4	12 1/2	Khaya	
❑ 1	Drawer back	3/4	2 3/4	10 1/8	Khaya	
❑ 1	Drawer bottom	3/4	9 7/8	11 7/8	Poplar	
❑ 1	Frame cross brace	3/4	2 7/8	23	Khaya	
❑ 2	Frame sides	3/4	2 7/8	12 1/4	Khaya	
❑ 2	Drawer runners	1/2	1 1/2	11 7/8	Khaya	
❑ 2	Frame returns	3/4	2 7/8	6	Khaya	

*TBE = Tongue Both Ends

square punch. The long mortises are cut at the router table; be careful to drop and lift the workpiece using layout lines as a guide. The router bit leaves a rounded corner so use a chisel to chop the ends square.

The breadboards are then drilled with a $\frac{3}{16}$ " drill bit. The holes are oversized to allow for wood movement as the lid panel expands and contracts.

Round over the edges of the breadboards and the lid panel before assembly. Attach the breadboard ends to the panel using a small amount of glue at the center, then drive 3"-long screws into the holes to keep the ends tight to the top.

Sculpted Handle

The handles may look simple at first glance, but the arch-and-cove profiles present a few challenges. Before shaping the handles, cut the mortises for the ebony plugs.

To shape the arched top of the handle, I use a curved template to help trace the shape of the arch, and to later serve as a router fence. Start with a piece of

$\frac{3}{4}$ "-thick sheet stock cut to approximately 10" x 32" (sized for clamping on a router table).

Mark the center point then measure out 10" in each direction. Mark the peak of the arch $\frac{5}{16}$ " up on the centerline. Draw the curve from the peak to the 10" marks using a drawing bow. If you don't have a drawing bow, draw the same layout 1" in from the edge and use nails to hold a bending strip in position. Cut the curve with a jigsaw or band saw and smooth the arc using a spindle sander, rasps or a flexible sanding strip.

With the curve established, transfer the arc to the top of each handle. Align the center of the curve with the center of the handle stock and each end with lines drawn $\frac{3}{16}$ " down, leaving $\frac{11}{16}$ ". Trim to your lines. I use a stationary belt sander to remove the stock to create the arch, but spokeshaves and rasps are another option.

At the router table, I use a $\frac{5}{8}$ " round-nose or core-box router bit to make the cove that goes around the perimeter of the handle. I start with the ends, using a backer board for additional support.

The long sides are routed using the curved template as a fence. Note that the workpiece is pushed from left to right (instead of right to left like you normally do) because the workpiece is behind the bit. (This process is a little tricky, so exercise caution and make the profile cut with multiple passes.)

Round over the handle and sand it thoroughly to make sure there are no

sharp corners, except at the base where the handle attaches to the case.

The handles are glued and screwed to the case sides $8\frac{3}{4}$ " up from the deck. I use scrap to support the handle while I drill and drive the $1\frac{1}{8}$ "-long screws. Double-check your screw length to ensure they won't punch through the interior of the case.

A Passel of Plugs

The blank of ebony is cut into sticks that are $\frac{1}{64}$ " over $\frac{3}{8}$ " square. The blanks are first cut into wide strips, which are then laid flat and cut into sticks. Because cutting thin strips can be dangerous, use a sacrificial push block.

To pillow the ebony plugs, I use a method I learned from William Ng. It involves a drill, a variety of sandpaper grits and a soft foam pad. With a chisel, chamfer the corners of the last inch of each stick. This allows the stick to fit into a standard $\frac{3}{8}$ " drill chuck.

Starting with #80 grit, pulse the drill with the end grain of the stick resting on the sandpaper and let the weight of the drill do the work. The sandpaper can be backed up with anything that has give. Move from one grit to the next until you reach #1,000 grit to bring the surface to a polished shine.

With the pillow created on the end of the stick, a simple jig is used to cut the plug off the end. My jig is made from scrap and holds the stick snug for sawing, guides the saw blade for a nice square cut and ensures each plug is the same length.

The remaining ebony sticks can be further trimmed at the table saw for use as bars, ripping them down to about



Back up. Scrap wood behind the handle blank makes it easier to control the work as the cove is routed in the end.



Double duty. The curved template is used as a router fence that supports the arched handle while the cove profile is routed.



Hold up. A block of MDF supports the handle as it is screwed in place to ensure that the handle is positioned accurately.

SUPPLIES

Lee Valley

leevalley.com or 800-871-8158

1 ■ square hole punch, $\frac{3}{8}$ "
#50K59.06, \$29.50

4 ■ $\frac{1}{2}$ " rare-earth magnets
#99K31.03, \$1.06 each

Rockler

rockler.com or 800-279-4441

2 pr ■ #60 torsion hinges
#34353, \$29.99 each

Prices correct at time of publication.



Spin it. A series of sandpaper grits is lined up on a flexible pad, and the drill spins the ebony into each grit.



