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Guide to box hinges, p. 98

Boxes

- Projects
- Design tips
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Boxes



28

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REPEATING



BANDSAWN
BOXES 22

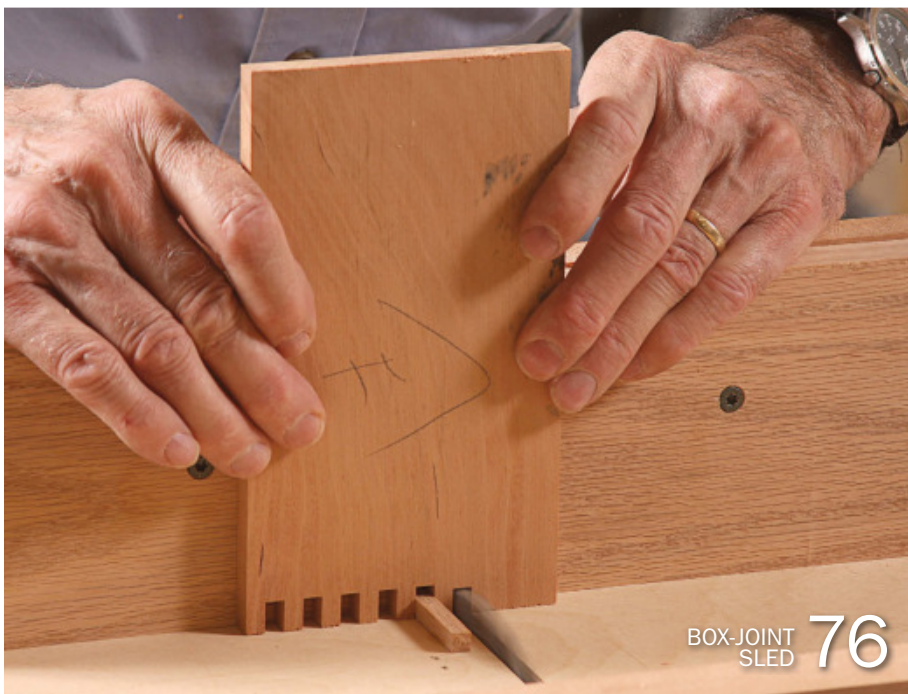
- 42 **Dovetailed Tea Box**
This project offers a variety of techniques in a small package
BY MICHAEL PEKOVICH
- 50 **Build an Heirloom Box**
Book-matched veneered top makes this simple box shine
BY BOB VAN DYKE
- 60 **Hexagonal Boxes Are Little Gems**
Dig out your attractive scraps and have some small-scale fun
BY CLARK KELLOGG
- 68 **A Box that Earns Its Stripes**
Got a tablesaw and tape? Make a miniature masterpiece
BY ADRIAN FERRAZZUTTI

Projects

- 16 **Sleek Box with a Sliding Lid**
Clean, versatile design offers easy access to what's inside
BY MICHAEL CULLEN
- 22 **Bandsawn Boxes**
Seamless boxes from a single block of wood
BY MICHAEL CULLEN
- 28 **A Box Worth Repeating**
A piece this beautiful shouldn't be one of a kind
BY LAURA MAYS
- 34 **Veneered Boxes Made Easy**
Create seamless beauty outside and in
BY CRAIG THIBODEAU

Departments

- 6 **Introduction**
- 7 **On the Web**
- 10 **Gallery**



Techniques

76 Simple Box-Joint Sled

The strength and style of finger joints come easy with this straightforward sled

BY DOUG STOWE

82 Finishing Boxes

Easy ways to protect the wood and line the interior

BY DOUG STOWE, DAVE SHAW, AND EMILY PALM



88 Hinges and Locks

Elevate any box with high-quality hardware

BY ADRIAN FERRAZZUTTI

Design Details

92 4 Ways to Top a Box

Low-tech lids open without hinges

BY MATT KENNEY

98 Picking the Perfect Hinge

The right choice will help you design and build better boxes

BY DOUG STOWE

104 Distinctive Box Details

6 ways to take your next box to the next level

BY DOUG STOWE



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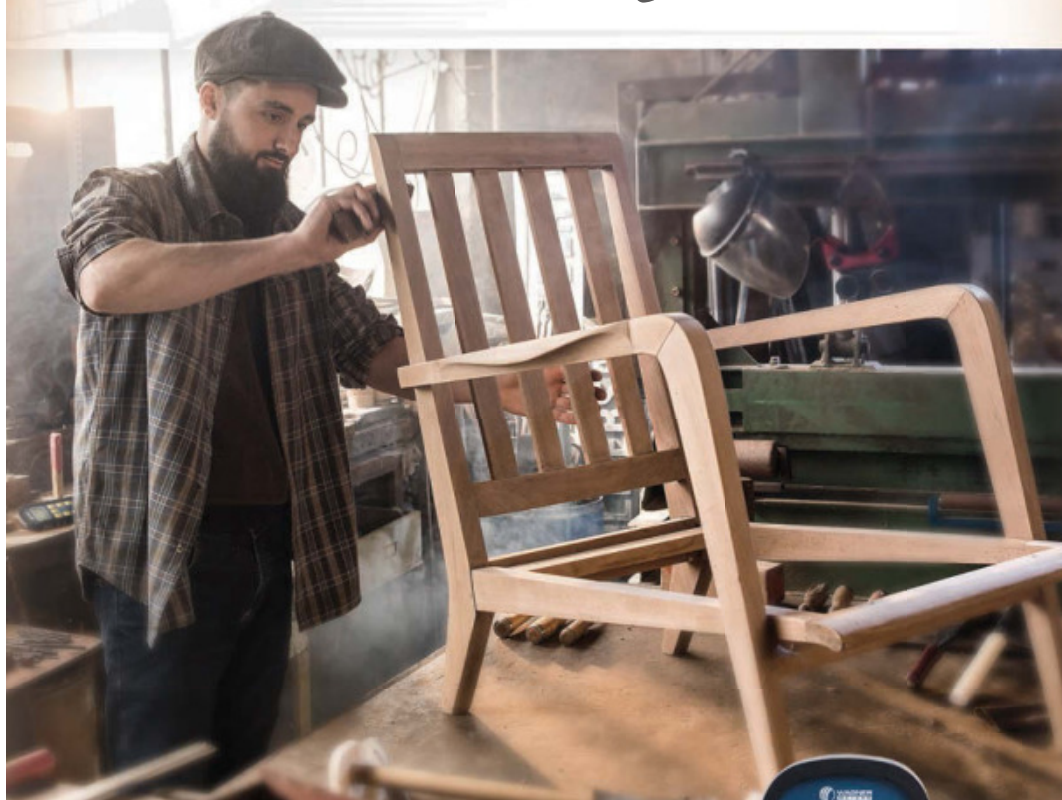
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introduction

GOOD THINGS COME IN SMALL PACKAGES

Whether you are just embarking on your woodworking journey or have been making furniture for so many years that your house won't hold even one more chair, a wooden box is the perfect project. As unassuming as it may seem, a box will give you a chance to learn or perfect almost any woodworking skill you can think of.

Want to practice dovetails? Try a dovetailed box, like the tea box in this collection. Ready to perfect your miters? Any number of the boxes shown here will help you hone this skill. Bandsaw skills need exercise? Throw caution to the winds and develop your design eye with a beautiful bandsawn box. Ready to unlock the secrets of perfect veneering? Check out the stunning examples in these pages, and then try one of your own.

Our editors and contributors at *Fine Woodworking*, all accomplished woodworkers, love making boxes. When asked why, they sing a similar tune:

"Boxes are small, so they are quick and don't take up a bunch of space."

"They let you test your skills, so you can start with simple joinery before working up to dovetails, air-tight miters, etc."

"You can test out design ideas on a box."

"For me, they serve as a benchmark of sorts, letting me track my progress. A box I was happy with 10 years ago might embarrass me today, and the boxes I make today are setting me up to build even better boxes five years from now."

These small projects don't require weeks of time and bushels of cash. They can usually be made using shop scraps, and completed in a weekend. Following the tips and techniques provided by our experts, you can make a box of almost any design you desire. You can sandwich them between larger projects or simply make boxes all day long.

Whatever your goal, get busy!
You're already holding in your hands the first tool you will need.



Fine Woodworking®

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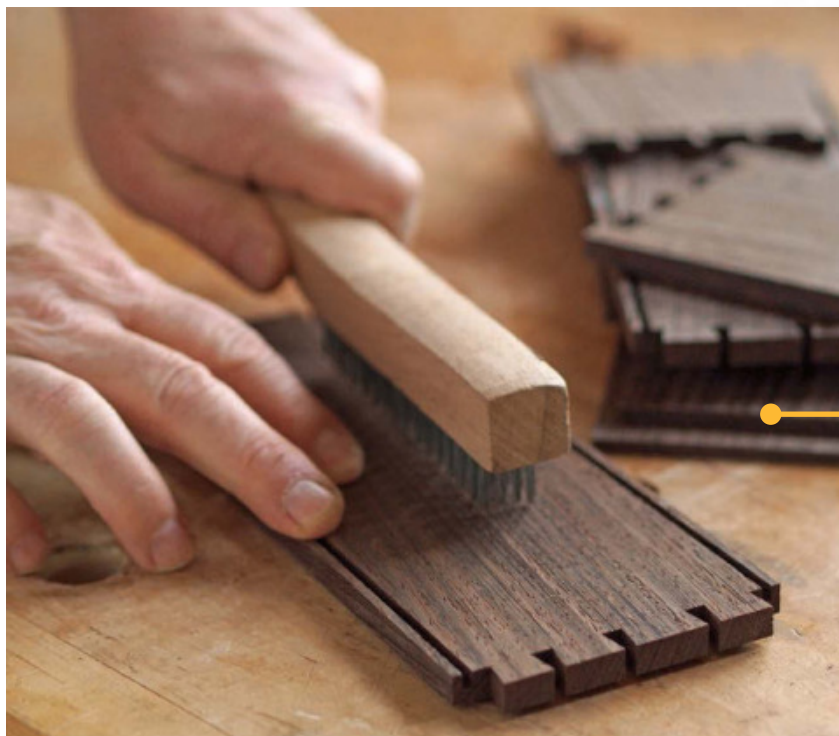
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on the web

FineWoodworking.com/boxes

Visit our website for everything you ever wanted to know about designing and making boxes. Plus, become an Unlimited member to access our extensive archive of articles and videos.



VIDEO

Michael Cullen's two-walled bandsawn box

Sit back, relax, and watch woodworker Michael Cullen make one of his beautiful bandsawn boxes, in less than five minutes!

VIDEO

How to create a textured finish with a wire brush

On his wenge tea box, *Fine Woodworking* editor and creative director Michael Pekovich reaches for a tool not normally found in the arsenal of most woodworkers, a metal barbecue grill brush.

VIDEO

Video series: Veneering basics

In this three-part video series, woodworking teacher Bob Van Dyke demonstrates basic veneering techniques including softening, rough cutting, seaming, and glue-up, while preparing a period-appropriate book-matched drawer front.

VIDEO

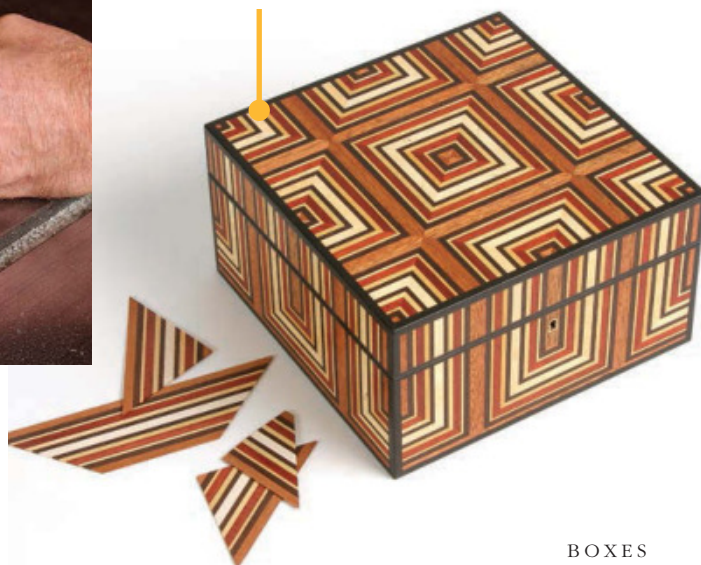
Cutting off a box top on the tablesaw

There are many techniques for removing a box lid, but Bob Van Dyke likes to cut through each wall completely in one pass using the tablesaw.

VIDEO

Veneered boxes with a twist

Learn how to build beautiful boxes sporting intricate geometric veneer patterns.



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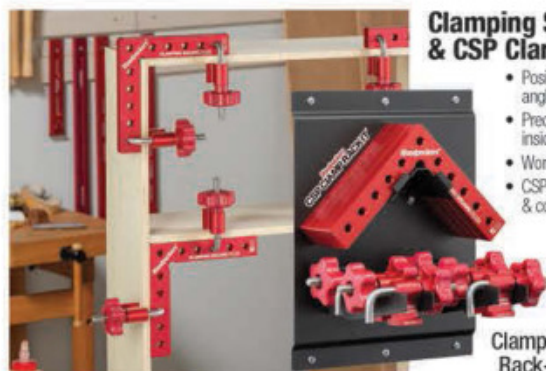
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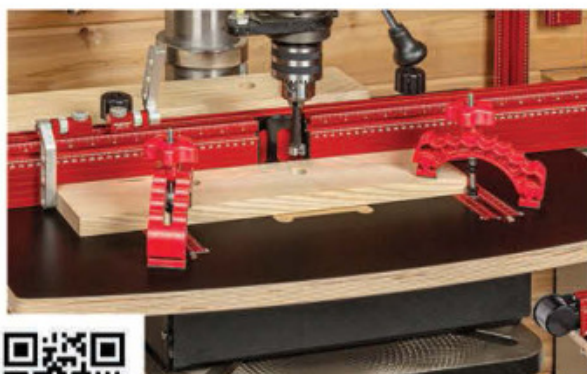
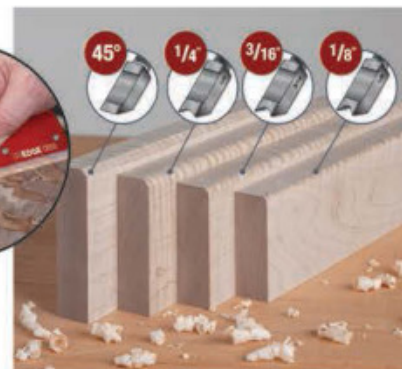
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gallery

A selection of beautiful boxes from our readers



AMY COSTELLO

Provo, Utah

Amy was enrolled in an independent study course on carving and marquetry at Brigham Young University when she made this tea box. It was inspired in part by a Designer's Notebook in *Fine Woodworking* in which several furniture makers designed their own tea boxes. It was also a chance for Amy to explore an interest in mandalas, traditional Hindu and Buddhist symbols.

ELM, WALNUT, AND EBONY, 9D X 9W X 3½H

Photo: Caitlin Egan



CRAIG JOHNSON

St. Paul, Minn.

The yellow birch used in Craig's sliding-lid box was reclaimed after years spent underwater, having been lost by loggers more than 150 years ago in a local lake. The box features hand-cut dovetails and a hand-carved recessed pull, and is finished with shellac and beeswax.

YELLOW BIRCH, 7D X 11W X 4H



R. EVAN MILLER

Sequim, Wash.

Evan made this music box as a gift for his sweetheart. The box sides are quartersawn walnut veneer laminated over curved molds. The box top and bottom, which is also a sound board, are made of ¼-in. honeycomb panel used in the aircraft industry. The sunburst design on the top is made using a radial pattern of mahogany veneer. The parts are held together with long screws so the box can be disassembled if necessary. A large mechanism inside plays Mozart, specifically "The Magic Flute," "Eine Klien Nachtmusik," and "Turkish March."

WALNUT, WITH VARIOUS FIGURED MAHOGANY AND WALNUT VENEERS;

6½D X 17¼W X 5⅝H





ALBERT KLEINE

Laurel, Md.

This tea caddy gave Albert the chance to explore different wood textures in a single piece. The open grain of the wenge, the smooth rosewood handle, and the charred red oak liner all give a different experience when felt with the hands. It's inspired by the work of Peter Spaulding and Michael Cullen.

WENGE, RED OAK, EAST INDIAN ROSEWOOD, 4W X 13L X 6H



DAN SOUTHERN

Huntington Beach, Calif.

Inspired by the famous Japanese torii gates, Dan wanted to make boxes that look like little pagoda shrines. The posts that suspend the box in the air are designed to echo the posts that suspend the handle. "I feel the rounded shape of the handle really completes the Japanese style I was after."

LACEWOOD AND WENGE, 6¾D X 16W X 10H

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DEVIN REAM

Holliston, Mass.

This box is modeled after a tea chest by Abraham Roentgen on display at the Metropolitan Museum of Art in New York City. Devin made a pair for a client to be used as funerary urns. "Both boxes have spring-loaded secret drawers that are released at the touch of a button." He used gold leaf on the corners instead of the traditional brass.

ROSEWOOD, MAHOGANY, AND PINE,
9D X 14W X 11H



GEREMY COY

Alexandria, Va.

This walnut box was designed to display the delicate Japanese kumiko latticework on the lid, which is made of more than 70 hand-fitted pieces of Alaskan yellow cedar. The grain-matched box is joined with mitered dovetails and finished with shellac and wax.

YELLOW CEDAR AND WALNUT, 6¼D X 10W X 2H

JOHN KENNEDY

Orlando, Fla.

The contour carving on John's Ripple Box represents the concentric circles that emanate out when a pebble is dropped into still water. Each ring is 10% bigger than the one that precedes it. "My challenge," he said, "was to do this on a square box and keep the effect."

BLACK WALNUT AND CURLY MAPLE
12½SQ X 18H





KYLE TOTH

Temecula, Calif.

Kyle received the veneer for this box in 2011, while he was a student at North Bennet Street School—a Boston furniture maker left it to the school when he passed away. The box has a sliding tray and the drawer bottom is carved with a leopard print design and lined with aluminum. To see a video of the box being made, check out Kyle's website at woodbytoth.com.

CHERRY, REDWOOD BURL, BLACK VENEER, EBONY, AND ALUMINUM,
8½D X 16W X 4¼H



KELLY PARKER

Parkville, Mo.

Asked to make a pyramid from wood, Kelly added a few surprises. Built using a brick-laying technique, this pyramid box has two secret drawers and a secret compartment. The dovetailed drawers have sides made of cherry. If you turn the top of the pyramid, you'll find the secret cavity embellished with mother-of-pearl inlay. The V-grooves on the sides are meant to resemble the detailing seen on the ancient pyramids made with large blocks of stone.