All the same. This jig is used to cut each plug to an identical length.



Hands back. This simple made-from-scrap jig holds the ebony bar so the profile can be safely routed.



A pattern emerges. The dark plugs and bars add a decorative element and hide the screws.

1/4" in one dimension and leaving the other dimension at 1/64" over 3/8". To create the pillowed effect on the bars, I use a 1/2"-radius roundover bit and lower the bit so that it just catches the vertical portion of the cutter. With the help of another jig (shown above), you can safely take two passes to create the pillowed effect.

The square plugs are tapered on each side so they wedge into the mortises. This is done with a few strokes of a chisel. For the bars, I use sandpaper to create the taper. To install the plugs and bars, use glue and a plastic-headed hammer. The key is to use light but firm taps that leave the plugs proud of the surface. Be careful not to push the plug in too far because it is very difficult to remove without doing damage.

Dye & Lacquer

When it comes to Greene & Greene projects, it's hard to argue with the beauty and elegance provided by the right stain. The dye mixture I use is a 1:2 ratio of General Finishes Medium

Brown to Orange. The dye is water-based, so I raise the grain with water and sand before applying the dye. The dye is sprayed coating the surface liberally, then I wipe away any standing liquid with a pre-moistened terry cloth sponge.

For a topcoat I used three coats of CAB acrylic lacquer with light sanding between each coat. After a week of cure time, I rubbed the surface with a #2,000-grit abrasive pad. The high grit doesn't change the sheen of the finish, but it produces a glass-smooth surface.

Before calling this project complete, there are a few loose ends to tie up, including the drawer magnets, the hinges and corner blocks (to raise the chest off the floor).

The hidden drawer is held closed with rare-earth magnets. I used them on the inside of the drawer face, but outside the drawer box. The 1/2"-diameter magnets are epoxied in shallow holes.

You can use traditional butt hinges to attach the lid to the case, but I prefer to use torsion hinges. They install in

seconds with no mortising and allow the lid to stay open without the need for additional safety mechanisms.

Four corner blocks are cut from scrap wood and attached to the inside corners of the base, with the blocks sitting under the deck. These keep the chest off the ground while allowing the drawer to operate properly. If you have carpet, you may consider longer blocks that raise the case even higher.

This blanket chest serves as a great starting point for anyone looking to dive into the world of Greene & Greene, and it only scratches the surface of what the style has to offer. Even if you're not a fan of Greene & Greene, you probably have an appreciation for the care and attention that goes into creating the eye-catching details. **PWM**

Marc is the author of the new book "Hybrid Woodworking" and the host of "The Wood Whisperer" (thewoodwhisperer.com).



Swing & hold. Torsion hinges serve to hold the lid open without any additional support.

ONLINE EXTRAS

For links to all online extras, go to:

■ popularwoodworking.com/apr14

VIDEO: Watch an interview with the author.

WEB SITE: Visit Marc Spagnuolo's web site.

ARTICLES: Discover more about Greene & Greene, including projects, finishes and details.

PLAN: A SketchUp model of this project is available free online.

IN OUR STORE: Pick up a copy of Marc's new book "Hybrid Woodworking" (Popular Woodworking).

Our products are available online at:

■ ShopWoodworking.com

From Punk to Period

BY CHRISTOPHER SCHWARZ

Freddy Roman built his career with hard work, outstanding teachers and plaid shirts.

You know those chests filled with tools that people give to children? The tools aren't much good for building anything. But the chests do have another purpose: planting the seed of an idea in the child's mind.

Such was the case with Freddy Roman. An uncle gave him a box with a complete set of tools – handsaws, screwdrivers, the works. Roman was too young to use the tools, but something about them became lodged in his mind.

“And when I saw Norm Abram and Roy Underhill on TV, I said: ‘I want to do what those guys do.’”

While Roman doesn't yet have his own television show, he has already created an impressive body of work for a 31-year-old woodworker. His work is on display at the Hamilton Grange National Memorial (Alexander Hamilton's home in New York), he's working for the Windsor Historical Society in Connecticut to build reproduction furniture for its buildings, and he is producing for clients Federal-style pieces that would be impressive for a woodworker twice his age.

Despite his young age, Roman's path to this point wasn't easy or fast. And he is quick to acknowledge he had some extraordinary help from teachers including Phil Lowe and Patrick Edwards, plus fellow woodworkers such as Bob Van Dyke and Will Neptune. But in talking to Roman and the people around him, it's clear he'll go to any

Young & ambitious. Freddy Roman's path to becoming a professional woodworker started on the streets of Hartford, Conn., and passed through the shop of world-class woodworker Phil Lowe.





Hand or power. After getting schooled in hand tools by Phil Lowe, Roman took up shop with Will Neptune. Neptune showed him how to use machinery to do amazing things, such as cutting all the joinery for this chest of drawers.