REDWOOD BURL AND CHERRY, 11½D X 11½W X 10H

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MATTIE HINKLEY

Richmond, Va.

Named "Pennsylvania valet" for the state where George Nakashima's studio is located and loosely inspired by his work, this box, veneered in nutmeg, sits atop solid pau ferro feet. A braided stay for the lid was made by weaver Linda Turner.

PAU FERRO, NUTMEG, AND EBONY,
13D X 9½W X 4H

Photo: Todd Sorenson

ROB WILCOX

Coulterville, Calif.

Rob made his first Swedish bentwood box for a gift exchange while a student at the College of the Redwoods. "The inspiration came from a crudely made box in our home. I believe it had been made by one of my great grandfathers, both of whom were Swedish carpenters. I modernized the style and gave it a more refined look overall."

WHITE OAK, 7¼W X 12L X 4½H



BRANDON O'FLAHERTY

Smiths Falls, Ont., Canada

Brandon built this ring box to house his wife's engagement ring. The burl veneer on the exterior was sanded through to reveal a blackwood trim at the edges. "Not only did I enjoy building this, but the added bonus was she said 'Yes!'"

AFRICAN BLACKWOOD AND MAPLE BURL
VENEER, 3D X 2W X 2H

Photo: Melissa O'Flaherty

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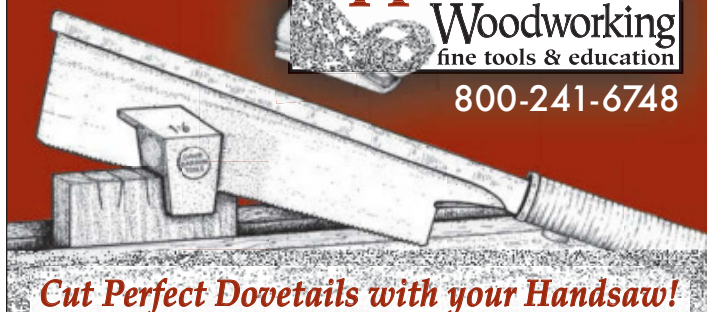
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to what's inside

BY MICHAEL CULLEN

Some years ago I decided to make a box for my wife, Barbara, to hold some of her favorite pens. My design was inspired by the memory of a simple wooden pencil box with a sliding top that I had as a child. To me, boxes are a beautiful expression of what working in wood is all about. Of all the things I make, nothing else holds as much mystery or evokes as much curiosity as a box. I loved making that box, and I've since made many more, in a variety of woods and sizes but all hewing to the same basic design: thin parts, mitered corners with slender splines, and a snug but smoothly sliding lid with a carved fingerhold.

Cut narrow grooves and tiny miters

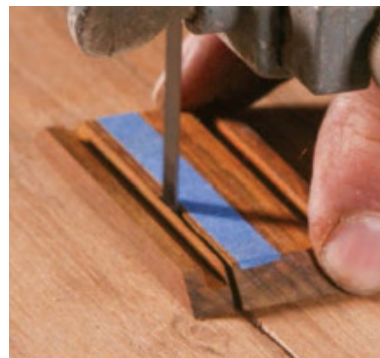
Because the parts are so thin, I take the utmost care in stock preparation. The lid, in particular, must stay flat over time





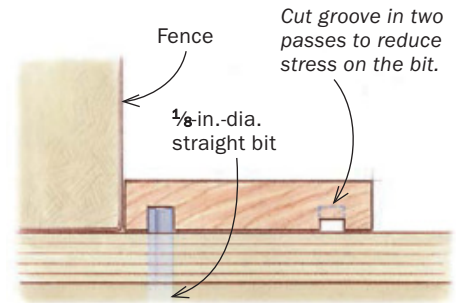
Cut the joinery

Fine miters. After cutting the sides to rough length on the bandsaw, Cullen cuts the miters in two passes with a jig on the tablesaw. The first pass comes within $\frac{1}{16}$ in. of the line, the second skim-cuts to final length.

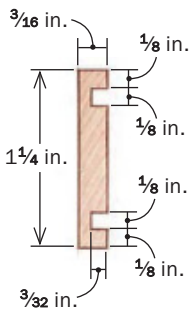


Post-miter surgery. With the miters cut, trim down one end of the box to allow passage of the lid; clean the edge with a block plane. The tab for the lid is cut from an extra piece of end stock that's been mitered to the same length.

Rout grooves for the lid and bottom. Because the parts are so small, it's safest to groove the blanks before cutting them to length. Cut both grooves with the fence at the same setting. Fashion a push block if needed.



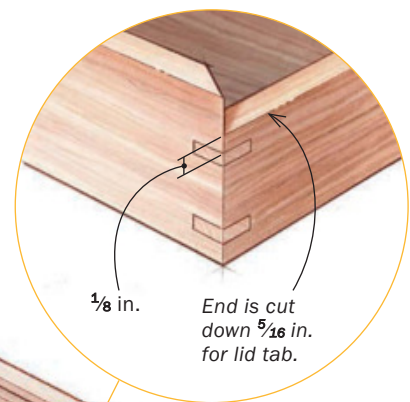
MITERED BOX WITH SPLINES



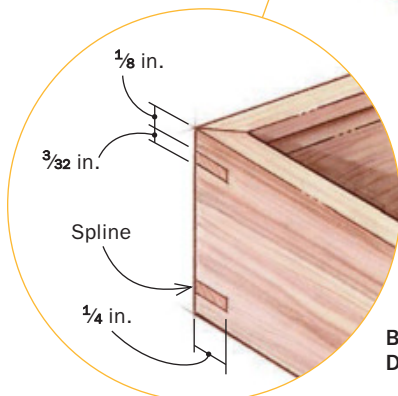
GROOVE DETAIL

End, $\frac{3}{16}$ in. thick by $1\frac{1}{4}$ in. wide by $2\frac{3}{4}$ in. long

Bottom, $\frac{1}{8}$ in. thick



FRONT CORNER DETAIL



BACK CORNER DETAIL

Groove, $\frac{1}{8}$ in. wide by $\frac{1}{8}$ in. deep

Side, $\frac{3}{16}$ in. thick, $1\frac{1}{4}$ in. wide by $9\frac{1}{2}$ in. long

Lid, $\frac{1}{8}$ in. thick

Tab, $\frac{3}{16}$ in. thick by $\frac{5}{16}$ in. wide by $2\frac{3}{4}$ in. long

Assemble the box



Use tape for clamps. Line up the sides of the box end to end and facedown, then stretch painter's tape across the joints. Prior to assembly, coat all the inside faces first with shellac and then with wax, being careful to keep the miters free of finish.

so it will always slide without binding. Double and even triple-milling is critical to prevent any twisting or cupping. It's best to use either riftsawn or quartersawn material, especially for the lid. Because the parts are fairly short, I mill them to final thickness in long strips and cut them to length later.

With the stock thickened and ripped to width, make the grooves in the sides to accept the lid and the bottom. I use a router table with a $\frac{1}{8}$ -in.-dia. straight bit, making each cut in two passes to reduce stress on the bit.

After completing the grooves I miter the corners of the box, using a crosscut jig on the tablesaw. This is the most critical step. Only a precise setup will yield joints that go together flawlessly. Use a sharp blade—it's essential for clean and accurate work on small pieces. I attach sacrificial boards to both the base and the fence of the crosscut jig so the parts are supported right to the blade. I test the setup by mitering a pair of long, straight scrap pieces and checking their interior angle for square with an accurate framing square.

Once the setup is dialed in, miter all the box sides. Depending on the species of wood you're cutting, it's sometimes cleanest to make an initial miter cut $\frac{1}{16}$ in. shy of the line, and finish with a skim cut. Don't forget to cut three end pieces for the box—you'll need the extra one to create the tab that will attach to the lid.

Fit and glue the box

The bottom of the box is fully housed in the grooves, and getting a good fit can be tricky. As I'm putting the bottom through the thickness planer, I go slowly and check the fit often. With the thickness established, cut the bottom to size, ripping it a bit narrow to allow for



Delicate brushwork. Flip the parts inside up, then apply glue with a small brush, coating the miters completely but avoiding the grooves.

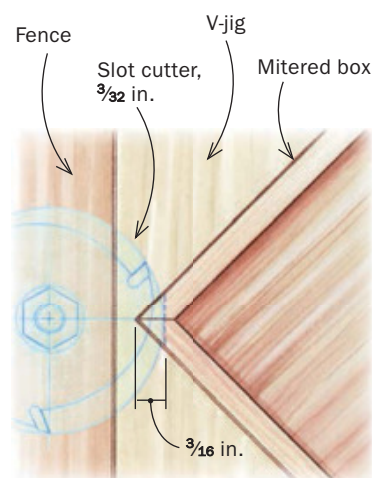


Wrap the bottom. Place the bottom in one long side, then fold the other sides around it (above). Stretch the loose flap of tape to close the last corner tight (left). Then, with fingers on the top edges of the box sides, press down onto the bench to remove any wobble.

Add the splines



Slotting for splines. Use a shopmade V-shaped jig and a slot cutter to cut the spline grooves on the router table.



Tiny splines. Mill a piece of spline stock with two clean, parallel edges, then cut it into triangles at the bandsaw.



seasonal movement. Before glue-up, I finish-sand the entire interior, tape off the miter faces, and apply a very thin coat of shellac, followed by a coat of wax and a good buffing.

Now the parts are ready for assembly. Because they are so small, I use tape instead of clamps. Carefully lay the box sides inside face down and end to end in the correct sequence. Then stretch painter's tape across the joints, flip the whole assembly over to expose the miters, and apply the glue. Coat the miters only, avoiding the grooves. Working quickly, insert the bottom and wrap the sides around it. Set the box aside until the glue is thoroughly dry.



Spline insertion. Use thumb pressure to push the splines home (above). After the glue has dried, Cullen chisels away most of the protruding spline (right), then finishes flushing it to the surface with a block plane.



Make the lid

The fit of the lid is critical. It should slide easily but with almost no play. After milling the lid just oversize, sneak up on a perfect fit by hand-sanding the faces and handplaning the edges.



Cut and fit the splines

I cut the grooves for the miter splines at the router table using a V-shaped jig and a $\frac{3}{32}$ -in. slot cutter. You could make this cut on the tablesaw, but I like the slot cutter because it creates a clean, square-bottomed groove, making for a perfect fit with the spline. I also like the narrowness of the groove; to me, a box this small needs very thin splines. To make the jig, cut a V-shaped notch in a thick scrap. The jig should hold the box 45° to the router table's fence and should back up the cut where the bit exits the corner of the box.

The next step is to make and glue in the triangular splines. I mill a piece of spline stock that's just wider than the deepest part of the spline groove. Then I make the angle cuts on the bandsaw. When gluing them in, be sure the splines bottom out in the joint.

Slide in the lid

The action of the lid is a vital part of the user's experience of a box. There should be slight, even friction when opening and closing the lid. You'll want just enough resistance so it will stay shut when the box is picked up. When you rip the lid to width, leave it slightly oversize and achieve the final fit with a handplane.

To make the finger hold, use a gouge to create a depression that has a fine-tooled texture, with the cuts arcing inward from all angles. After completing the carving, size and fit the end tab to the lid so that when the box is closed, the seam between the tab and the side below is virtually invisible. Glue on the tab, finish-sand the entire box, and apply several fine coats of shellac. Even out the sheen with 0000 steel wool, then add a thin coat of wax. □

Michael Cullen is a woodworker in Kent, Conn.



Scoop out a finger pull. Cullen uses an ellipse template to establish the perimeter of the finger pull. Then he carves it out with a gouge, cutting radially from the edge to the center and leaving the facets visible.



Press on the tab. After testing it for fit to the miters, glue the tab to the end of the lid with finger pressure.



I build a lot of furniture—often complex, exacting pieces carefully mapped out in scale drawings. Some years ago I began making bandsawn boxes as a way to relieve the tension of working on such long, demanding projects. The boxes are quick, requiring no measuring, no joinery, and almost no planning. They welcome creativity, opening a door to limitless variations of form and embellishment. And most of all, they are fun. I can grab a piece of scrap, make a fast pencil sketch right on the wood, and work freehand at the bandsaw to create a box in no time.

I've always admired Shaker boxes, with their combination of good form and minimal material making a container that is lightweight, strong, and elegant. My goal with bandsawn boxes is similar: to push the

PROJECTS

Bandsawn Boxes

Seamless boxes from a single block of wood

BY MICHAEL CULLEN



limits of the material without compromising strength or function—and wind up with something beautiful.

I cut the boxes from a single chunk of wood, sawing it apart and then gluing it right back together with some parts removed. This makes for perfect grain matches and no issues of wood movement. I cut a tapered plug from the center of the blank, which I use to make a perfectly fitting bottom to the box as well as a keeper that holds the lid in place.

I make two types of bandsawn boxes. One has two curved walls that meet in a point at each end. The other is a four-walled, rectangular form. Almost all the steps for making the two types are the same.

Michael Cullen makes furniture and boxes in Kent, Conn.

Two-walled box



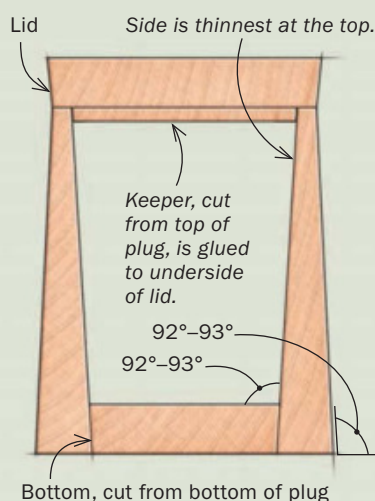
To make the two-walled box, start with a thick block of wood: 12/4 or 16/4 stock is optimal. Some of my favorite species for bandsawn boxes are basswood, walnut, mahogany, maple, and cherry. I carve and milk-paint many of my boxes, but I leave some unadorned.

Flatten the top and bottom of the blank, making the surfaces parallel. The sides don't have to be milled, but the glue-up will be easier if they are not too uneven. There's no required size for a blank, but one about 8 in. long by 4 in. wide by 3 in. or 4 in. tall would be good for a first try.

The first step at the bandsaw is to cut the lid from the block. Then set the lid blank aside and draw the shape of the box on the top of the box blank. These lines will define the interior of the box, so be sure to leave space outside the lines for the wall thickness.

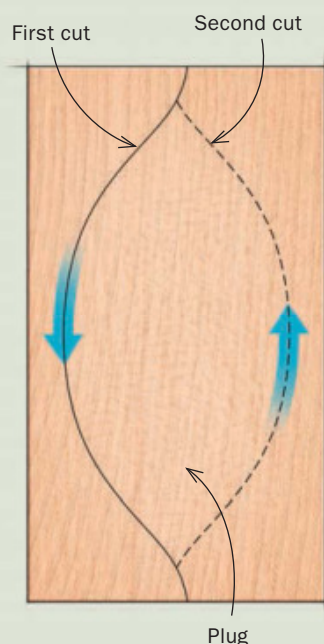
To saw out the interior, angle the bandsaw table roughly 3° off horizontal. A little more or less is fine. The idea is to make the interior cavity tapered—smaller at the bottom—so the tapered plug can be used to make a perfectly fitting box bottom. Saw steadily without rushing, so the blade tracks without deflection. The better the cut, the better the joints will be. I use a 3/4-in. blade with 4 or 6 tpi (teeth per inch). With the cuts complete, bring the outer halves together. The joints at each end should mate with no light showing through.

CROSS-SECTION



THE FIRST TWO CUTS

Make the two cuts in opposing directions to yield a tapered plug.



1 INITIAL SAWING

Off with the lid. After milling a block of wood, saw a slice off the top and set it aside—this will become the lid.



Tilt the table. After cutting off the lid, Cullen creates the interior cavity of the box by cutting a tapered plug from the blank. Set the bandsaw table a few degrees off horizontal before cutting out the plug.



Two curving cuts. For a box with pointed ends, two sawcuts are all it takes to shape the interior walls. Cullen makes a shallow test cut into the end grain to confirm that the blade is angled in the right direction and will yield a cavity that is smaller at the bottom.

Two-walled box continued

2 GLUE UP THE SIDES

Don't overdo the glue. Apply the glue carefully to prevent squeeze-out inside the box, where it is very difficult to clean up.

Hands before clamps. To be sure the bandsawn joints line up perfectly, fit the halves together first with hand pressure. Hold them firmly together for a minute or two to let the glue tack before applying clamps.



Glue up the sides, and when the glue has cured, drop in the plug. It should rest slightly below the bottom of the sides and form a perfect seal. Mark the plug where it emerges, then remove it and draw a second line at least $\frac{1}{4}$ in. above the first. With the bandsaw table still angled, cut along both lines to create the box bottom.

Glue up the sides, and when the glue has cured, drop in the plug. It should rest slightly below the bottom of the sides and form a perfect seal. Mark the plug where it emerges, then remove it and draw a second line at least $\frac{1}{4}$ in. above the first. With the bandsaw table still angled, cut along both lines to create the box bottom.

feeling. For a wall that is thicker at the bottom, creating a solid look as on this box, you can leave the bandsaw table at the same tilt as for the inside wall but approach the cut from the opposite direction.

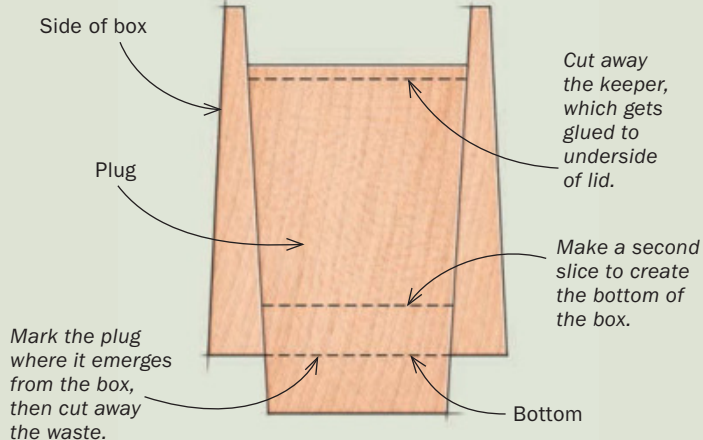
After gluing the lid keeper to the lid blank, put the lid on the box and trace the outside shape of the box on the underside of the lid. Then cut out the lid. I often make the cut so the lid flares outward. It looks good and makes the lid easier to grip. I usually fair the curves and smooth the bandsawn texture with rasps and files, and finish with sandpaper on a flat sanding block, beginning at 100 grit and ending with 400. For more aggressive shaping, I'll use the disk sander.



3 SLICE THE PLUG

Mark the excess. To create the perfectly fitting bottom of the box, first push the plug into the cavity and draw a line around it where it emerges.

TAKE THREE SLICES FROM THE PLUG



Two cuts to get the bottom. With the bandsaw table still angled, saw off the waste piece at the lower end of the plug, then take a second slice to make the bottom of the box. Last, cut a slice off the top of the plug—this will be the keeper on the underside of the lid.



4 COMPLETE THE BODY OF THE BOX

Color comes next. If you'd like to paint the inside of the box, now is the time, while you have access from top and bottom. Paint the bottom as well.

Free the box from the blank. To create walls that are thicker at the bottom, leave the table tilted as before but approach the cut from the opposite direction.



Pop in the bottom. After brushing a narrow band of glue around the lowest part of the inside walls, drop the bottom into the cavity and press it into place.



5 ADD THE LID

Locate the keeper. Guided by a tracing of the inside of the box cavity, Cullen glues the keeper to the underside of the lid blank. He presses the keeper into place, holds it a minute, then clamps it.



Sizing the lid. After gluing on the keeper, fit the inverted box onto it and trace the perimeter of the box onto the lid blank. Then remove the box and saw out the lid.

A fitting lid. Cullen saws the lid at an angle opposite to the walls of the box. The flare looks good and also makes the lid easier to lift off (below).

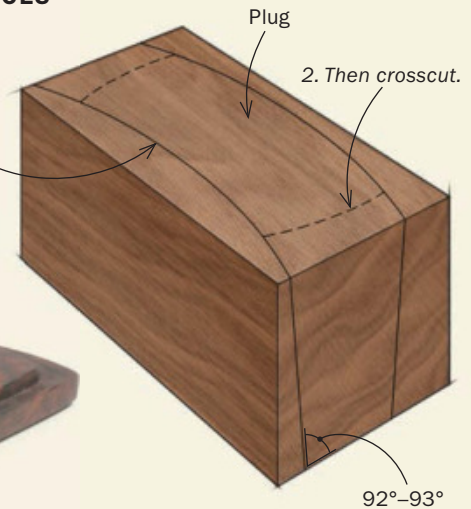


Four-walled box



TAKE FOUR SLICES

1. To establish the interior of the box, first make two slices lengthwise.



To make a four-walled bandsawn box, you'll follow nearly every step of the procedure for a two-walled box. The only real difference is in the pattern of cuts you'll make to the box blank once you've sliced off the lid blank.

After slicing off the lid blank, draw the design directly on the top of the box blank. Again you'll want the interior cavity to taper inward from top to bottom, so angle the bandsaw table a few degrees. Slice lengthwise through the block for the first

cut, then the second. The blank will now be three long, narrow pieces. It's a good idea to mark them so they'll go back together in the correct order. Now crosscut the central piece at each end to define the ends of the box's interior.

The glue-up here is slightly trickier than for a two-walled box, and to keep the parts aligned during assembly I often do the glue-up around the plug. Be careful when applying glue to avoid squeeze-out, which could glue the plug in place.



From a blank to a box. With the bandsaw table angled a few degrees, make the two long cuts first, then the short ones to create a four-walled box.



Assemble around the plug. Cullen uses the plug to help keep the parts positioned for gluing. Careful glue application and the kerf spaces at either end of the plug keep it from getting glued into the box.



Saw the outside walls. After glue-up, cut the outside walls to free the box from the blank.

TIP



PLUG YIELDS MORE BOXES



Cullen often uses the plug from one bandsawn box to make a smaller nesting box. The plug he's holding above yielded two more boxes.

Saddled lid

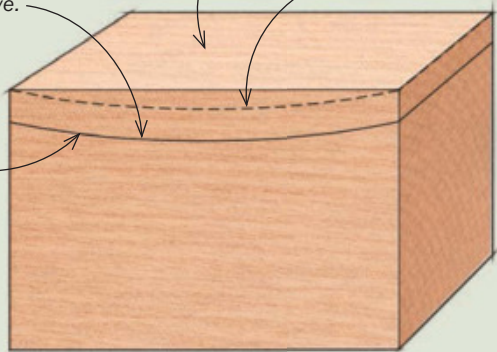
CUT A CURVED LID

1. Cut the lid blank from the box blank on a curve.

Waste

2. Saw the top of the lid to a matching curve after gluing on the lid keeper.

Lid



The lids of these bandsawn boxes are open to all sorts of variations. The box and its lid can be flat-topped, scooped, crowned, even wildly undulating. I made the lid for this mahogany box so it curves downward in the middle. The process tracks the

steps for making a flat lid with just a couple of exceptions.

When I cut the lid blank from the box blank, I simply drew a curved line and followed it. Had I drawn a squiggly line, the lid would fit just as well. After cutting out the sides of the box, I

sliced the lid keeper from the top of the plug, cutting parallel to the curving top face of the plug. I glued the keeper to the lid blank while the lid blank was still flat on top. Then I sawed the top of

the lid to a parallel curve. I could just as easily have left it flat on top or sawn it to a wavy surface. Experimentation is the name of the bandsaw boxmaker's game.

Cut away the lid on a curve. To make a lid that's dished end to end, cut the lid from the box blank on a curving line (right). After cutting the box apart, slice the keeper from the top of the plug, following a parallel curve (below).



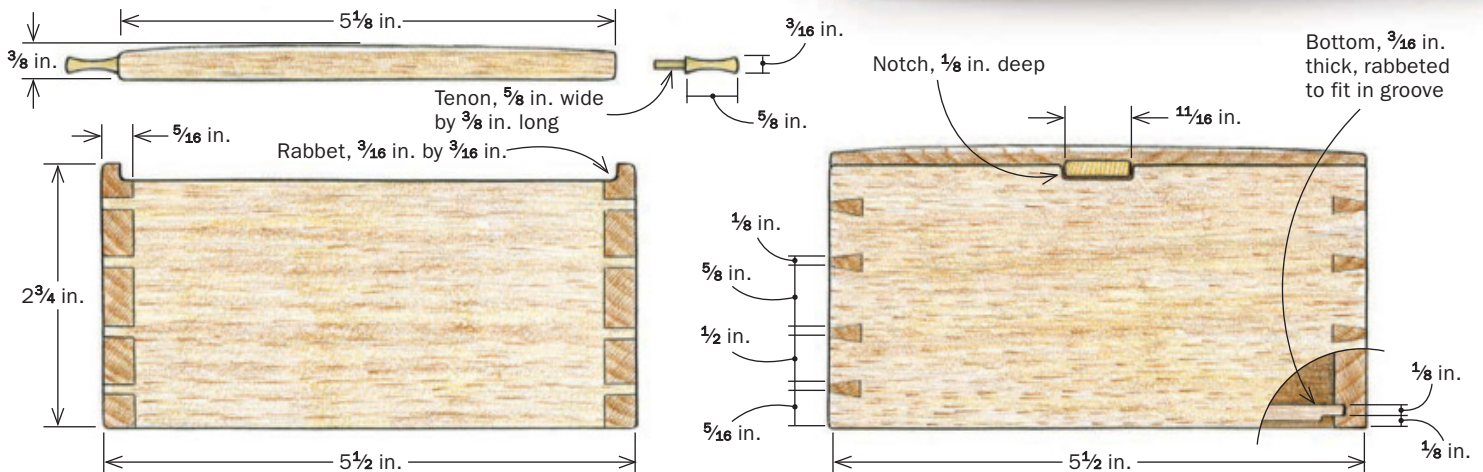
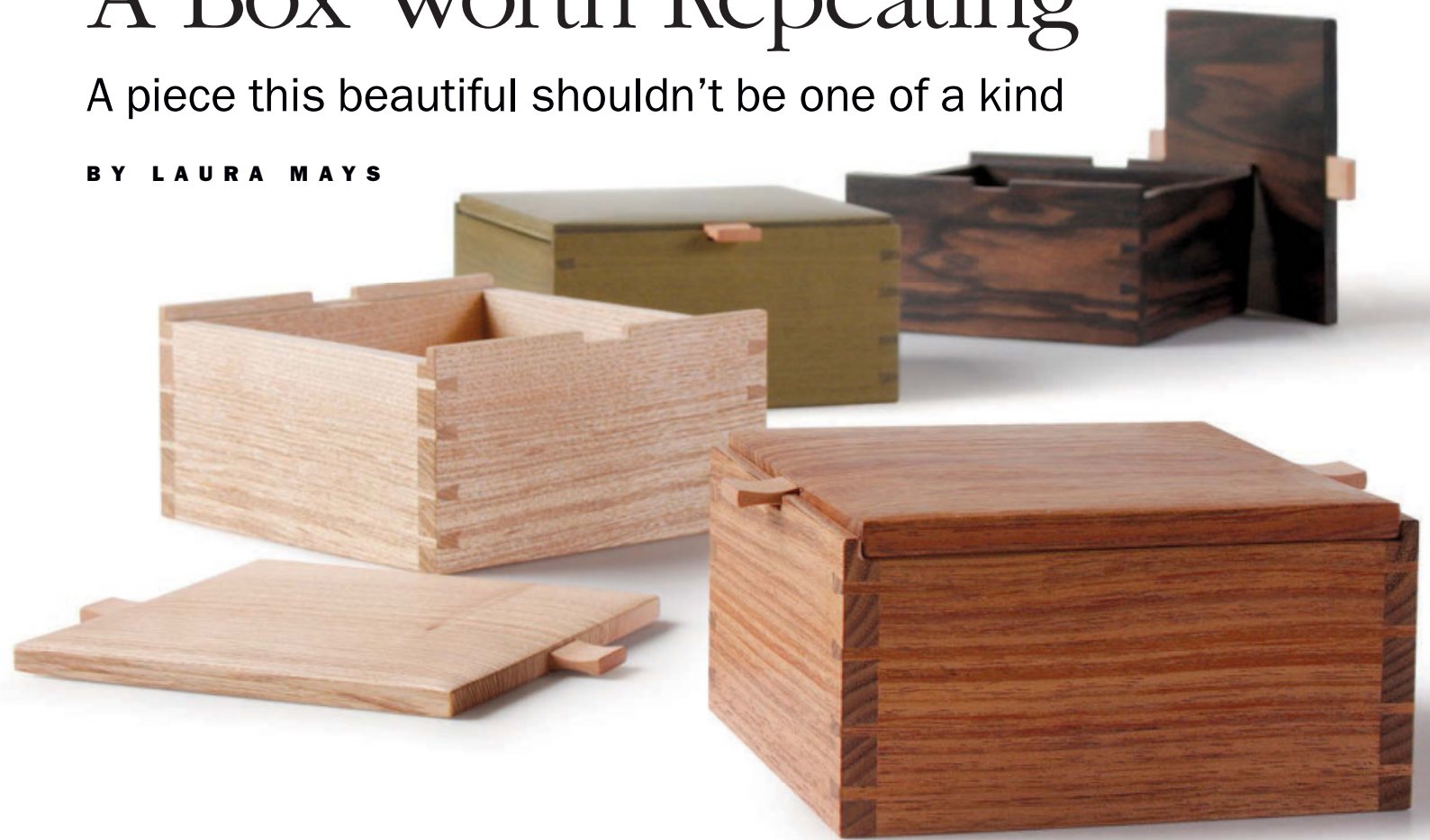
Press the keeper into place. After applying glue—careful to stay well inside the perimeter line—press the keeper onto the lid blank and hold it a minute (left). Then add clamps, using the plug, which is sawn to the identical curve, as a custom caul. With the keeper glued in place, saw the top of the lid to a mating curve (below).



A Box Worth Repeating

A piece this beautiful shouldn't be one of a kind

BY LAURA MAYS



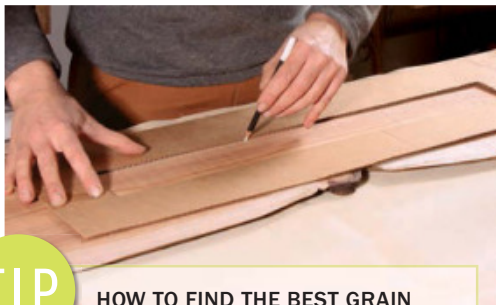
I first made this box several years ago as part of a series for an exhibition organized by the Crafts Council of Ireland called “Of Colour in Craft.” Artisans in various disciplines were asked to make pieces that used color prominently. I chose to make identical boxes in 10 species, each a different color.

Boxes are a great vehicle for exploring design ideas in a series (see “Designing in matched sets...” p. 33). Small and simple in form, they can easily be grouped to create an arrangement with a strong character of its own. Making boxes also is a good way to spend time between bigger projects, to use leftover wood, or to make gifts.

This square, dovetailed box is half as tall as it is wide, with a drop-on lid that is slightly pillowed. The lid has small handles to lift it off and help hold it in place. The project offers a chance to practice hand skills and to execute the small-scale details that make all the difference. It is very satisfying to make.

Fine dovetails

The foundation of the box's beauty lies in careful grain selection and neatly executed dovetails.



TIP

HOW TO FIND THE BEST GRAIN

Simple cardboard window frames help Mays to select and mark out the material for the box sides and lid.



Mill and mark, then cut the joinery

This box only uses about half a board foot of lumber. If you're making a set like mine, you'll want variety. Trawl through your scrap pile (and those of your friends), and scour the odds-and-ends bin at the lumberyard for pieces with great grain patterns.

Rough-mill the stock oversize by about $\frac{1}{8}$ in. in thickness and width. Don't cross-cut the sides to length yet; they'll be too short to go through the planer for final milling. Sticker the wood and let it sit for several days before thicknessing to final dimension. Afterward, lightly handplane what will become the internal surfaces of the box to get them very close to final prep. This is also a good point to confirm the orientation of the workpieces to avoid confusion when cutting the joinery.

At the tablesaw, rip the sides to width and crosscut them to just over finished length. I trim them to exact length on a shooting board, then check the ends for square. If they're out of square, the box will be, too.



Just a hair wider.

To mark out for the shoulders, Mays sets her marking gauge just wider than the thickness of the stock. This makes the tails and pins protrude slightly beyond the outside surfaces of the mating pieces.



Saw the pins.

Mays uses a joinery saw from Glen-Drake Toolworks for this task. Due to the pandemic, this particular saw was unavailable at press time, but any dovetail saw will do the job.



Transfer the

layout. Clamp the pin board to a piece of wide stock held in the vise. Blue tape on the backer board shims the pin board forward so it aligns with the scribed baseline.

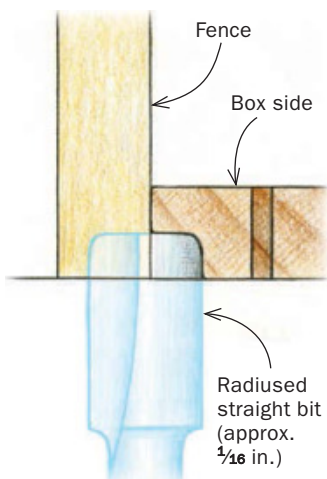
Flush the bottom edges. Dry-fit the box and flush the bottom edges so the box sits level (below).



Make way for the lid

Before gluing up the box, Mays routs grooves for the bottom and gently radiused rabbets to hold the lid.

RADIUSED RABBETS



Create a shelf for the lid. To cut the gently rounded recesses for the box lid, Mays uses a high-speed-steel straight bit onto which she has ground a slight radius.



Small details make a big difference

With the dovetails done, it's time to prep the sides to accept the bottom and lid. The bottom is rabbeted into grooves routed into the sides. Dry-fit the box and plane the bottom edges flush for a consistent reference when routing the grooves. On the tail boards, the grooves are stopped; mark out their ends with the box together.

To hold the top, I routed a rabbet on the top edge of each tail board. I used a straight bit and rounded the cutters for a slightly radiused inside corner. The lid handles rest in notches in the top of each tail board. To create them, hog away the waste at the bandsaw and clean up the sawmarks at the router table. Before gluing up, prepare and pre-finish all the inside



Notch for the handle. After marking out the notch (above), Mays removes most of the waste at the bandsaw, then cleans up the cuts at the router table (right).



Two edges of the lid rest on the sides. To make room, trim those two box sides flush with the bottoms of the rabbets on the adjacent sides.



Clamp thoroughly. Mays applies pressure in both directions on each joint, checking for square and adjusting the clamps as needed. She uses cork-faced cauls to accommodate the protruding tails and pins.

Shape the handles

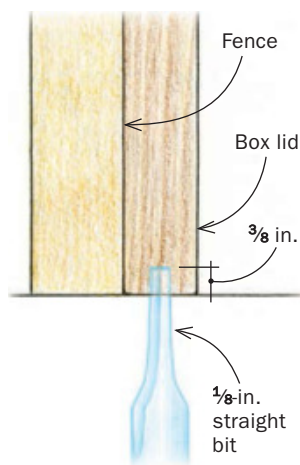
Mays cuts multiple handles from a single blank. The handles help lift the lid, and because they are recessed snugly into the sides, they align the lid precisely and hold it in place.

Handle mortises.

Set the lid in place to mark the mortises for the lid handles (right). Using a straight bit at the router table, make stopped cuts into the lid's edges to create the mortises (far right).

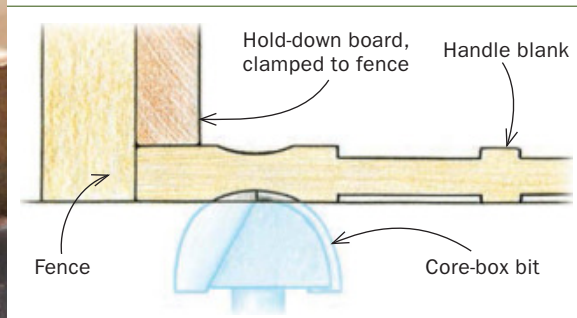


STOPPED MORTISES



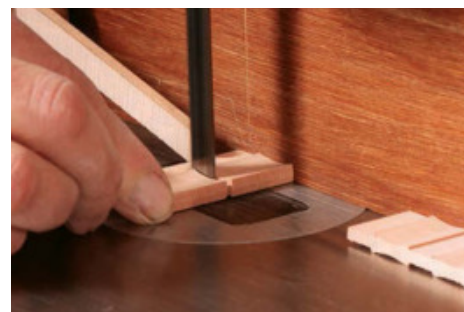
Create the

fingerhold. After routing shallow dadoes to shape tenons into the pull blank, Mays uses a core-box bit to create the thumb depressions in the pull's body.

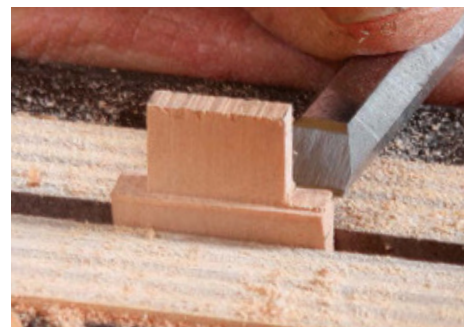


Fine-tune the

shape. After routing and further shaping the thumb depressions, use a block plane and sandpaper to round the front surfaces on the handle blank.