His favorite band. One of Roman's obsessions is making banding and studying the hand processes used to produce historical forms.

lengths to be a successful professional woodworker.

"I am amazed at what he has been able to learn. It is very impressive," says Van Dyke, who runs the Connecticut Valley School of Woodworking and hired Roman years ago. "Look at that Seymour desk – he did two of them (for private clients) – he got the opportunity to make some pretty nice stuff."

But Van Dyke, who counts Roman as a friend, is also quick to point out that Roman still has a ways to go to reach his full potential as a furniture maker.

"Sometimes I tell him: 'Open your eyes and shut your mouth. You might learn something,'" Van Dyke says.

An Uncertain Beginning

As a kid, Roman lived in two worlds. He had family members who belonged to gangs in Hartford, Conn., and his mother was constantly moving the family around to get her children in better and better schools.

Roman, on the other hand, had his head in the clouds – almost literally. He was enamored with architecture and would wander around Hartford, Boston and New York City looking straight up at the buildings, studying their structure and – more significantly – the way they were embellished.

"I fell in love with the shapes and entablatures and the columns," he says. "I was one of these weirdos who would go to New York and just look straight up. I'd imagine these craftsmen work-

ing on each site. Every embellishment was deliberately made. Not only was it the structure that I liked, it was also the embellishment."

So Roman went to college to study architecture and drafting, but says he left "because I knew more about drafting than my instructors."

Unsure of his next step, Roman began working as a supervisor at a CVS Pharmacy and applied for a job at a Woodcraft in nearby Manchester, Conn. The person conducting the interview? Bob Van Dyke.

"Bob thought I was a punk kid," Roman says, laughing.

The unusual thing about this particular Woodcraft is that it is physically attached to the Connecticut Valley School of Woodworking. So while Roman was helping customers in the front of the store, there were world-class teachers lecturing just past the back wall.

"One day I was checking my schedule (at the store)," Roman says, "and there was this guy named Phil Lowe, planing away and talking. I got sucked in and fell in love with the work immediately."

Roman decided he wanted to attend Lowe's school, The Furniture Institute of Massachusetts, which was a two-year program. So Roman took on a third job stocking shelves at night.

"I guess I put the bug in him," Lowe says. "When Freddy showed up here he was a punky sort of guy. And I guess we set him straight pretty quickly."

The first order of business, Lowe says, was to learn hand drafting and how to draw projects full-size. Then it was off to the bench room to learn hand skills and to design a pair of sawhorses. Next, students learn the machine processes and build their sawhorses. Then they design and build a simple table, Lowe says. The final prescribed project is a cabinet-style tool chest. And Roman's chest is still in use today below his workbench.

"Freddy certainly wasn't my best student, but he had the passion," Lowe says. "He persevered. Actually, toward the end of his time he came up short on funds. I gave him a spot in the shop doing repair work and had him do that to pay off his responsibility."

Learning the repair side of the business turned out to be a good thing – Roman still repairs chairs and refinishes furniture between commissions. After completing the program at The Furniture Institute of Massachusetts, Roman stayed on for another year working for Lowe in the shop.



In the works. One of Roman's side lines is rescuing, restoring and reselling vintage machinery, such as this vintage Delta band saw.



A nice arrangement. Roman toys with some burl panels he has laid up for a future project.

"It was sad to leave Phil," Roman says. "That was all I knew. He's not only a mentor, but a father figure. He lectured me day and night about what I did right and wrong."

Going Pro

After leaving Lowe's school, Roman did some other jobs, including time in a kitchen cabinet shop. But one day six years ago he got an offer that would take Roman in a different direction.

Woodworker Will Neptune was looking for someone to share shop space but who wouldn't interfere with his work. Roman jumped at the opportunity.

"I grew significantly as a craftsman because of it," Roman says. "Phil gave me hand skills and taught me that power tools were a roughing tool. Will says if you pick up a hand tool, you are losing money. Now I feel comfortable with a hand tool or a power tool. I have the luxury of doing it either way."

Today Roman and Neptune still share shop space in southern Massa-



Pays the bills. Repairing and restoring furniture – such as these chairs – fills in the gaps between furniture commissions.

chusetts. The machine room is filled with equipment that both of them have brought to the shop. What's remarkable about the machine room is all of the significant and surprising modifications that Neptune has made to the machines (with Roman's assistance at times). The table saws have been altered to take larger blades. The European band saw has been reworked in ways that are difficult to describe. Quite frankly, the machines are tweaked to a state I've never seen before in a workshop.

And then there's a shooting board sitting on top of one of the table saws.

The contrast between the two worlds – hand and power – is heightened even more in the bench room. Against the outside wall of the shop, Neptune's area has a simple bench and a few tools, and it is dominated by a small table he is working on.

Roman's side of the bench room is crammed (which is too mild a word) with handplanes, chisels and clamps, clamps, clamps. Below Roman's workbench is the chest he made at The Furniture Institute of Massachusetts, and it is absolutely packed with planes, screw-



Cylinder desk. With this ingenious piece (a reproduction of a high-style Federal desk), the lid lifts automatically as you pull out the writing surface.



Cover-ready. Roman built this Federal dressing chest. The original is on the cover of the book "Antique American Federal Furniture by John and Thomas Seymour."

"It is the first of all problems for a man to find out what kind of work he is to do in this universe."

—Thomas Carlyle (1795-1881),
Scottish philosopher & author

drivers, chisels and every other sort of hand tool needed for woodworking.

With these tools, Roman worked on one of the most significant projects of his career so far – helping to produce reproduction furniture for the Hamilton Grange Memorial. For a year and seven months, Roman worked on 14 pieces for the Hamilton Grange, including lap desks, two entry hall tables, a sideboard, a roll-top desk, side chairs, armchairs and a sofa.

“All of them were Federal, Neoclassical,” Roman says. “And there was also these French chairs. Those were the worst chairs of my life. Other than those chairs, everything was so exciting and enjoyable. I’d only build another one of those French chairs for \$100,000.”

The work for the Hamilton Grange was exacting because Roman and the other craftsmen had to reproduce every aspect of the pieces, including the dovetail angles and the mistakes the original builder had made.

With that job behind him, Roman is building pieces for the Windsor Historical Society, he’s rehabbing woodworking machinery to sell to fellow woodworkers, he’s restoring harps and he has a long row of antique chairs in his shop that need fixing.

“Phil says if you know how to repair



Get to work. Roman stores many of his hand tools in the tool chest he built while attending The Furniture Institute of Massachusetts.

Driven for drivers. Like his mentor, Phil Lowe, Roman has a penchant for collecting screwdrivers, which he keeps in his tool chest.



Simplicity. In designing and making these tables, Roman says he was trying to find a balance between Shaker and Federal styles. In other words, simple and clean lines but with a touch of embellishment.



things, then you will always be busy,” Roman says.

Roman’s goal, however, is to make as much Federal-style furniture as he can – the stuff with veneer, stringing, inlay and banding that he loves so much. As he takes up a handful of banding he made (by hand) in his shop, his enthusiasm for the craft almost boils over as he describes how he looks at a piece of furniture.

“I like to run up to a piece to look at the small details first, and then I step back and say, ‘Wow. That made the cornice,’”

Roman says. “All the little details are what attracted me to the craft.”

Oh, and he was also strangely attracted to the shirts.

“I do know why I love plaid shirts,” Roman says. “I love Norm. It was Roy Underhill and Norm. Norm with his table saw, and then you see Roy who brings up the hatchet. With Roy you see the man walking through the city with an axe and toolbox at the beginning of the show. I feel like that – I’m an outsider. A man in the city with an axe.” **PWM**

Christopher is the editor of Lost Art Press and author of the book “Campaign Furniture.”



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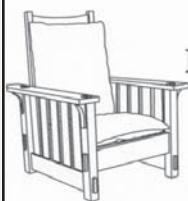
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Shop Mallet Selection

It's easy to get a handle on which whacker to choose.

If you've ever whacked a carving tool or pounded a joint using your palm or the side of your fist – I know you have because we've all done it – you know the result: a sore hand and unfinished business.

This is why we need mallets. And while a mallet is not supposed to compensate for dull tools or force an ill-fitted joint closed, it is a much-needed woodworking tool. In reality, any device will do in a pinch – I once used an old baluster for drawer dovetailing. But what mallets do we need, and why? Where do you begin?

Head Case

Mallets generally fit into one of three categories. To determine what fits where, we need only examine the head. Traditional joiner's mallets have large rectangular-shaped heads, the key word being "large." These mallets are typically wooden and have a variety of duties in a woodshop, including assembly and, as the name implies, joinery.

The head of a carver's mallet – most often turned or round in shape – is generally smaller in size. These mallets run the gamut when it comes to size and weight, and of what material it's made. There are really two camps within this category: mallets made with wooden heads and those that have brass (or other metal) as the striking surface. A carver's mallet of the non-brass variety is sometimes used for many of the duties covered by a joiner's mallet, but you seldom see the reverse. And mallets with brass or other metal heads are most often used when carving.

The third group of mallets could be best described as "other." This category is a catch-all for rubber mallets, deadblows and the like.



The better beater. Woodworking mallets come in all shapes and sizes, and in many different materials. The secret to choosing the right mallet for the task at hand is to evaluate the head.

Shape & Size for Joinery

Joiner's mallets generally are two-piece construction with a handle fit into the head, either firmly attached or with the head sliding over a tapered handle. The head is large, wide and almost rectangular in shape. The business ends of the head are end grain, and are cut at an angle to establish better contact with the item being struck. The sides of the head are most often straight and flat, and can be used too. But I don't recommend using mallet sides when you need to apply extra force.