Cut the handles from the blank. After ripping two rows of handles from each blank, crosscut the individual ones free from each row.



Create the shoulders. Saw away the waste on each end of the tenon. Then pare the excess flush.

Pillow the lid

Dry-fitted handles locate the lid precisely, so it can be marked and cut to width for a perfect fit. The pillowed top starts with four planed facets, which are then sanded smooth into a gently sloping surface.

Get a handle on the fit. Dry-fit the handles and set the lid on the box (right). Then invert the lid and box to mark the lid for cutting to width (far right).



surfaces, and both sides of the bottom, with shellac and wax. After glue-up, clean up the outside surfaces with a plane or scraper, and sand as needed.

Topping it off

After cutting the lid to length (but leaving it wide), I use a $\frac{1}{8}$ -in. straight bit to rout the handle mortises.

For the handles, I started with rectangular blanks about $\frac{1}{4}$ in. thick and $2\frac{1}{2}$ in. wide. At the router table, rout a shallow dado that starts $\frac{5}{8}$ in. from the edge of the workpiece. Next rout a matching dado in the opposite face. The stock that remains between the dadoes is the handle tenon. Test its thickness against the mortises before finishing the handles. Now rout a shallow cove, top and bottom, across the grain, and sand it to fit comfortably under the thumb.

To shape the lid, I started with a roundover bit at the router table to gently ease the edges of the underside for a snug fit in the radiused rabbet. To pillow the top, draw a pair of diagonals across the surface and a depth line on all four edges. Now plane an angled facet in each quadrant that slopes gently from the center down to the layout line on the edge. Scrape and sand to blend the facets into a gently curved shape.

Finish the lids and the exterior with shellac and wax, and glue in the handles. □

Laura Mays is director of the Fine Woodworking program at The Krenov School in Fort Bragg, Calif.



The lid is a pillow. To create the rounded surface of the top, use a block plane to create facets that slope gently toward each edge of the lid. Start by working across the grain (left). Then plane with the grain to create the remaining facets (below). Afterward, scrape and sand to blend the facets into a gentle curve.





RUNNING RIDGES

This series experiments with a ridge or narrow raised band running over the exterior of the boxes. The first one has two intersecting ridges, the second has a curved ridge, and the third has a ridge that runs around the short dimension. I feel like this series is not over—there are more variations I would like to add.

Designing in matched sets is a balancing act

In our craft, we repeat actions over and over, plane stroke by plane stroke, gaining muscle memory, trying to build the action into our very being. In this there is sameness, yet there is also change. We constantly seek feedback from our actions, altering our stance, shifting pressure, reversing direction.

This interplay between sameness and change is one reason I'm drawn to making objects in series, matched sets where the pieces aren't identical copies of one another but variations on a theme.

Each series of boxes shown here starts with an idea that is very simple but gains complexity and subtlety in the making. The pleasure is in the possibilities: "What if I do the same thing but just change this...?"

The key to making a series work lies in finding the right balance between change and sameness. Too much sameness and the series becomes overly repetitive and uninteresting; too much change and it becomes a set of separate objects.



ALTERING FACETS

When I was first learning woodworking in Ireland, our instructors gave us an exercise in which we made a small dovetailed box and then planed away some of the surface to reveal the interior of the joinery. Any undercutting on the pins and tails, any ragged shoulders would be revealed. For this series, I explored the idea further by removing planar facets in different configurations, this time from small madrone boxes. Using the same species throughout puts emphasis on the different arrangements of facets.

I chose madrone because it is close-pored and holds detail very crisply.



CHANGING COLOR

With the Color series, I kept everything the same except the wood species. The basic form of the box is very simple. To have altered other aspects or have had a more complex base object would have distracted from the main point. The series as a whole is one object, made up of a number of separate objects.

Veneered Boxes Made Easy

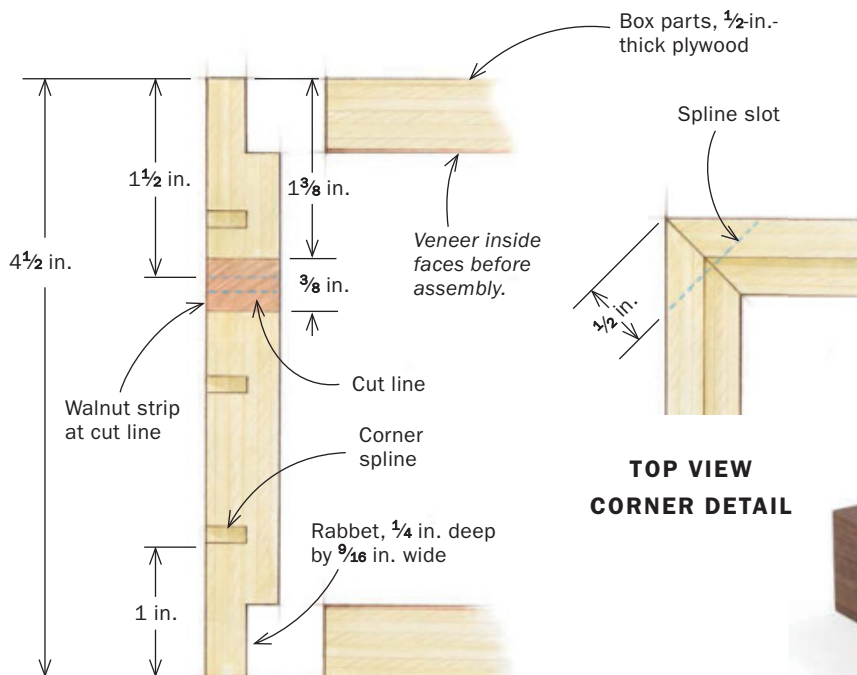
Create seamless beauty outside and in

BY CRAIG THIBODEAU



SIMPLE RABBETS AND MITERS

Mitered corners reinforced with splines are hidden by veneer for a clean look. Built as a closed unit, the box is sawn apart to separate the lid from the body.



I built my first boxes from solid wood. Then I started playing with veneer, discovering a new world of wood species, colors, and amazing grain patterns. I never looked back. Using veneer makes it easy to decorate a box in myriad ways. The box shown here has a beautiful walnut exterior, with a bright, golden interior of curly anigré.

I veneer the inside before assembly and the outside afterward. That not only delivers a flawless interior but also lets you use your preferred joinery method and then simply veneer over it, creating a perfect grain match and a seamless exterior. My joinery method for veneered boxes is a combination of miters and rabbets.

I assemble the parts into a closed six-sided box, and then rip off the lid on the tablesaw. Before I veneer the sides and assemble the box, I figure out where the seam will be, rip apart the plywood pieces at that line, and glue a strip of solid wood between them—one that matches the exterior veneer. When I cut off the lid later





Lay up the veneer. Use a roller to spread polyurethane glue on the substrate, then lightly mist the glue face of the veneer with water and press down the veneer by hand. Use cauls and clamps or a vacuum bag to glue the veneer.

on, I end up with a solid edge on both lid and box.

To keep the focus on the fundamentals, I've kept this box simple. But the same veneer approach can be used on boxes with decorative inlays and borders.

Interior veneers go on before assembly

I used less than a quarter sheet of ½-in.-thick Baltic-birch plywood for this box and about the same amount of ¾-in.-thick MDF (particleboard also works) to make clamping cauls for gluing on the veneers.

The plywood sides start as one long piece, long enough for all four sides and their miters. Rip this long piece into two strips, with the cut located at the seam between the lid and body. Then glue and clamp a strip of solid wood between these parts, and plane and sand it flush.

Cut out the top and bottom parts now too, and cut an extra piece of substrate—roughly 6 in. by 12 in.—for testing the miter and hinge setups later.

I tend to use lighter-colored, straight-grained veneer for the interior of my boxes and furniture, in a color that both complements and contrasts with the exterior. Here the long piece of substrate for the box sides will be veneered on one side with a single piece of anigré.

For the tops and bottoms, you can use one wide piece of veneer, or cut and tape together two pieces to make a book-matched sheet. (See Bob Van Dyke's Heirloom Box on p. 50).

I cut veneer with a sharp veneer saw and a straightedge. To press the veneer onto the plywood, a vacuum bag (or vacuum press) is the quickest and easiest method, but clamps and cauls are a fine choice for

veneer the inside face and miter the sides

Start by ripping the plywood strip in two and gluing a piece of solid wood where the seam between the lid and body of the box will be. Then veneer the inside face before mitering the parts. This is much easier than trying to add the veneer later.



Start with butt joints. After trimming the excess veneer from the long edges, Thibodeau cleans them up with light ripcuts. Then he crosscuts them to final length as shown, with a backer strip preventing blowout.



Neat trick for clean miters. After tilting the blade to exactly 45°, clamp an auxiliary fence to the rip fence, and bury the blade in it. Then adjust the fence so the miter cut extends exactly to the tip of the butt joint. Dial in the setup using a sample of the veneered box sides, and support the workpieces with the miter gauge.



Rabbet the top and bottom edges. Use a dado blade to cut rabbets roughly half the thickness of the sides, and just a hair wider than the thickness of the top and bottom.

ASSEMBLE THE BOX

The box assembles with packing tape. The edges of the sides end up just proud of the top and bottom, and are easily sanded flush.

Tape and glue the joints. Lay the sides tip to tip, and stretch clear packing tape over the joints. Then flip the assembly and brush yellow glue onto the miters, keeping the glue away from the inside faces to minimize squeeze-out.



Wrap up the assembly. Fold up the box to close the joints, and stretch tape over the last joint. After removing squeeze-out from the corners of the rabbets, drop in either the top or bottom, unglued, to be sure the box stays square as the miters dry.



those who only use veneer occasionally, especially on small workpieces like these. I recommend polyurethane glue, which introduces very little moisture and creates a rigid glue line.

Make clamping cauls—You'll need one clamping caul for the top/bottom, and one for the long side piece. For the bag my clamping caul is just a piece of $\frac{3}{4}$ -in. MDF, cut about $\frac{1}{4}$ in. larger than the substrate. For the clamp method, I again use MDF but I apply a layer of $\frac{1}{4}$ -in.-thick cork to the cauls to even out the pressure. I use spray adhesive to apply the cork, and then clamp each caul to my workbench—cork side down—to ensure a good bond.

I wrap my cauls with clear packing tape to resist glue, or place a sheet of plastic between the caul and workpiece. (I use rolls of 3- to 5-mil plastic from the home center.)

Glue in the top and bottom. After a couple of hours, glue in the top and bottom panels, using cork-lined cauls and focusing clamping pressure near the edges of the box.



Cut joinery and assemble the box

The sides of the box are joined with miters, and the top and bottom sit in rabbets cut into the sides. This lets you assemble the miters first and then drop in the top and bottom.

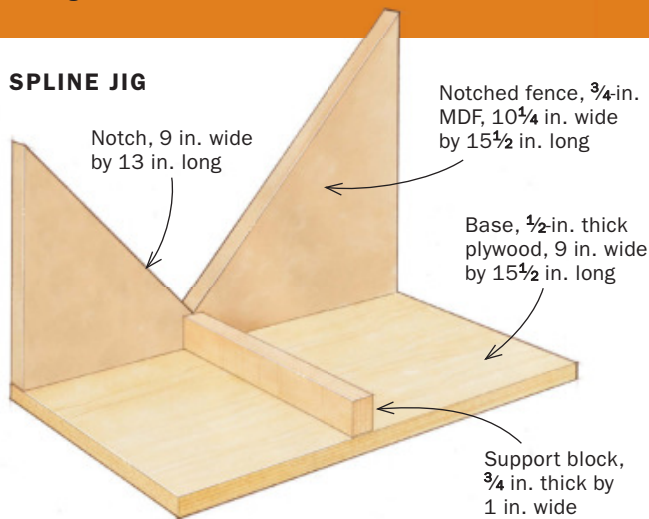
Before assembly, sand and finish the inside face of all the parts up through 220 grit. Shellac is a great option for an interior finish as it dries quickly and, unlike oil finishes, it doesn't impart a strong scent in a closed space.

I use Titebond I because it dries quicker than polyurethane and is easier to clean up. When the miters are cured, I glue in

ADD SPLINES, RIP OFF THE LID

Thibodeau reinforces the miters with small splines before sawing off the box lid.

SPLINE JIG



Smart sled. This simple jig cradles the box at 45° for cutting the spline slots. Be sure you don't cut too deep and penetrate the box interior.



Glue in the splines and trim them flush. Solid wood splines are planed for a snug fit in the slots. After the glue dries, use a handsaw and block plane to trim them flush.



Rip off the lid. Set the tablesaw blade $\frac{1}{8}$ in. higher than the thickness of the sides. Then make cuts on three sides, starting on a short side. For the fourth cut, stabilize the box by adding shims equal to the thickness of the blade's kerf and taping the box together as shown.

the top and bottom. Then, on a box this big, I add splines to strengthen the miters.

Rip off the lid and apply backer veneers

Once the splines are dry, trim them flush. Then it's time to cut the lid off the box on the tablesaw. When you've done that, sand the cut edges smooth, and test the fit of the lid and box. If there are any gaps

between them, flat-sand them with a hard block until they disappear. On the top and bottom of the box, the uneven edge grain of the plywood will telegraph through over time if you use a single piece of veneer, so use a plain, straight-grained backer veneer under the walnut. Align the backer's grain perpendicular to the grain of the substrate.

I always go with traditional clamps for applying the exterior veneers, as the vac-

uum bag could crush the hollow lid and body of the box. Use a set of thick cauls to ensure the clamp pressure is distributed evenly. I recommend two layers of $\frac{3}{4}$ -in. MDF for each caul, covered with cork and packing tape.

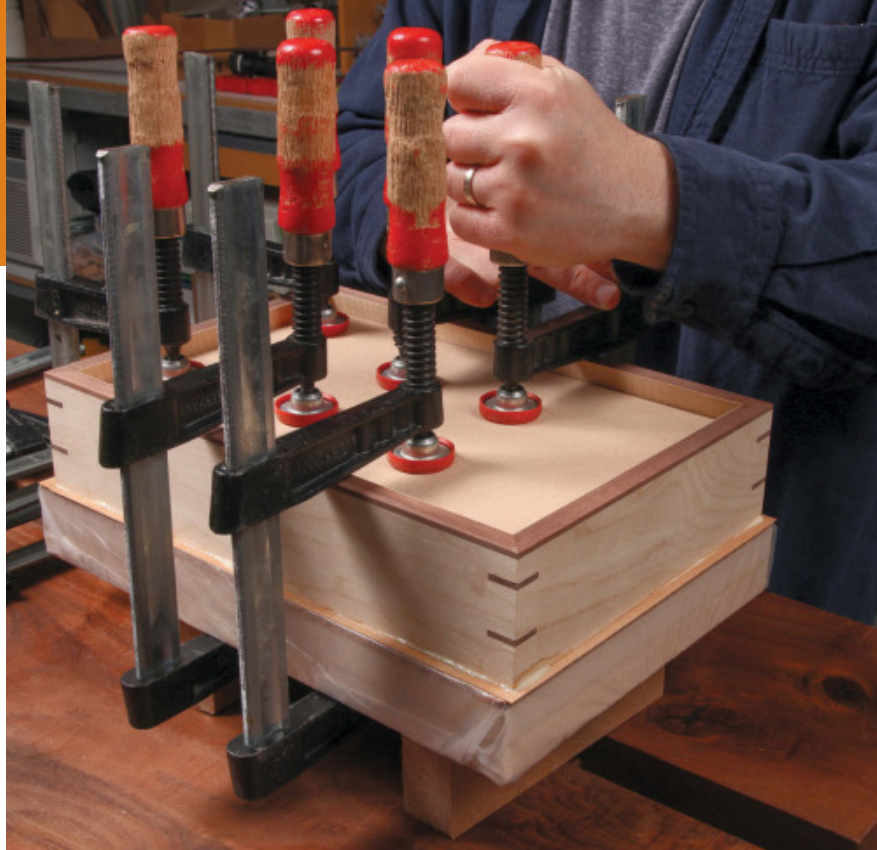
Be sure the top and bottom of the box are dead-flat before veneering, sanding the edges of the sides flush to the top and bottom if necessary. Leave the backer veneer

BACKER SHEETS TOP AND BOTTOM

The plywood edges of the sides will be detectable under the veneer unless you add a backer veneer first. The grain of the backer sheet should be perpendicular to the grain of the plywood below.

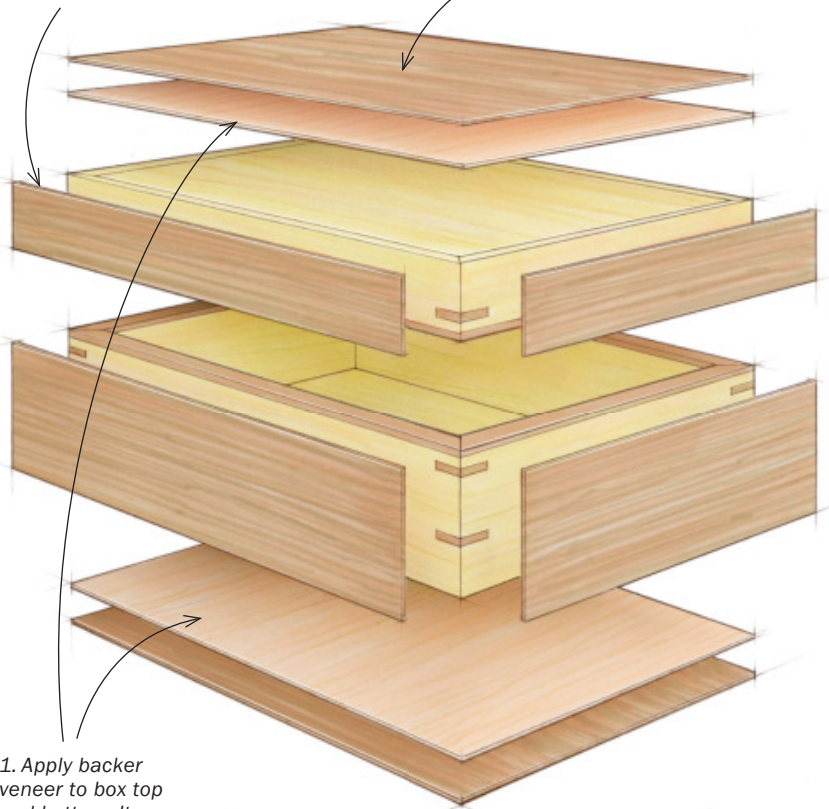


Glue and clamp. Backer veneer can be any common species, cut slightly oversize, with the grain running perpendicular to the plywood's face grain. A thick caul placed inside the box distributes clamp pressure evenly (right).