The larger head of a joiner's mallet



Variations. The overall shape of the joiner's mallet is common, but sizes and weights vary dramatically.

CONTINUED ON PAGE 60

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allows woodworkers to easily strike their project or chisel – the required precision of that strike is lessened due to the wide surface. And the flat surface decreases the chance of a bad strike that could deflect the tool, especially if that tool has a round end.

Joiner's mallets weigh anywhere from 12 ounces to nearly 24 ounces. (Timber framer's mallets, which are similarly shaped, can be as heavy as 32 ounces.) A weight of 16 ounces or more offers plenty of punch for mortising work or when cleaning the waste out from between dovetails.

If you increase the mass of the head (larger size or added weight), you de-



Old friend. Any wooden mallet will give up the ghost over time and need to be replaced. My first mallet has been retired, but it could still do the job if necessary.



Direction deflection. A round mallet deployed against a rounded chisel handle can easily deflect the tool and result in a bad strike, which could turn your project to waste.

crease the amount of force needed to do the work, but you increase the need for stamina and strength to use the tool over long periods of time. Some manufacturers add weight by soaking the mallet in boiled linseed oil. This also preserves the wood and keeps fiber crushing (and mallet degradation) to a minimum.

Beech is a favorite hardwood for many joiner's mallets, but you'll find maple, too. It's best to use tightly grained, dense hardwoods.

What's in a Name

Round mallets are known as carver's mallets. But is that name suited to the tool? I'm willing to bet that there are more carver's mallets doing joinery work than being used to assist with carving. (I began woodworking using a carver's mallet; it was an old baseball bat that was shaped into a mallet.)

Why not use a carver's mallet for joinery? If you strike the round end of a chisel with a round mallet, you can easily deflect the blow in a direction other than that intended. While using the lighter mallet strikes typical for carving, that is an advantage. When making joints, it's not necessarily a good thing. But if your mallet work is advanced, this is seldom a problem.

If you're using a round-head mallet for joinery work, the weight needed to make the tool work its best is on par with that of a joiner's mallet. Unlike a joiner's mallet, however, you're more apt to see many different wood species used for the head of a carver's mallet. (Lignum vitae is a popular species in commercial mallets.) I believe this is because carver's mallets are popular shop-made tools; it's easy to raid your scrap bin for a variety of materials.

In many carver's mallets, the handle-to-head intersection is integral because the mallet is turned from a single piece of stock. Combining two pieces (different species or not) requires the use of a joint. Many shop-made mallets use a simple connection such as a dowel joint. Some commercial carver's mal-



Your way. Because carver's mallets are so easy to turn in a home shop, they are often created from a variety of different wood species, including exotics. And different species can be mixed or matched.



Use finesse. Metal-headed mallets aren't for whacking out a set of dovetails or chopping mortises; these mallets are for swinging gently such as when carving.

lets use a mechanical fastener buried below the surface.

Brass Changes Tasks

Whenever I see brass as the head of a carver's mallet (bronze or steel, too), I think carving and light-duty work. I don't think joinery. Brass mallets, in my opinion, are not to be used to whack your chisels when dovetailing

or other joinery work. Light taps associated with carving are the perfect use of brass-headed mallets.

Metal striking your chisels mushrooms the handles, which can eventually split them – this is also why regular hammers should be avoided for joinery work. There is one exception: If your chisels have metal rings or caps at the ends, striking the tool with a metal mallet is acceptable.

Brass mallets can weigh as much as joiner's mallets and other carver's mallets. Smaller brass-headed mallets – shaped similar to hammers – generally range in weight from 6 ounces to 14 ounces. (You can find examples that weigh considerably more.) In my opinion, these mallets are perfect for light work, including but not limited to driving pegs and setting plugs.

Build a Better Mousetrap

Toolmakers are seldom content with available products. Mallet manufacturers are no different. This desire to make better tools has led to a few mallets that incorporate different materials or processes beyond a good soaking in boiled linseed oil.

The most well-known modern change to a carver's mallet is to wrap the business end with urethane. These mallets are quieter in use, but I'm not



Build it better. Mallet makers are determined to make better tools. Here you see urethane-wrapped, infused and leather-faced mallets. Urethane is easier on your tools while the infused mallets are more resistant to wear.



Less bounce. Dead-blow and other rubber mallets are designed for minimal rebound and are less likely to mar your workpiece.

sold on them as a replacement for a joinery mallet. Why? When I use urethane-headed mallets, I don't feel the transference of force from the mallet to the chisel is a one-to-one ratio. The softer urethane absorbs some of the force, which requires me to do more work to complete the task. Urethane mallets, however, are easier on your tools. If there's other science involved, it's beyond me.