2. Apply veneer to sides, working around the box one face at a time.

3. Add the face veneer to the top and bottom of the box.



1. Apply backer veneer to box top and bottom. Its grain should run perpendicular to the face veneer.

VENEERING SEQUENCE



Trim the excess. Trim overhanging veneer using a handheld router and a flush-trimming bit, starting with the end-grain areas and using a climb-cut to avoid chipout. Then sand the edge square and flush with a hard block.

veneer the exterior

Thibodeau cut the exterior veneers from one large piece to create continuous grain and a harmonious look.

Prep the side veneers. For continuous grain, cut a long, straight-grained strip for all four sides of the box and lid, slightly oversize. Label the parts and their orientation on the box before cutting them apart.



One side at a time. The veneer goes on as before, with polyurethane glue, and one caul sized to fit inside the box and the other slightly oversize for the outside.



Align one part with the next. After trimming the excess veneer as before, align the grain of the adjacent piece as you apply it, holding it in position with blue tape.



to dry overnight, trim off the excess at the edges, and then give the entire exterior of the box a light scuff-sanding with a hard block and 150-grit paper—not enough to change its size or shape, just enough to clean up any glue.

Attach the outer veneers and finish the box

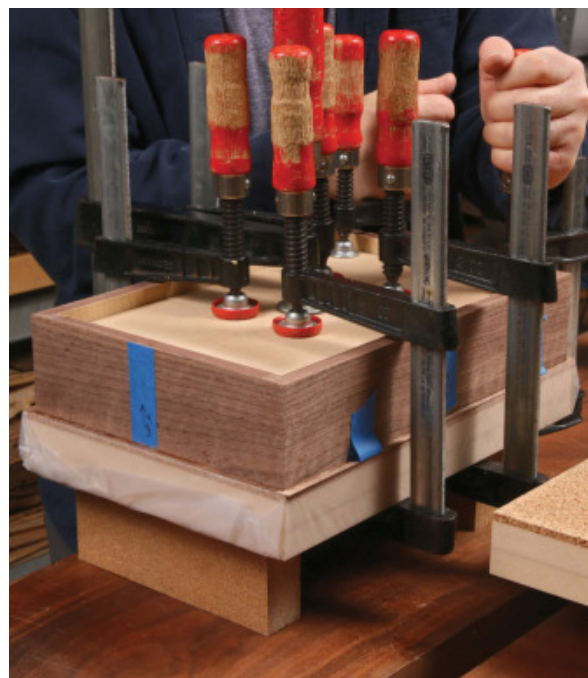
Now you're ready to apply the exterior veneers. The side veneers go on first. Cut the side pieces from one long piece of veneer, so there will be a continuous grain match at three out of the four corners and a perfect match at the seam between the lid and body.

Once the side pieces are attached and trimmed flush on both the lid and the body, glue on the final top and bottom veneers. After trimming them flush, give the whole exterior a quick sanding with a hard block and some 150-grit paper to smooth everything out and remove any glue. But don't sand it any smoother until the hinges are installed; you want the veneers to stay as thick as possible so you can sand away any little misalignment of the top and bottom.

After the hinges are installed (see p. 40), do the final sanding of the sides (except the back) with the box assembled, to ensure all the corners line up perfectly. Sand with a hard block, lined with cork, using 180-, 220-, and 320-grit paper. Then remove the hinges to finish-sand the back, top, and bottom.

The exterior finish is your choice: oil, polyurethane, more shellac, whatever you like.

Craig Thibodeau is a furniture maker in San Diego, Calif.



Veneer the top and bottom. These veneers are applied and trimmed exactly like the backer veneers, but with the grain running lengthwise this time.

Side-rail box hinges: Looks, performance, and easy installation

1. SET UP YOUR ROUTER TABLE

Each mortise is cut in a single pass on the router table, approaching the bit from one side or the other, depending on the part of the box being mortised.

Set the height.

Use your fingertip to set the bit flush with the thickness of a hinge leaf.



Add a stop block and make a test cut.

Thibodeau positions a stop block with the help of a 34mm spacer. Make sure the cutting edge of the router bit is at its outermost point. Set the fence to center the bit on the thickness of the sides. Use a sample piece, veneered like the real box sides, to check the setup (far right).



Test the fit. The hinge leaf should be flush on top, with the barrel centered on the back edge.



I install high-quality side-rail hinges in every box I make these days. I'm using them here on a veneered box, but they work just as wonderfully on solid-wood boxes. I prefer this type of hinge because of its clean, minimal look and built-in lid stop.

There are a number of high-quality side-rail hinges on the market. My favorite ones are the SmartHinges from Andrew Crawford (smartboxmaker.com). The lid stop is machined into the hinge barrel, making it invisible, and the hinge barrel is rounded on its back end, the only side-rail hinge with that elegant touch. The ends of the hinge leaves are also rounded, which makes mortising super easy on the router table.

By the way, if your box design incorporates a lock, Crawford's SmartLock hardware is easy to install and matches the design of the hinges.



SmartHinges only require two router-table setups, using either an 8mm or $\frac{5}{16}$ -in.-dia. router bit (both work) and a small shopmade spacer, which dials in the distance between the bit and a stop panel clamped to the table. For SmartHinges the spacer should be 34mm wide.

Set your bit height to exactly the thickness of one hinge leaf, and set the fence to locate the bit in the center of your box sides. Use the spacer to position your stop block on the left side of the cutter.

To test the setup, you'll need a sample box side, veneered the same way as the real thing. Make a test cut, sliding the sample along the fence until it hits the stop block and then pulling it back until it clears the bit. Keep the piece pressed against the fence.

2. ROUT THE HINGE MORTISES

Now the real thing. Be sure to hold the box snug against the fence all the way up to the stop block and all the way back out of the cut. Note how Thibodeau marked the hinge locations in chalk to keep track of these critical cuts. You'll be able to cut two of the four mortises with this first setup.



Test-fit a hinge leaf to check your setup. If you need to make an adjustment, just make a test cut on another edge of your sample part. Use this setup to cut the top-right and the bottom-left hinge mortises, as shown. Then move the stop block to the right side of the bit, using the 34mm spacer as before. Just to be sure, test the setup on the sample piece again. Now you can cut the top-left and bottom-right hinge mortises.

To install the hinges cleanly and accurately, push each leaf into place and use a centering bit to line the pilot holes up with the holes in the hinges. It helps to angle the holes very slightly toward the front of the box in order to pull the hinge leaves tightly into their mortises.

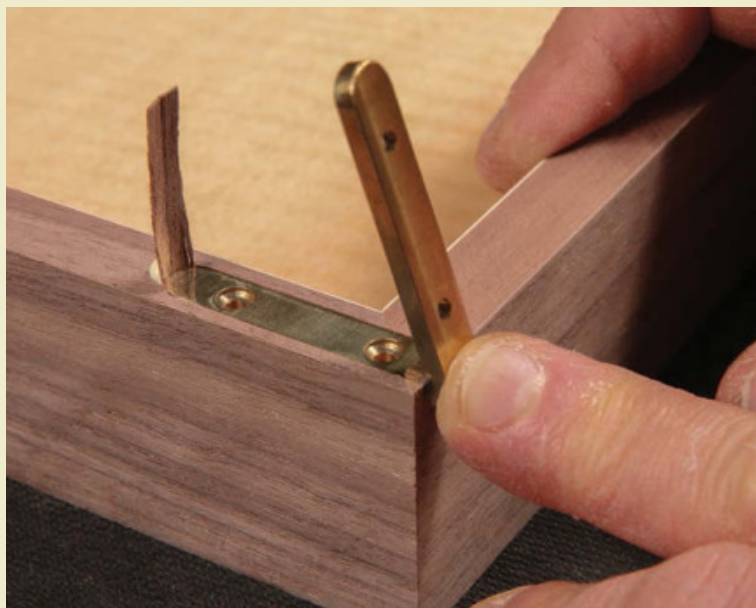
—C.T.



Switch sides. To cut the two remaining mortises, move the stop block to the other side of the bit, using the same spacer to position it. Once again, keep the box or lid snug against the fence throughout the cut.



Check the alignment. Insert the hinge leaves fully in their mortises, and then check the alignment of the lid at the front edge (above). If the alignment is off, you can add a shim to align the parts. Use the hinge leaf to press a small piece of veneer into the back of each mortise, taping the hinge there until the glue dries.



Dovetailed Tea Box

This project offers a variety of techniques in a small package

BY MICHAEL PEKOVICH

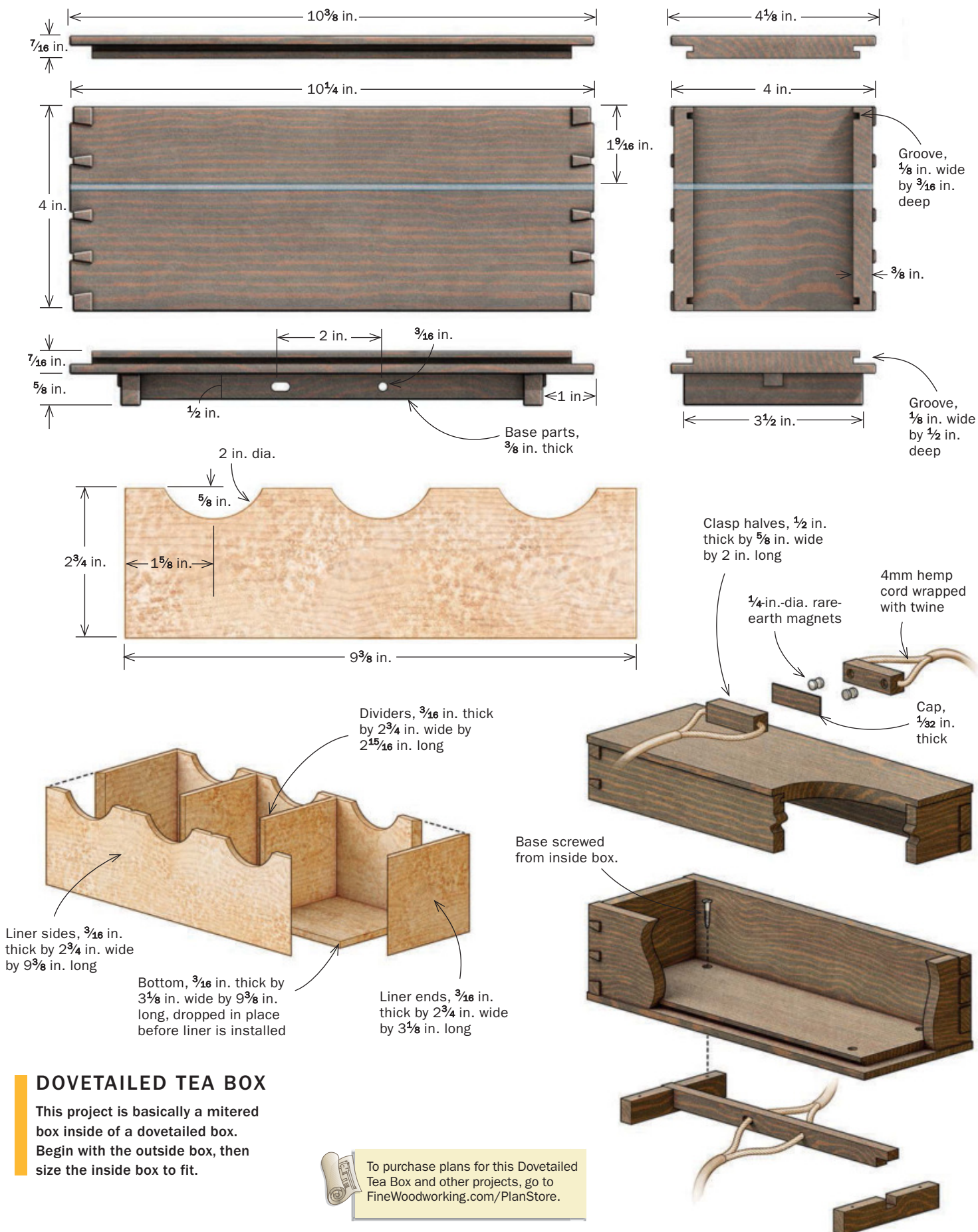


For some reason, tea tastes better coming out of a dovetailed box rather than the cardboard box from the grocery store. For me, tea is about taking a break. The time it takes to steep is just as important as the drinking of it. So anything that adds to that experience, whether it's a teapot or cup or box, can make a difference. For this particular box, I had imagined something like an oyster: a wenge exterior acting as a rough, rocklike shell and a bird's-eye maple liner providing an iridescent interior.

The box turned out to be a study in texture. The proud dovetails, the wire-brushed wenge, the hemp cord, and the bandsawn surface of the clasp all combine to create a box that is as interesting to touch as it is to look at. For an object that sees as much handling as a box, that's an important thing.

Work from the outside in

The box is fairly straightforward to build. I glue up the dovetailed sides, capturing the tongue-and-groove top and bottom, and then make a sawcut right through the box,



A dovetailed box

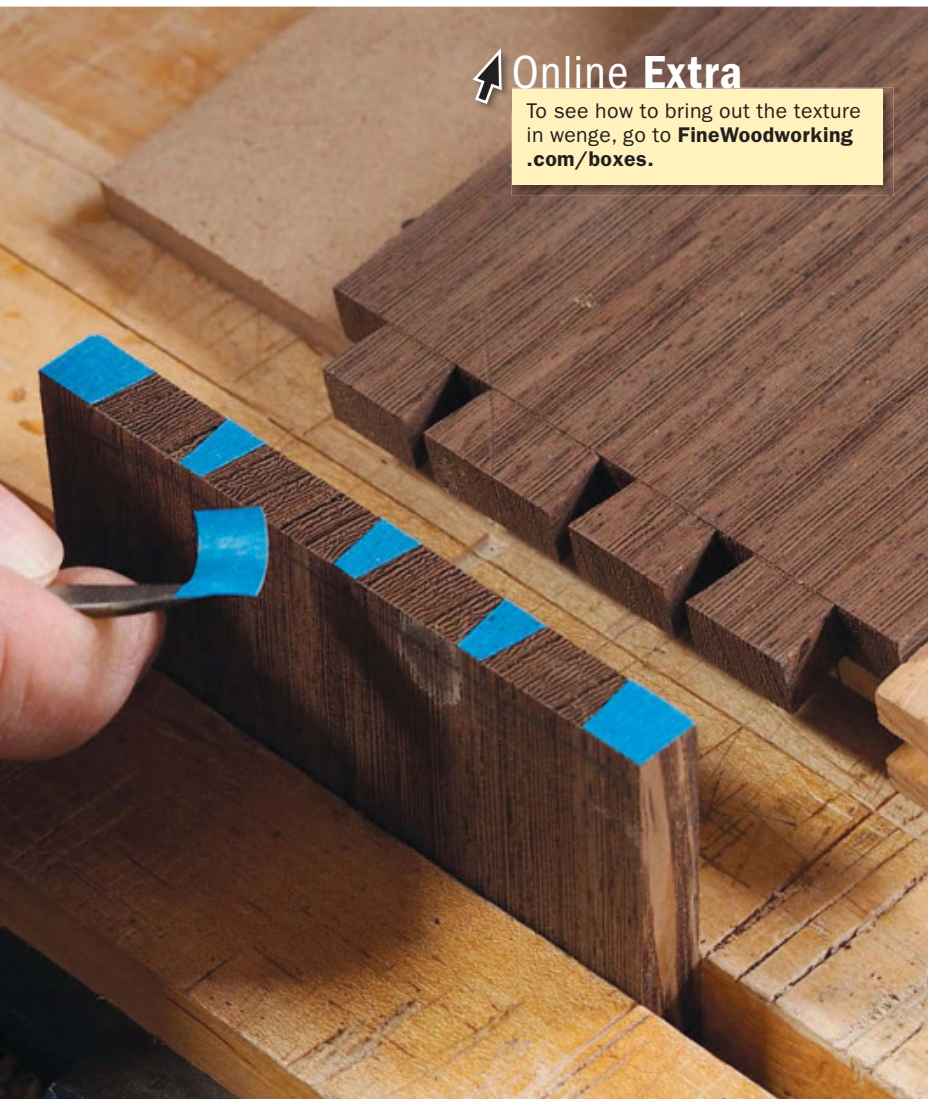


A little help with the dovetails. A simple shoulder guide positioned along the baseline (above) and held in place with a spring clamp helps ensure proper alignment of the parts for scribing (right). Adding tape to the end grain and peeling away the waste after sawing offers a clear road map for sawing (below).



Online Extra

To see how to bring out the texture in wenge, go to FineWoodworking.com/boxes.



separating the lid from the base. I then build a liner and add it to the inside.

Dovetailing the box is the place to start. To create the proud dovetails, set a marking gauge a little wider than the stock thickness. When laying out the tails, make the tail that will be sawn through to remove the lid a little wider than the others to account for the sawkerf.

Once the tails are cut, I use a couple of tricks to make cutting the pins a little easier. First, I apply painter's tape to the end grain. This will help to highlight the otherwise invisible knife lines on the hard, dark end grain. Before layout I trim the tape to the exact size of the end of the board instead of folding it over the corners, which could throw off alignment when scribing the pins. Second, I use a jig to help position the parts accurately for scribing. The jig is a rectangle of $\frac{1}{4}$ -in. MDF with a pine fence glued along one edge. A groove in the pine helps to secure it to the MDF and allows for slight adjustments when gluing. Use a combination square to check the fence for square while the glue is still wet and adjust as necessary.

To use the jig, position its fence along one edge of the tail board, and then slide the jig toward the end until the MDF is aligned with the baseline of the tails. Use a spring clamp to secure the jig. Place the tail board on top of the pin board with the edge of the MDF contacting the inside face. Slide the tail board over until the jig's fence contacts the side of the pin board. The tail board should now be in position for scribing the pins with a knife. Once you are done, peel away the tape from the waste areas between the pins to reveal a clear road map for sawing. To finish the joint, cope out the waste and chisel to the baseline of the pins.

Grooves for the top and bottom.

Adjust the rip fence to take a cut a kerf-width away from the edge. Groove the box sides, and then raise the blade and groove the edges of the top and bottom (right). Aim for a fit that's rattle-free, but not overly snug (far right).



Join the top and bottom

Boxes can look clunky if you're not careful, so I made the top and bottom appear thinner by leaving just a portion of their thickness visible above and below the sides. The result is a delicate-looking top and bottom that are in scale with the overall size of the box.