At the other end of the scale are the infused mallets made by Blue Spruce Toolworks. An acrylic-polymer resin fills the wood pores completely to prevent the fibers from crushing when used. The resin also adds weight. The company has three mallets. The round design (in both 14- or 16-ounce) has been available for some time, and there's a 24-ounce joiner's mallet that is just coming to market. I've chopped many dovetails using one of the round mallets and find it exceeds my expectations.

Other Shop Mallets

When it comes to assembling projects in my shop (or taking them apart), I prefer a mallet with less punch. A urethane-wrapped mallet works well for this, but I like a dead-blow hammer or a rubber mallet. In my experience, wood mallets, no matter the design, tend to crush the wood or leave dents when striking projects.

Our shop dead-blow is made of urethane (no surface bruising) and has shot loaded inside to keep the mallet from bouncing off the project. Minimal rebound makes better use of the applied force. The same holds true for a rubber mallet, except there is no shot inside.

In my home shop, a rubber mallet is the tool I use for assembly or when flushing the edges in a panel glue-up. One of these shock-absorbing mallets should be included in your tool arsenal.

Drive it Home

If you're using a carver's mallet for joinery, you owe it to yourself to try a joiner's mallet. When I switched, I discovered that my dovetail work improved. (It could have been the result of better strikes, or it could be as simple as added weight.) If you switch, keep your carver's mallet, too. It works best for finesse work and can be the force behind carving tools. And every shop should have a dedicated mallet for grunt work, so stop bruising your project (and your hands) and get a dead-blow. Brass mallets? Sorry, I don't own one. **PWM**

Not once has Glen pounded his keyboard with a mallet, but you can strike up a conversation with him at glen.huey@fwmedia.com.

ONLINE EXTRAS

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BLOG: Read more about the infused mallets from Blue Spruce Toolworks.

IN OUR STORE: Learn the benefit of the mallet and other hand tools in "Mastering Hand Tools," by Christopher Schwarz.

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Woodworking ESSENTIALS Woodworking Essentials takes a close look at the tools, materials and processes of woodworking.

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Soap as a Wood Finish

While this natural Danish finish looks beautiful, it's high-maintenance.

You may be surprised to learn that a quite popular finish for furniture and floors in Denmark, and other northern European countries, is soap. I lived in Denmark for two years in the mid-1970s and have visited many times since. I've seen a lot of beautiful furniture finished with soap.

The wood used is always solid because excessive contact with water could lift veneer. It's also always light in color: usually white oak, ash, beech, maple or pine. A soap finish deadens the rich colors of darker woods such as cherry and walnut.

Not just any soap works, only natural soap flakes. Ivory Flakes, which are no longer available, was an example. Now we have to import the flakes. (See Supplies for a few sources.)

The look is very thin, similar to oil or wax, but with no color and no shine. An oil finish adds a yellow/orange coloring, and both oil and wax add shine. A soap finish is totally flat. It looks as if there's no finish at all, but it's better than no finish because it resists stains.



Soap finish. This is a close-up view of the end of an oak table made by Ansager A/S in Denmark. It shows the thinness, flatness and colorlessness of a soap finish, which looks like no finish at all.



Soap flakes. Natural soap flakes used to be sold in the United States as Ivory Flakes. Now we import the flakes – shown here both in flake form and packaged – from England. On the right is my mixture of two tablespoons of flakes in one quart of boiling water, after the stirred mixture cooled and thickened. (I leave the cloth in the container.)

Before you read further, I must caution that, though beautiful, inexpensive, environmentally friendly and extremely easy to apply, a soap finish is high-maintenance, considerably more so than oil or wax. Reapplication could be required as often as once a month on high-use surfaces such as tabletops. So the person responsible for the care must be willing to devote the effort or the finish will become unattractive quite quickly.

Soap Flakes

The reason natural soap flakes work (and detergent doesn't) is that the flakes thicken when dissolved in boiling water and get fairly hard after the water evaporates; it's about the same hardness as an oil/varnish blend after a puddle has cured on a non-porous surface for a month or two. You can still dig your fingernail into the soap, but it hardens enough to seal the pores in wood from quick penetration by stains.

To make the soap finish, add about two tablespoons of flakes to a quart of boiling water. Exactness isn't at all

critical. In fact, suggested proportions vary widely, both for initial application and for maintenance. All work well.

Stir well and let the mixture cool and thicken overnight. After the first few applications you can increase the proportion of soap to water if you want. You can also thin any thickened concentration by adding boiling water and stirring.

Application Steps

Before applying the soap finish, sand the wood to at least #150 grit.

The soap is going to raise the grain of the wood, so you could raise the grain by wetting the wood first, then sand it smooth after the wood has dried. Or, you could skip this step and simply sand with increasingly finer grits between coats, which is what I do and what all directions I've seen say to do.

For the first two or three applications, it's best to apply the soap finish to both sides of tabletops and wide panels (or at least wet the underside – for example, with a spray bottle) to even the swelling. Wetting only one side of

wood many times causes it to cup and split like boards on a deck.