I start by cutting grooves at the top and bottom of the long sides and then around the edges of the top and bottom boards. I use a tablesaw blade with a $\frac{1}{8}$ -in. kerf and set the rip fence one kerf's width away from the sawblade. Leave the rip fence here while grooving the case parts and the top and bottom. Start with the long sides. Set the blade to cut roughly halfway through their thickness, and cut grooves along the



Trim the top and bottom. Rip along the edges of the top and bottom to create a short tongue and allow the lip to overhang the sides. The ends of the box are not grooved, so turn the grooves at the ends of the top and bottom into rabbets.



Live up the wenge. To add a little texture to the surface of the wenge, scrub along the grain with a wire brush. Follow with fine steel wool to smooth any fuzzy areas.



Slice off the lid. After gluing up the box, cut it in two at the bandsaw. Center the kerf in the middle of the wider dovetail. Chamfer the edges of the cut, but leave the bandsaw marks and burnish them with steel wool.

Start with square ends. Size the liner sides and ends for a snug fit in the box. Start by cutting them slightly oversize and sneak up on the fit with a handplane. The dividers will fit in V-grooves halfway into each long side, so their starting length needs to be the width of the box minus the thickness of one liner side.



V-grooves, then miters. The liner joinery can be handled at the router table. Start by cutting the V-grooves while the ends of the stock are still square (right). Then set a chamfer bit to cut a miter almost the full thickness of the stock (far right). Leave a small flat at the top to ensure that the liner is not shortened during mitering.



Dividers get beveled ends. Set the chamfer bit to cut a bevel half the thickness of the stock. Flip the divider to cut the second bevel.

top and bottom edges. Then raise the blade to cut a deeper groove into all four edges of the top and bottom. The blade height should equal the thickness of the stock plus the amount you want the top and bottom to overhang the sides. Then kick it up a bit higher to allow for seasonal movement of the top and bottom.

The result should be a snug fit that's not overly tight. Next, make a trim cut to create a short tongue along the long edges of the top and bottom. This will allow the joint to fully seat. You won't need this tongue on the ends, since the ends of the box aren't grooved. Instead, trim away wood to turn the grooves at the ends of the top and bottom into rabbets.

Before glue-up, burnish the parts with a wire brush to define the grain and create a subtle texture. I apply a coat of thinned shellac to the parts to prevent any glue squeeze-out from sticking to the wood. Once the glue is dry, I saw the box in two at the bandsaw. Normally I would remove the bandsaw marks, but I like the added texture here, so I just chamfer the corners and burnish the edges with fine steel wool.

A mitered liner



Divide and conquer

The mitered liner acts to register the lid to the box. It also offers a nice surprise when the box is opened. I try to use wood that will offer a contrast to the dark wenge and a little pop as well. Curly, bird's-eye, and spalted maple all work well.

Start by cutting the parts to finished length but with their ends square. I'll get close at the tablesaw and then use a shooting board to dial in the fit. The sides and ends should just fit inside the box, but the dividers need to be cut shorter. Set one long side of the liner in place, and size the divider to fit between that and the opposite side of the box.

Turning the square ends of these parts into miters and cutting the V-grooves can be handled at the router table. Begin with the V-grooves; it's easier to cut them while the ends are square. Install a V-groove bit and raise it to half the thickness of the stock. Use a push pad to keep the stock on the table and tight against the fence. One fence setting will handle all four V-grooves.

To cut the miters, install a chamfer bit (the V-groove bit would also work), and position the fence to expose just a portion of the bit. You want a bevel that's almost the full height of the workpiece, with just a thin line of unrouted stock above it. Don't raise the bit too far or you will shorten the piece as you rout the miter.

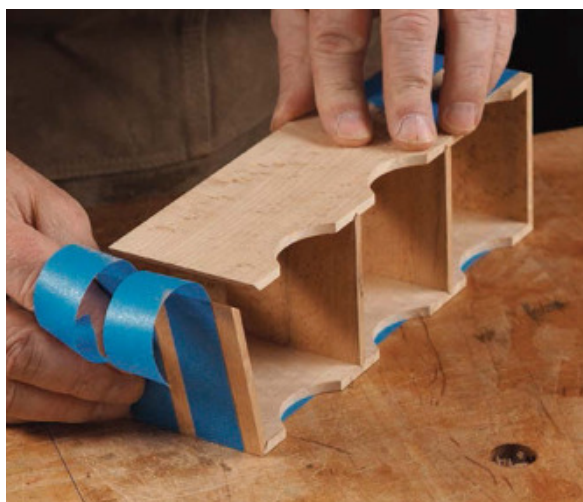
For the dividers, slide the fence over until you are cutting a bevel half the thickness of the stock. Flip the stock over and take a second pass to create a mitered point to register in the V-groove. Again, leave a thin flat at the center of the stock where the bevels meet.

The mitered parts probably won't fit at this point. I use a shooting board designed to handle 45° miters to bring the stock to length. Start with the corner miters. Then plane the dividers to fit, taking equal passes on each side to keep the point centered.



Fine-tune the fit.

Pekovich uses a dedicated shooting board designed to plane mitered ends (far left). Start with the liner sides and ends and install them in the box. Then size the dividers to fit in the V-grooves (left). Aim for a snug fit, but don't try to wedge too-tight parts into the box.



Wrap it up. After cutting the scallops in the sides, lay the liner parts facedown on the bench and apply tape across the joints. Flip them over and add glue to the miters and V-grooves, then roll up the assembly. The tape should be enough to keep the miters tight, but clamps may need to be added across the dividers to tighten gaps at the V-grooves.

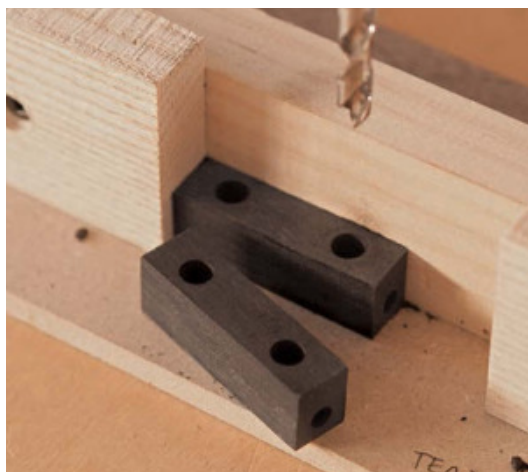
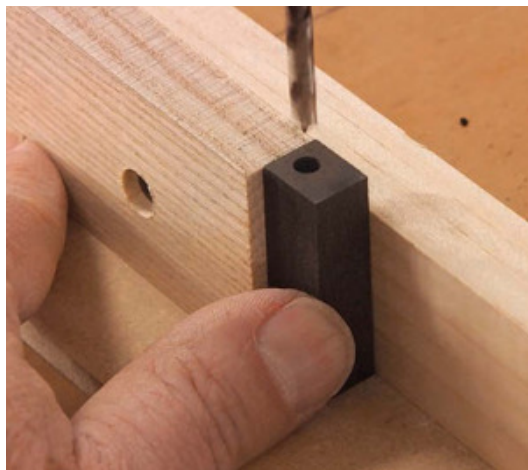


Add the liner. Drop the bottom in first, then slide the liner in on top of it. Gluing isn't necessary. The portion of the liner that extends above the box sides may need to be beveled slightly on the outside faces to allow the lid to lift off easily.

An ebony clasp

Drill the blanks.

Each half of the clasp receives a hole for the cord as well as a pair of holes for the magnets. A fence clamped to the drill-press table helps when aligning the holes. When drilling the through-hole, a stop keeps the blank vertical (top). A pair of stops are used to drill the magnet holes (bottom).



Add magnets and cap it with veneer. For extra strength, drop a pair of magnets into each hole. Double-check their orientation to make sure the halves attract instead of repel each other. Then cap the magnets with a thin strip of ebony. If the cap is too thick it will reduce the attraction of the magnets.

Once the liner is fitted, remove the parts and glue them up. After smoothing the surfaces, I apply a thin coat of shellac to keep glue squeeze-out from sticking to the inside faces. To assemble the liner, clamp a straightedge to the benchtop and arrange the parts along it with the inside faces down. Apply tape across the seams and flip the parts over. Add glue to the miters and V-grooves and roll up the assembly, adding tape to the last corner. If necessary, apply light clamping pressure across the dividers to close any gaps. When the glue is dry, sand the top edges flush, then plane or sand a long, shallow bevel on the outside of the assembly where it extends above the box sides. This will make it easier to remove and replace the lid.

Tie it all together

The final task is to add the base and the ebony clasp. The first step is to make the clasp itself. In the past I've used a sliding dovetail to join the clasp halves, but I have since discovered that hidden magnets handle the job well and make construction easier.

Each half of the clasp gets three holes—a hole through its length for the cord and a pair of stopped holes for the magnets. Then it's a matter of dropping a pair of 1/4-in.-dia. magnets into each stopped hole and covering the face with a thin strip of ebony.

In order to attach the clasp, the base must be in place. It consists of two short bars that act as feet and a longer bar between them.

The center bar is notched to fit the feet, which are screwed to the box from the inside. The longer bar is also drilled so the cord can pass through—one hole being round, the other oval.

Thread the cord through the round hole in the base and then through the clasp halves. The ends of the cord should pass each other through the oval hole in the base. Use twist ties at the top and bottom of the sides to hold the paired cords together. The fit of the clasp should be snug, but not so tight as to prevent the halves of the clasp from joining. Once the tension is right, fix it by driving a wedge into the oval hole. I use a chisel to bevel the end of a dowel, add glue, and drive it into the oval hole, locking the cord ends tight. Then I saw the dowel flush and trim off the cord ends, making sure not to cut into the cord itself by accident.

The last step is to wrap the sections of the cord between the twist ties with thinner twine. Removing the base temporarily and clamping it in a vise makes the process easier. It's common for the cord to take on a curve as it is wrapped. Straightening it as you go can help, but you may still need to play with it a little more once the wrap is finished. Screw the base back in place and you're ready to fill the box with your favorite tea. □

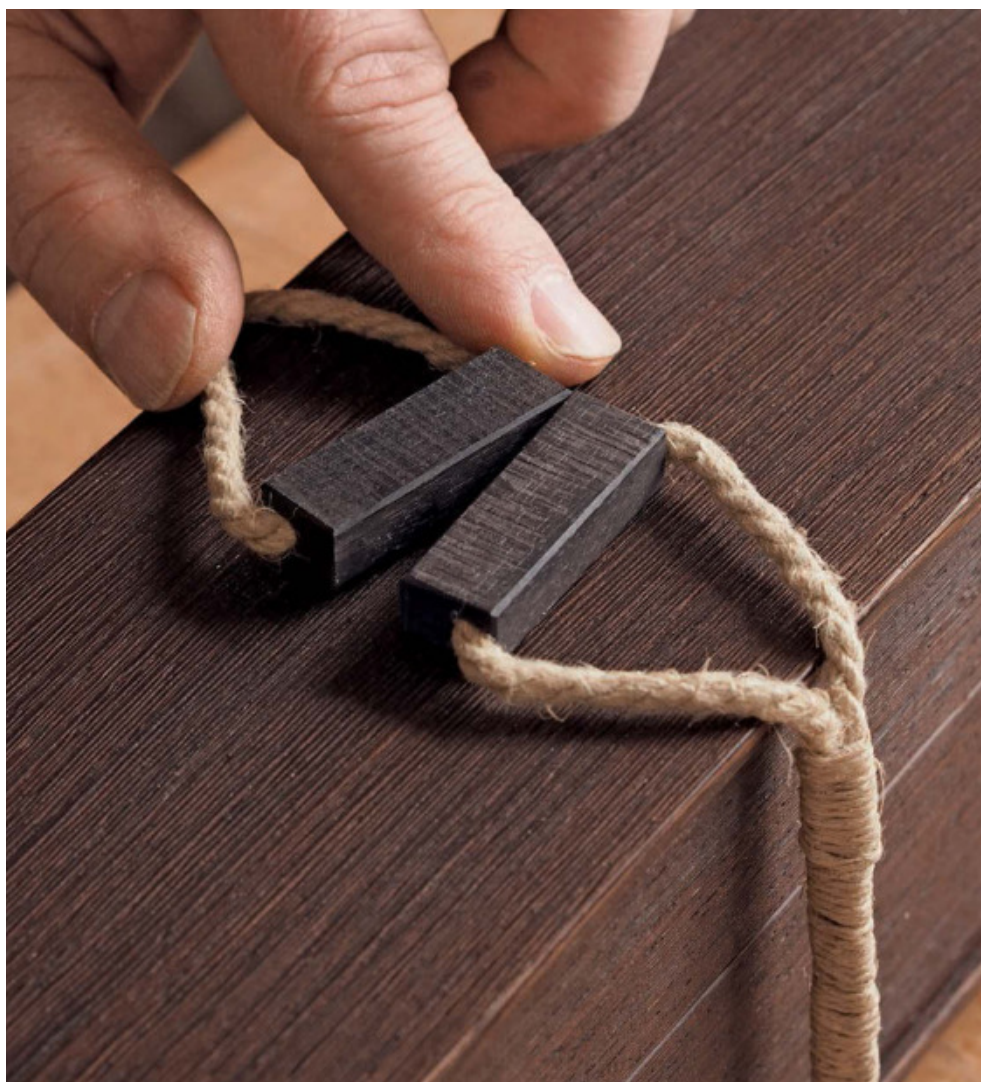
Editor and Creative Director Michael Pekovich has just completed his second book, Foundations of Woodworking, from The Taunton Press.



String it up. Loop the cord through the holes in the base and clasp. Add a twist tie at the top and bottom edge of each side. Adjust as necessary until the clasp is centered on the lid (above), then drive and glue a wedged dowel into the oval hole in the base that the cord ends are threaded through (right).



Add a wrap to the cord. Use thinner twine to wrap the cords between the twist ties. Start with a few wraps over the end of the twine to secure the starting end of the wrap. Before reaching the opposite tie, insert a loop of twine under the wrap (top). When you reach the end, thread the twine through the loop and pull it to draw the end under the wrap (above).



Build an Heirloom Box

Book-matched veneered top makes this simple box shine

BY BOB VAN DYKE



Boxes are a great place to practice and hone new skills. The materials won't break the bank and you can spend as much or as little time on them as you want. This box project is a great example. With it, you can work on your dovetail skills and learn to cut tongue-and-grooves at the router table. It will also introduce you to working with veneers and bandings, two details that really bring the piece to life.

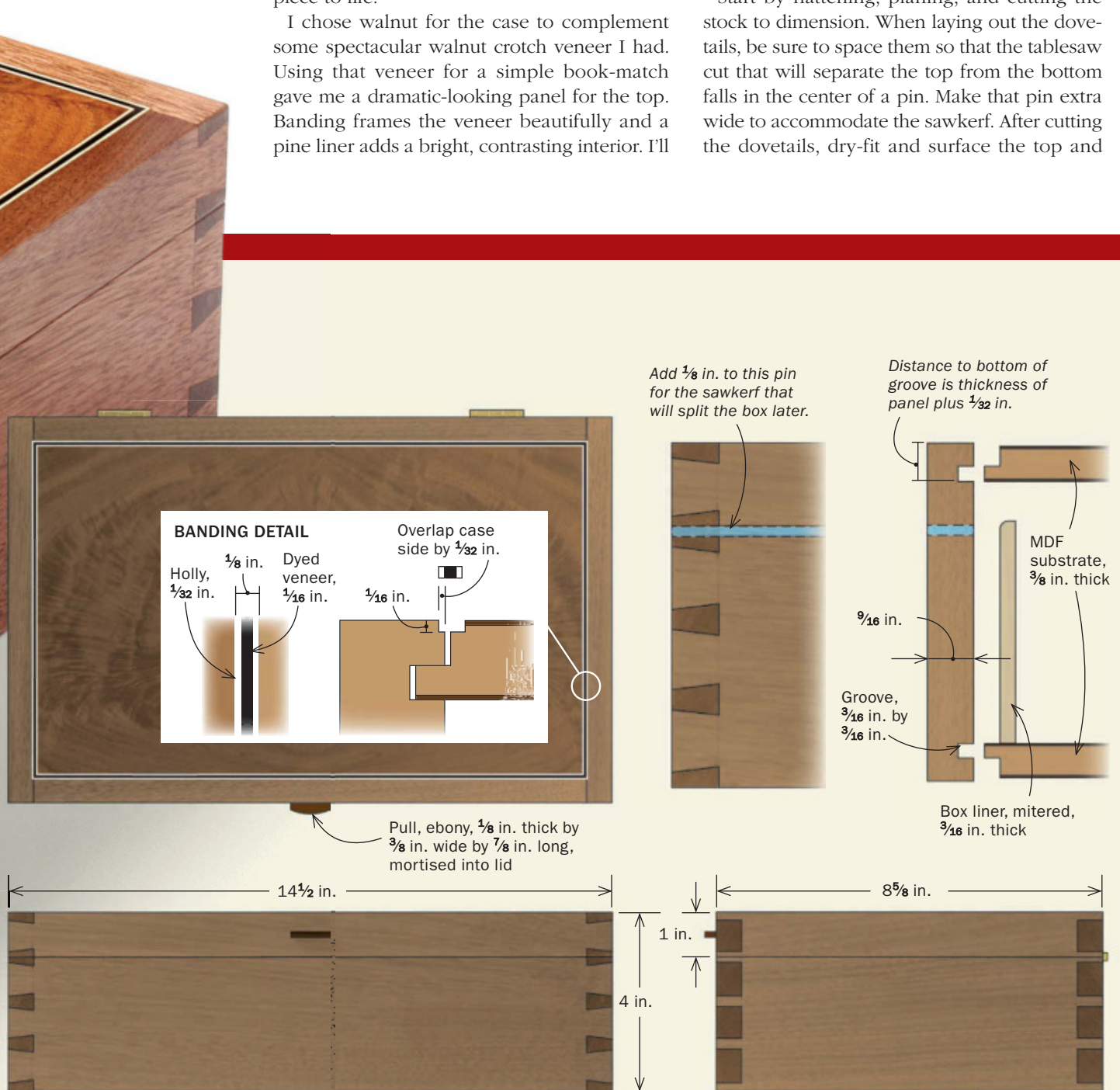
I chose walnut for the case to complement some spectacular walnut crotch veneer I had. Using that veneer for a simple book-match gave me a dramatic-looking panel for the top. Banding frames the veneer beautifully and a pine liner adds a bright, contrasting interior. I'll

guide you through putting the box together and show you some tips for getting the most out of this small project.

Lay out dovetails around the grooves

The case for this box appears to be of basic dovetail construction, but because the top will be sawn off later at the tablesaw, you must provide for the sawkerf when laying it out.

Start by flattening, planing, and cutting the stock to dimension. When laying out the dovetails, be sure to space them so that the tablesaw cut that will separate the top from the bottom falls in the center of a pin. Make that pin extra wide to accommodate the sawkerf. After cutting the dovetails, dry-fit and surface the top and



Cut and tape the veneer

Rough out the veneer.

With the two sheets for a book-match stacked and aligned, use a veneer saw and straightedge to rough out the pieces. The straightedge must be wide enough to register the veneer saw fully.



bottom edges with a smoothing plane, taking extra care to keep them parallel. This is key, to ensure the grooves that come later are not misaligned.

Make the veneered panel

For this box, I'm using veneered panels for the top and bottom. The veneer for the top panel is book-matched. For each panel you'll need at least two sheets of face veneer and a single sheet of veneer for the back side. Keep in mind, it takes a few days to flatten the veneer.

Before flattening, number the sheets and be sure to keep them in order throughout the process. Spray both faces of each sheet with a veneer-flattening solution (GF-20, veneersystems.com). Let this stand for 20 minutes, then stack the wet veneer sheets with a few sheets of blank newsprint in between them. Put the entire package between $\frac{3}{4}$ -in. melamine cauls, clamp it firmly, and let it sit.

Replace the wet paper a few times a day for two to three days until the veneer is no longer cold to the touch. It's easier to keep the treated veneer flat if it stays in the clamped cauls when not being worked on. With the veneer flattened, select two sequenced sheets to begin designing the book-match.

To help visualize the book-match, I use a couple of mirrors taped together. For a simple book-match, place the mirrors upright on the veneer stack, in the approximate place of the glue seam. The reflection will show you the match. To help visualize the panel, use a couple of scraps of wood to outline the finished panel. When you're happy with the match, mark a line against the mirror. This will be the seam of the book-match. To determine the bottom and top edge of the panel, use an architect's triangle to draw a line perpendicular to the mirror.

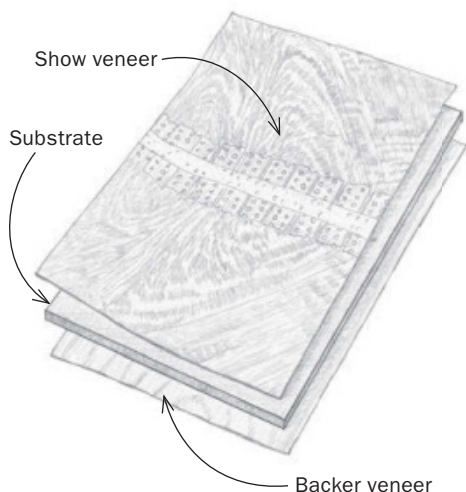


Tape brings it together. After lining up the grain for the match, stretch blue tape from one side to the other to bring the seam together tightly. Folding the ends of each strip makes removal much easier.



Flip it over for more tape. With the blue tape on, flip the sheet and apply veneer tape to the other side, stretching it over the seam horizontally. A final strip of veneer tape down the seam helps reinforce it even further. Once it's set, flip it back over and remove the blue tape.

Glue the panel



Roll out the brown carpet. Roll a healthy coating of liquid hide glue on the substrate for the panel (left). The coating has to be even and full to avoid dry spots. After both sides are loosely taped in place on the substrate, put the panel in the cauls for clamping (right).

With the match drawn out, double-check that sheets are exactly aligned, one on top of the other. Rough-cut both sheets at the same time. Check for square with the edge of the panel and, using a veneer saw and straightedge, cut both sheets at least 1 in. oversize.

Now, open the sheets along the seam. If you lined them up correctly, the match should be close to perfect. If it's not, slide one sheet over the other until the joint lines up better and draw a new line. Cut one sheet on that line, put the two pieces back together, and cut the joint again—parallel to the new cut you made and about $\frac{1}{8}$ in. away from it. When you get the grain match you want, turn the sheets over and butt them together on the bench to prepare them for glue-up.

Preparing for glue

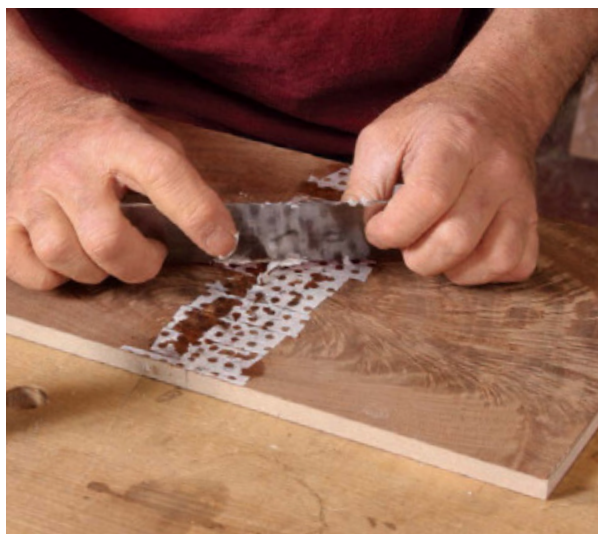
To get the veneer ready to be glued, I use a combination of the standard crinkled blue painter's tape and traditional veneer tape to get a seamless glueline. Cut a handful of pieces of blue tape about 4 in. long and fold over the ends to make a removal tab. Starting in the middle of the back of the sheets, put a piece of tape on one sheet, pressing down on the first sheet and then carefully pulling the sheets together with the tape. Press the tape onto the mating sheet and repeat with the other pieces of tape.

Now turn the taped sheet over and do the same on the show face using veneer tape. When the veneer tape is dry, carefully remove the blue tape from the other side. The veneer's now ready to be glued to the panel.

Cut the MDF substrate and the taped veneer about 1 in. oversize. Make sure the seam stays in the middle and is square to the edge. I use liquid hide glue. Roll an even layer on one side of the MDF and place the



Keep an even keel. The panel should see even pressure across the cauls, so using numerous clamps is advantageous even on a small panel. Give the panel 24 hours to cure before removing the cauls.



Scrape it clean. To make the veneer tape easier to remove, Van Dyke wets it with an envelope moistener and then uses a card scraper to gently scrape away the remnants.

Dovetail the sides

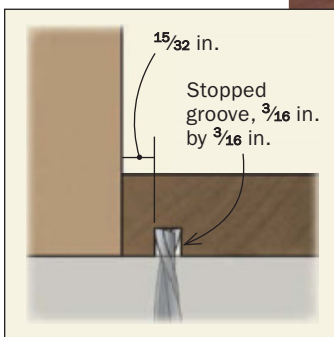
Cut the dovetails. Van Dyke cuts his dovetails at the tablesaw and cleans them up with a chisel. The extra space between the far right tails makes up for the kerf that will be removed later when the box is split.



Level the edges. With the case dry-assembled, use a smoothing plane to make sure the top and bottom edges are smooth and parallel.



Rout the panel grooves. The stopped grooves for the top and bottom panels are cut at the router table. Use stop blocks to control the plunge cut and to avoid routing through the tails.



veneer. Turn the assembly over and repeat for the inside face. Tape the corners of the assembled panel so it doesn't shift and clamp it between cauls. Let the panel dry for at least 24 hours before removing the clamps.

When the panel comes out of the clamps it will have glue squeeze-out and rough edges. Strike a straight line about $\frac{1}{4}$ in. from the bottom edge, perpendicular to the glue line. Using the tablesaw with an L-fence, cut on the line. Joint that edge and rip the panel to final width. Now mark the center of the top and lay out the two end cuts, keeping the seam in the middle.

Rout the rabbets and grooves

The veneered top and bottom panels are rabbeted to fit grooves cut into the inside face of each side. To locate the groove, measure the thickness of the panel and add $\frac{1}{32}$ in. That extra $\frac{1}{32}$ in. will leave the solid-wood sides proud of the top, which makes it easier to level the two surfaces later. If the panel were flush with or proud of the edges, trying to level the two could destroy the thin veneer. The grooves must be stopped or they will show. To make these plunging stopped cuts safely, I use the router table with a fence and stop blocks. Square up the ends with a chisel.

With the grooves cut, dry-fit the case again and measure the inside dimensions to get the length and width of the two panels. Add $\frac{3}{16}$ in. to each dimension to allow for the tongue that will fit in the groove.



Fit the panel



Score before routing. Use a cutting gauge to score the show side of the panel. This will help avoid any tearout in the veneer while routing the rabbet.



Rabbet it. To make the tongue on the panel, you need to cut a rabbet all around. Use a router table and a $\frac{3}{4}$ -in.-dia. spiral bit for this cut.



Check the fit. The panel must have a tight, friction fit in the groove. The top edge of the side will be just proud of the panel. The sides will be flushed to the panel later.

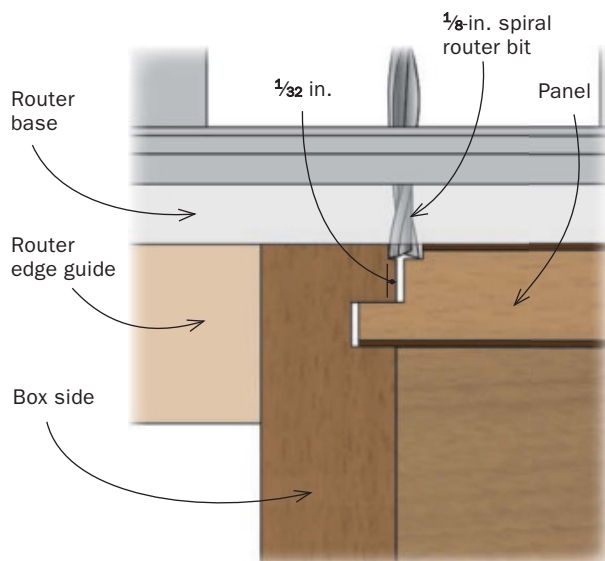
Assemble the case



Softwood cauls are key. Van Dyke uses soft pine cauls placed directly over the tails to protect the box as clamping pressure is applied (left). The softwood will indent around the pins, applying pressure directly on the tails. With the box glued up and dry, rout the sides flush with the top panel (above) using a bearing-guided, flush-trimming bit at the router table.

Add the banding

Two-pass routing. After making the banding, rout the groove for it in two steps. The first cut establishes the exterior edge and must fall at least $\frac{1}{32}$ in. on the walnut sides to provide support for the banding. The second cut establishes the interior edge.



Keep things square. Once the routing is done, use a chisel to square up the corners of the groove.



Simple means of mitering. A wooden jig allows miters to be cut with a sharp chisel and a steady hand. A wide chisel and a thin strip of wood keep the banding pressed firmly to the block, providing pinpoint accuracy.



Dry-fit first. To avoid glue-up mishaps, it's important to check the banding's fit before getting the glue. Remove the banding by carefully lifting out the corners with the tip of a marking knife.

Fit the panels to the grooves

Now cut the top and bottom panels to size. Make sure to center the veneer seam perfectly when you cut the top. With the panels cut to size, rout the tongue around their edges (you're essentially cutting a rabbet). I cut the tongue at the router table using a $\frac{3}{4}$ -in.-dia. spiral bit. Use an offcut from the panel to set up the cut. Once the test piece fits, cut the tongue on the real panels. To prevent the show veneer from chipping during routing, I score a line in the veneer with a sharp cutting gauge. I set the gauge to the width of the rabbet in the test piece. After scoring the lines, rout the rabbet all the way around the show face of both panels.

Test-fit and glue-up

Test-fitting the panels gives you the chance to adjust the fit with a shoulder plane if need be and develop a sound strategy for glue-up, which is always slightly nerve-wracking. When dry-fitting the box, don't put the top and the bottom in at the same time or you might not get the box apart again without hammering.

Do your final surface-prep on all parts and glue up the box, including the top and bottom panels, which don't float. I suggest liquid hide glue for this project because it offers a longer open time and it lets the top and bottom panels slide around in their grooves for adjustment. Yellow glue swells the joints and grabs too quickly. After the glue has dried, level the dovetails using a

handplane and then set up a bearing-guided, flush-trimming bit in the router table to level the solid-wood sides that were left proud of the veneered surface.

Banding adds flair, hides gaps

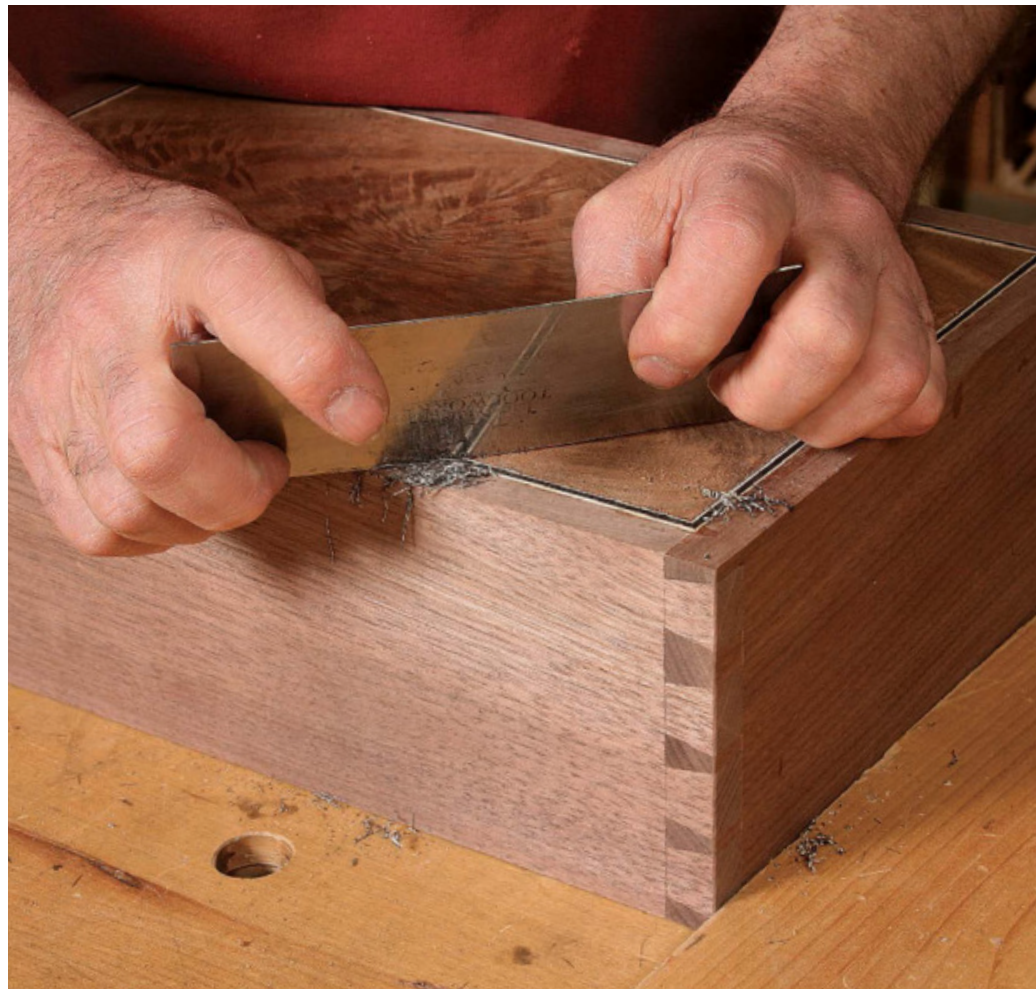
The visible seam between the solid-wood sides and the panel will disappear when you install the decorative banding around the panel. Set up a trim router to cut the groove for the banding.

Set the depth of cut so the banding sits just a little proud when it's glued in. Position the fence for the first pass so that the bit cuts about $\frac{1}{32}$ in. into the solid-wood sides and the rest into the veneered top. The second, fitting cut will lie in the veneer surface only. To prevent chipout, I set a cutting gauge to the outside of this final cut and score a line all the way around the top of the box, exactly where the router will be cutting. Test the settings for both the cutting gauge and router on a scrap to be sure the thickness of the groove and its distance from the edge of the work and the outside edge of the banding groove are dialed in correctly. Once I'm satisfied with the banding's fit in the test piece, I rout both passes on the box itself and get ready to install the banding.

The banding pieces are mitered. Rather than overcomplicate this, I use a sharp chisel and a miter block to get accurate joints. Miter the banding strips all the way around the box. To ensure tight miters, I leave each piece a little long so there is a very slight belly in the banding when I install it. When the banding is pushed



Burnish and level the banding. After applying glue to the groove and installing the banding sections, work the belly out of the banding with the back of a chisel (above), smoothing from the center toward each miter. This pressure will close up the miters for a seamless joint. After the glue dries, a card scraper makes quick work of leveling the proud banding with the rest of the box top (right) without harming the book-matched panel.



Cut away the lid

Off with the top. Van Dyke prefers using the tablesaw to remove the lid because it leaves behind a clean, square surface (right). Once three of the four sides are sawn, place a spacer whose thickness matches the blade width halfway down (far right). Squeeze the top side of the box as it passes the blade (lower right). When the cut is complete, the lid will pop off the bottom.



into its groove, that little bit of extra length will push into the miter, ensuring a tight fit. When it fits perfectly, glue in the banding with liquid hide glue in the order it was fitted. After the glue is dry, level the banding with a card scraper. Now it's time to open up the box.

Separate the top and add hinges

There are many ways to cut the lid off a box. I use the tablesaw, because it leaves fewer blade marks to clean up. I use a thin-kerf blade set a little higher than the thickness of the box sides. I set the fence so the blade will cut right in the middle of the wide pin near the top. Before I make the cuts, I make a wood spacer a little longer than the length of the box and a hair thinner than the width of the kerf the sawblade will make.

Cut three faces of the box. Before cutting the last, put the spacer into the kerf about halfway down the box. Because the lid is squeezed during the last cut, as soon as it's free the spacer forms a fulcrum point and the top snaps out of the way of the blade, preventing any scarring from the blade's teeth.

Clean up any sawmarks with a handplane or card scraper and then lap the edges on sandpaper glued to a piece of glass to make the mating surfaces flat and straight. This will ensure that there are no gaps when the lid and base are put together.

I prefer the stop hinges from Brusso. They hold the top at a slight angle past vertical. Take extreme care to mortise accurately for the hinges. Sloppy hinge installation will skew the top when the box is closed.





Plane and sand for a gap-free fit. Use a handplane to remove any saw marks left over from the tablesaw (left). Follow up by sanding the box and lid on a flat surface to ensure that the pair come together evenly (above).



Hinges and liner. Brusso brass hinges and a mitered pine liner finish off the box. The liner is held in by a friction fit and left unglued.