Here are the steps:

- Spread the soap gel thickly onto the wood using a clean cloth or sponge.

- Let the soap stand for a couple of minutes, then wipe off the excess with the direction of the grain.

- Let the wood dry, then sand it with #220- or #320-grit sandpaper, coarse enough to remove the raised grain efficiently, but no coarser.

- Apply a second coat just as the first.

You can apply as many coats as you want, sanding between each. There's no reason to apply more than three or four at the beginning; you won't improve stain resistance. The only problem I've ever heard of is leaving the soap too thick on the surface so it marks when objects are dragged across it.

Before you actually apply this finish for the first time to furniture or floors, I

suggest you experiment on scrap wood. When three or four coats of the finish have thoroughly dried, drip water, red wine, catsup, etc. on the surface and wipe dry after a minute or two. Then follow with the maintenance steps below to convince yourself you really want to use this finish.

Maintenance

Regular maintenance is critical with a soap finish. The initial dissolving of the soap flakes stores well, so it can continue to be used.

Dust with a damp cloth, never with furniture polish.

For the first few months, reapply the soap finish every week or two, especially any time the surface begins to look dry.

During use, the surface may get stained. Stains are usually easy to remove – surprisingly easy in my ex-

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perience.

First, sand lightly with #220- or #320-grit sandpaper to remove any raised grain caused by the stain. (Never use steel wool.) Then apply another coat of soap and wipe off the excess. This usually removes the stain.

If not, scrub the surface, always with the direction of the grain, using a sanding sponge or Scotch-Brite pad and more soap. You can do this several times, letting the surface dry in between. To keep the coloring even, work on the entire surface.

If the stain persists, pour boiling water onto it, wipe dry then apply more soap. Boiling water dissolves the soap and is very effective for difficult stains. You can do this several times.

If this still doesn't remove the stain, you may have to sand the entire surface to remove it. Then apply more finish.

The Danish term for soap finish is *saebe behandling* (soap treatment). Search for it on the web to see the sparse (meaning “easy”) instructions, along with some pictures and videos showing the easy application process. **PWM**

Bob Flexner is author of “Flexner on Finishing,” *Finishing 101* and “Understanding Wood Finishing.”

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Wiping up a spill. Spills should be wiped up quickly, of course. This was a red-wine spill, which I partially wiped up after less than two minutes. After several light passes with #280-grit sandpaper, the mark was totally gone.



Ten-minute spill. While I was wiping, sanding and photographing, the remainder of the spill just sat on the wood; it left a distinct mark when I wiped it up 10 minutes later.



Scotch-Brite scrub. The spill was still distinct after the some light sanding, so I gave it a light scrub with a Scotch-Brite pad and more soap finish. Ideally, I would have done this to the entire surface to ensure an even coloring.



Mark is gone. As you can see, the stain is totally gone after the wood has dried.

Blacker House Garden Bench

A gnarly old conifer finds new life on a recognized California estate.

In 1908, architects Charles and Henry Greene built one of their most famous residences, the Robert R. Blacker House. In addition to designing the home and interior furnishings, they also designed the landscaping which included a Bermuda cedar tree in the front yard.

A century later, the 55'-tall tree threatened to fall onto the house. Once a sentinel standing watch over the entrance of a grand estate, the gnarly old conifer now leaned like an old man on weak legs. The tree had to come down.

Our hope was that the wood salvaged from this tree could be used somewhere on the grounds – the current owners of the Blacker House had the same thought. The plan was to drop the tree, saw it into usable lumber then build something with it that could be used on the property.

While the Greenes have long been celebrated for their “total design” approach and their unique ability to design homes, the interiors and the furnishings so cohesively, this would be the first example of furniture built for a particular Greene Brother’s property with material grown on that property. We had the opportunity to take the level of cohesion a step further.

As its name implies, Bermuda cedar originates from Bermuda. These trees have a long history as prized timber, which was first used for the construction of homes by English colonists. Later it was discovered to be an excellent material for shipbuilding. John Rolfe—who in 1614 married Pocahontas—lost his way on his expedition to Virginia and became stranded on Bermuda. He constructed a new ship from the island cedar before he continued his journey.

During World War II, the United States built air bases in Bermuda and



unintentionally introduced two species of insects that killed 99 percent of the Bermuda cedar trees. Today, the species is seldom mentioned in the lumber or landscaping trades.

When the Blacker House tree came down, we salvaged materials ranging from 1" to 4" in thickness. It air-dried for about five years. When we finally took a look at the pile, we were pleased to find that the boards remained fairly flat and straight—some boards checked and cracked, but a high percentage of usable lumber remained.

The wood ranges from bright pink through magenta in color when freshly cut. It oxidizes, however, and turns a warm brown, and it is strongly aromatic. The grain is usually straight, but can also be wild and interlocked with high chatoyance. Once dry, Bermuda cedar is relatively lightweight.

Bermuda cedar works well with machine and hand tools; a fine surface can be achieved with a handplane. The wood is resinous, which lends to its moisture resistance and partially explains why it works well as a material for ships. (I collected some resin that had secreted onto the branches and successfully made an alcohol-based spirit varnish.)

The Blacker House owner’s landscape architect had designed a series of



benches for the garden – the weather-resistant tendencies of the Bermuda cedar perfectly fit this idea. The benches were a modified version of a garden bench originally designed by Henry Greene for yet another property. Utilizing joinery often used in Greene & Greene furniture (housed and pegged mortise and tenons) the benches should last for a very long time.

The task of taking a project from a live tree to finished furniture was an enjoyable experience; learning about this unique wood species enriched the experience even more. While the tree no longer provides shade or a space for birds to nest, it now offers a place to sit and enjoy the beauty of the Blacker House. **PWM**

John is a cabinetmaker in Pasadena, Calif. He can be reached at jipekjian@gmail.com

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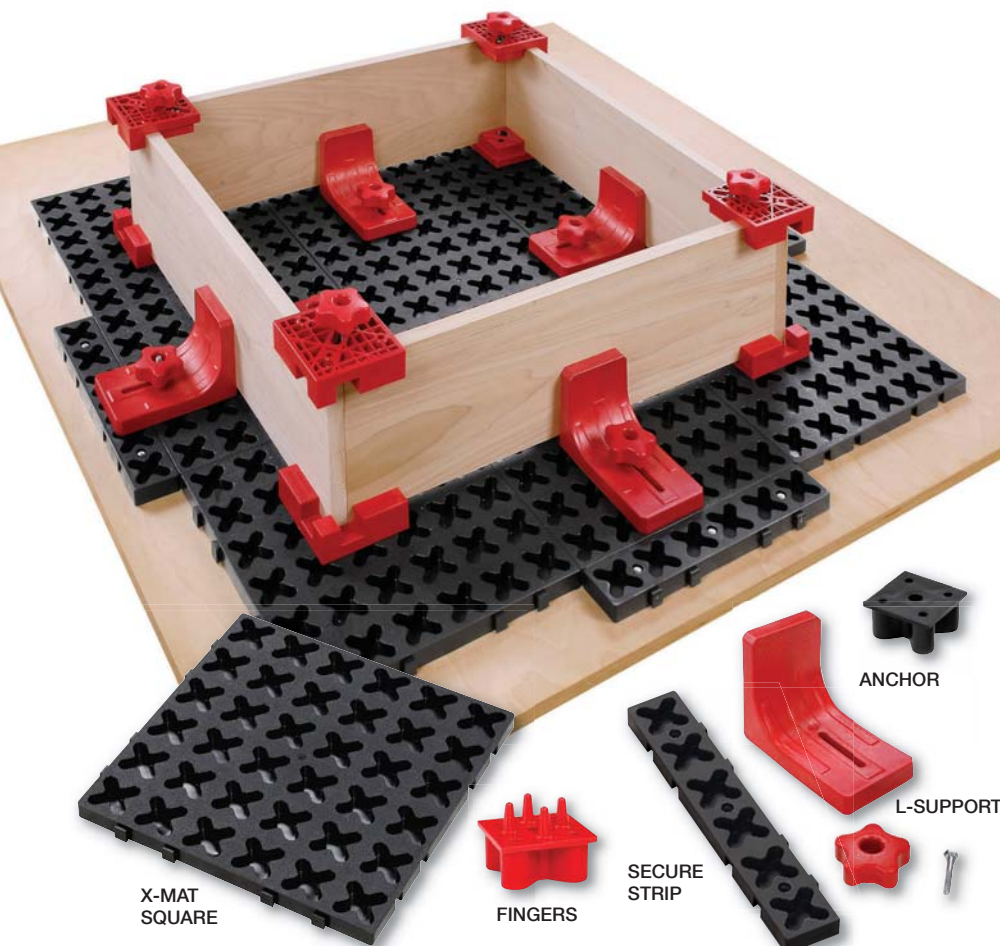
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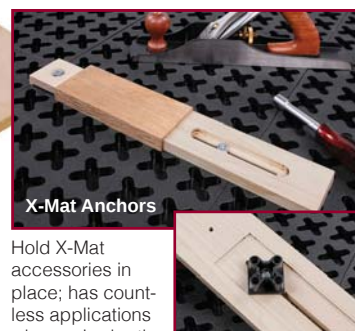
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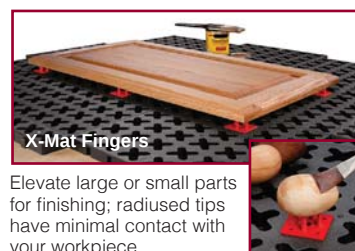
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