A mitered wood liner finishes off the inside of the box. I use $\frac{3}{16}$ -in.-thick pine and rip the stock about $\frac{1}{4}$ in. wider than the depth of the box. The liners are not glued, but held in place by a friction fit. Once they're fitted, round over the outside top edge with a small roundover bit buried in a router table fence. This way the fragile mitered ends don't get damaged.

The finish is up to you, but I find that these boxes are a perfect place to learn or practice traditional French-polishing techniques with shellac. After a final rubout, your box is ready to hold any number of treasures. □

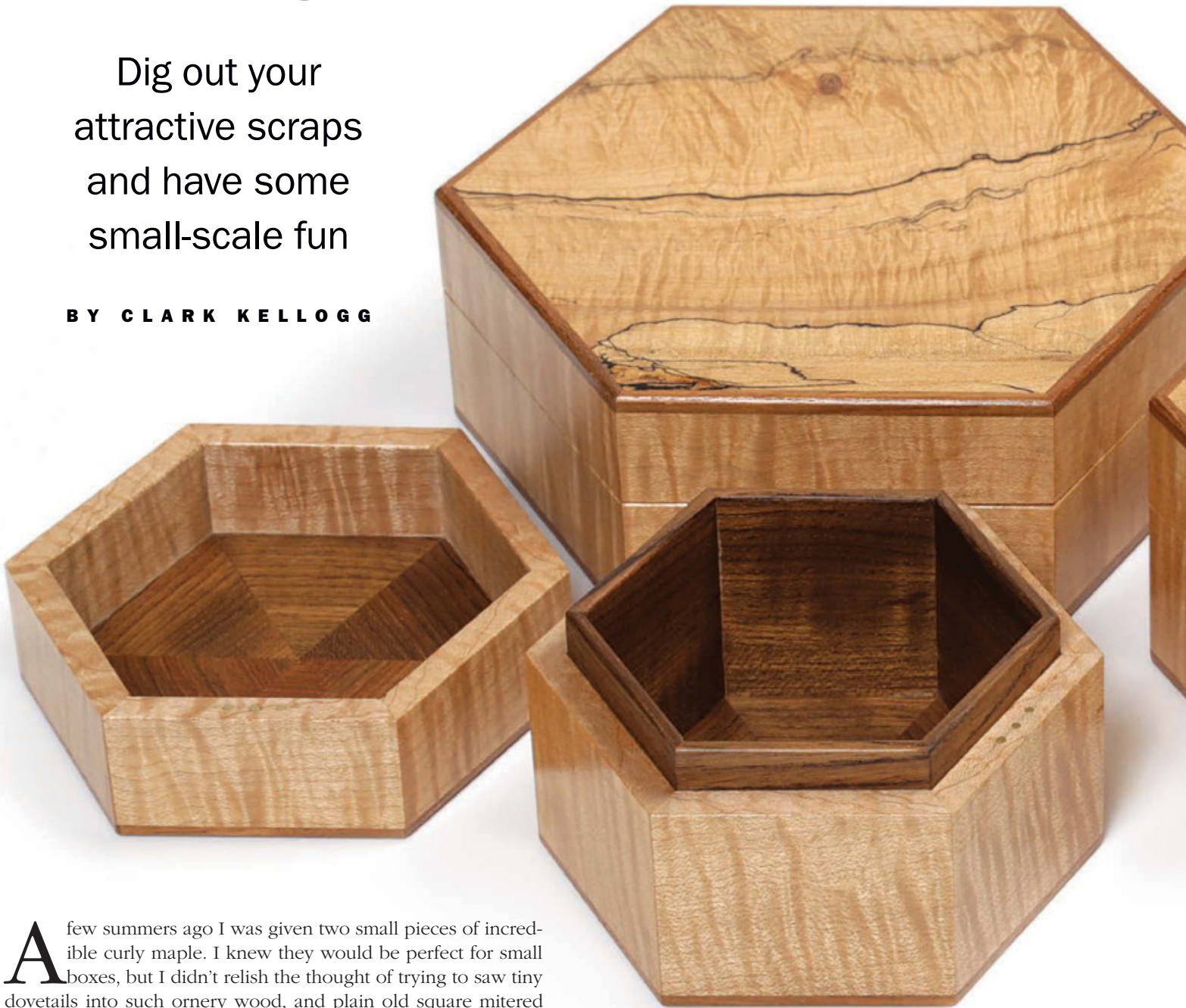
Bob Van Dyke is the director of the Connecticut Valley School of Woodworking.



Hexagonal Boxes Are

Dig out your attractive scraps and have some small-scale fun

BY CLARK KELLOGG



A few summers ago I was given two small pieces of incredible curly maple. I knew they would be perfect for small boxes, but I didn't relish the thought of trying to saw tiny dovetails into such ornery wood, and plain old square mitered boxes felt like a missed opportunity.

Inspiration struck when a yogurt container fell off a shelf in my shop, spilling its cargo: What about a mitered box with six sides?

Working at this small scale, and almost entirely at the bench, is a great way to explore a finer level of detail in your work. I developed a few new jigs and techniques for these boxes, and found fitting the pieces together to be really fun. Each box starts as a strip of solid wood, which becomes the sides. Once that is mitered, rabbeted, and joined—by wrapping the six-sided tube

with blue tape and rubber bands—the hexagonal top and bottom panels are set into the rabbets and the box is cut apart to separate the lid.

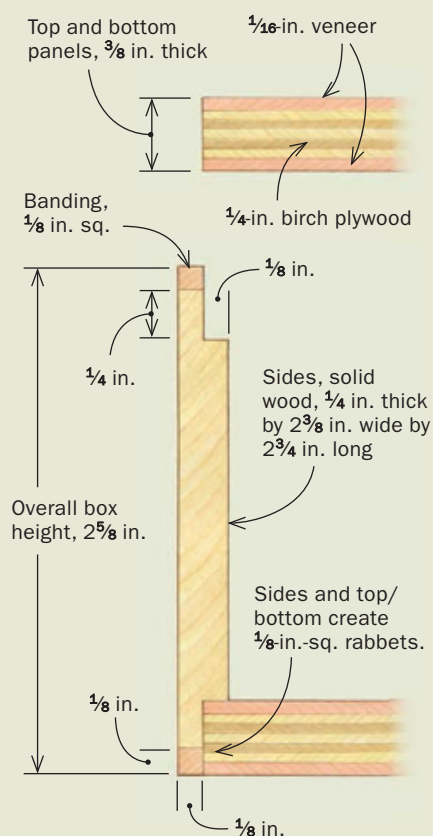
Choose woods that harmonize and complement one another, accentuating the overall form and tone of a piece rather than distracting from it. I used a combination of bird's-eye maple on the sides, spalted maple on top, and teak for all the details. Some of my other favorite combinations for boxes and furniture include

Little Gems



ANATOMY OF THE BASIC BOX

Here's the anatomy of the box before it's cut apart and the liner pieces are added. The sides are solid wood, rabbeted to accept the top and bottom. To avoid wood movement that would push the sides apart, the top and bottom are sandwiches of thin plywood and shopsawn veneer. Thicker than the rabbets they sit in, the top and bottom create outside rabbets for banding.



walnut and beech, walnut and pecan, white oak and wenge, pear and cocobolo, cherry and cypress, cherry and Douglas fir, and maple and pear.

Miter, rabbet, and assemble the box sides

Start by prepping the sides of the box. To ensure continuous grain, start with an 18- to 24-in.-long piece of $\frac{1}{4}$ -in.-thick stock. Its width should be the box's height.

I start making the small mitered side pieces by cutting them to exact length at the tablesaw with the blade at 90° . I make a few extra pieces to use for setting up the miter cuts. Then I line up my best six pieces in sequence and number each one. To control the small pieces safely as you miter their ends, I use a tablesaw

sled. I clamp a small stop to the sled, and make test cuts to dial in its position, which stays the same for cutting both miters on each piece. The goal is to leave just a hairline of the original squared-off ends intact. Keeping this tiny blunt edge will give you positive registration against the fence. It disappears during final sanding.

When the test pieces look good, miter the actual box sides. To check your work, arrange them facedown on the workbench, stretch blue tape across the outside faces, and wrap the sides into a tube. If the miters don't come together perfectly, you can tune them up by hand. I use a guillotine-style miter trimmer to tune miters these days. If you aren't inclined to shell out for a miter trimmer, you can fine-tune miters very effectively with a simple shooting jig for your block plane, which I did for years.

Start with the sides

HOW TO CUT MITERS IN SMALL PARTS

The sides are solid wood, cut from a single strip for grain continuity around the box. Follow the steps below for safe, accurate results with these small workpieces.



A box from scrap. After resawing strips of curly maple for the sides and scraps of spalted maple for the top (left), Kellogg planed a long strip for the sides to $\frac{1}{4}$ in. on a melamine sled (right).



Butt joints first. To be sure the joints end up square and the pieces the same length, make 90° crosscuts to start. Note the marks that record the original grain sequence, and the extra pieces being cut.



Set the blade to 60°. The bevel setting is critical, so Kellogg relies on a digital angle gauge (above). To cut the small workpieces, he uses a tablesaw sled (right). Dial in the position of the stop with a series of test cuts on your extra pieces, aiming to leave just a hairline of the mitered edge square. Then cut the real sides. A single stop setting will work for both miter cuts.



It's vital for opposite sides of the box to be exactly the same length. Check the joinery with another tape-wrap dry-fit to be sure it's perfect before moving on.

Cut rabbets and pre-finish the inside faces—Now cut the rabbets in the sides. Rout the rabbets on the router table, making sure to cut them on the inside face. Next, plane and sand the inside of the sides to 320 grit. Then pre-finish the top third of the inside faces with shellac and wax, keeping finish off the miters. The pre-finished area will be the inside of the lid, and should be as polished as the outside of the box. The rest of the interior will be covered by liner pieces. I use shellac on boxes, since it leaves no odor inside and builds to a high polish in a few hours, letting me move on to the next steps.

Assemble the sides—Once the interior faces are finished, check the miters one last time and unroll the tube on your bench, keeping the blue tape in place. Now comes the glue. I like Titebond's Translucent Wood Glue for box work. It sets quickly and cures to a rigid, nearly invisible glue line. After applying it, roll up the tube and stretch tape across the last open joint.

To pull the miters extra tight, I back up the tape with a length of bicycle inner tube, wrapping the strip around the sides until the entire box is encased. You can get old inner tubes for free at your local bike shop.

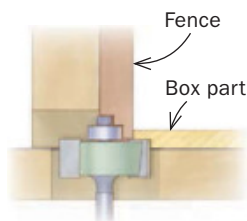
FINE-TUNE THE FIT

Kellogg fine-tunes the miters on a shooting board before glue-up. They also get rabbets and finish on their inside faces before assembly.

Shoot the joints. To make this jig, leave the tablesaw blade at 60° and bevel one edge of the base. Then screw on a fence and plane its end flush with the plywood.

Keep opposite sides equal. It's critical to keep opposite sides of the box exactly equal in length. Check them as you go.

Rabbets on the router table. Attach a zero-clearance fence to support these small workpieces safely.



Top and bottom are veneer sandwiches

Avoid using solid wood for the top and bottom panels, as seasonal movement could split the joints apart. Instead, I sandwich two layers of shopsawn veneer and a core of thin plywood. I saw my veneers at 2mm (a fat $\frac{1}{16}$ in.) and use $\frac{1}{4}$ -in. birch plywood (which is a bit less than $\frac{1}{4}$ in. thick) for the core.

Once the top and bottom are pressed up, you should have two roughly $\frac{3}{8}$ -in.-thick panels. When placed in the $\frac{1}{4}$ -in.-deep rabbets in the box sides, these panels end up about $\frac{1}{8}$ in. proud at the top and bottom, creating a $\frac{1}{8}$ -in. by $\frac{1}{8}$ -in. rabbet that gets filled with edge-banding.

Sawing your own veneers lets you take advantage of pretty wood scraps you al-

ready own. In this case, I used spalted maple for the top of the lid, which adds interest to the outside and ties in nicely with the maple sides and teak edge-banding.

Joint the face of the veneer stock before resawing it. If your bandsaw is set up well and you use a freshly sharpened blade, you can use the sawn face as the glue side; if the cuts are bumpy, sand or plane them.

Assembly tricks for tight joints

To bring the joints together without gaps, Kellogg uses blue painter's tape and a length of bicycle tubing as clamps.



Assemble in order. Line up the parts in sequence, tip to tip, with the top and bottom edges perfectly aligned, and then stretch two strips of painter's tape along their backs.



Thin lines of glue. After flipping over the strip, Kellogg applies Titebond Translucent Glue, putting just a thin line in the bottom of each joint, to minimize squeeze-out inside the box.



Tape then rubber. After wrapping the box into a tube and pulling blue tape across the last open joint, Kellogg wraps bicycle tubing around the box, securing the ends with spring clamps.

Add the top and bottom

SIMPLE PARQUETRY

Since the top and bottom panels are sandwiches of veneer, there's a nice opportunity to hide a surprise inside the box: hexagonal parquetry in a complementary wood. It's easy to make.

Cut out the pieces. Kellogg jointed one face of a piece of teak before resawing it to a fat $\frac{1}{4}$ in. on the bandsaw. Then he laid out and cut the triangles he needed.



Shoot the edges. A basic bench hook, with a 60° fence attached, makes it easy to plane the end-grain edges straight and true. Flip the parts to plane with the grain.



Divide and conquer. Glue three triangles together at a time, pulling the joints together with strips of blue tape before weighting the assemblies to keep them flat while they dry.



Join the halves. Shoot the long edges of the initial glue-ups, using the same jig. Then apply glue and pull the halves together with more blue tape (right). Keep the panels flat to dry.

The veneered top and bottom of the box allow me to add hexagonal parquetry on the inside faces, made from the same teak accent wood. Saw and trim the triangles as shown. Before gluing them, I create a flat, non-stick platform by stretching packing tape over plywood.

To get ready to glue up the top and bottom sandwiches, trace the assembled box onto all the layers. Then cut them out on the bandsaw. Ultimately, you want about $\frac{1}{4}$ in. of extra material around the edges, to be safe. Parallel-jaw clamps and thick cauls work fine for pressing the panels.

To trim the glued-up panels to fit into the rabbets, center the corners of the box on the seams of the parquetry, and trace inside the rabbets with a sharp pencil. Then bandsaw each panel, staying clear of your pencil lines, and shoot each edge with a block plane, using the same bench hook you used for the parquetry.

Don't worry if there are small gaps between the panel and the inside of the rabbet; those will be covered up by the edge-banding. But make sure the bottom of the rabbet is clean and the panel will press all the way down, because gaps at the bottom edge will show inside the box.

As you did with the box sides, sand, shellac, and wax the inside face of the

Online Extra

Learn about an amazing traditional tool for trimming miters at FineWoodworking.com/boxes.





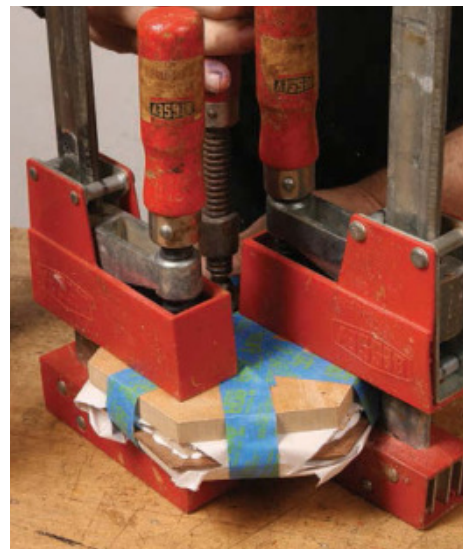
Cut parts a bit oversize. Use the assembled sides to mark the outline on the plywood and veneer. Note that the top gets spalted maple, but plain maple is fine for the bottom. Trace and cut $\frac{3}{4}$ -in.-thick MDF cauls now too.

MAKE SANDWICHES

The top and bottom panels are sandwiches of thin plywood, parquetry, and veneer. Solid-wood panels could break the box's miter joints with seasonal expansion.



Apply glue evenly. Spread glue on the plywood using a notched piece of veneer. The order is parquetry, plywood, then veneer, with paper on the outside faces to keep squeeze-out from sticking to the cauls.



Stack and clamp. Tape the stack to be sure the parts stay aligned as you clamp them. The thick cauls help to ensure even pressure.

FIT AND ATTACH THE TOP AND BOTTOM

Banding will cover the joints, so the top and bottom don't have to be flawlessly fitted. But be sure they bottom out in the rabbets so there are no gaps visible inside the box.



Trace the rabbets. Aligning the seams of the parquetry with the corners of the box, trace the inside edge of the rabbets with a sharp pencil.



Saw and shoot. Bandsaw the two sandwiches close to the pencil lines, then use the shooting-board setup to fine-tune the edges, until the top and bottom drop into their rabbets.



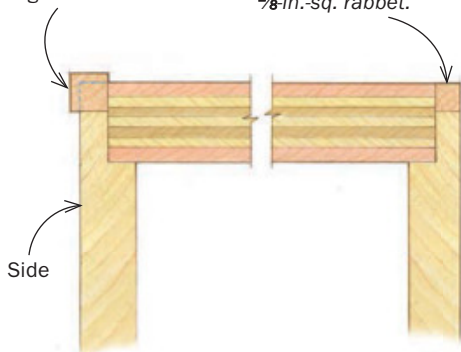
Glue both at once. Reuse your clamping cauls to glue in the top and bottom panels. Don't overdo the pressure here or you could break the box.

Inlay the banding

Fit and apply the edge-banding one piece one at a time. The same tape and shooting board come in handy again.

Solid edge-banding is glued in oversize.

After planing flush, edge-banding fills $\frac{1}{8}$ -in.-sq. rabbet.



Saw and shoot. Saw the banding to length, and use the 60° bench-hook setup to trim the ends.



One at a time. After planing the ends to line up with the corners of the box, glue and attach the first piece with blue tape, stretched tightly across it. Then plane one end of the next piece, and hold it in place to mark the opposite end (left). Plane that end until it lines up with the next corner, and then attach it with more glue and tape (right).



parquetry before gluing these panels into the box.

Edge-banding hides any gaps

The edge-banding at top and bottom is attractive and easy to apply. As a bonus, it hides gaps between the top, bottom, and sides. For safety reasons, I rip the $\frac{3}{16}$ -in.-sq. banding stock on the bandsaw, not the tablesaw, leaving the sawn edges facing outward at glue-up. I plane them flush and smooth afterward.

When applying the banding, I suggest starting with the bottom ring, just in case things don't go absolutely swimmingly the first time around. Attach each piece with white glue, with blue tape acting as clamps once again. Finally, use a block plane to trim the edge-banding flush on all sides.

Plane the banding flush. Start by planing a light chamfer on the tips of all the miters so you don't chip one piece when planing another. Plane the banding close to flush, and then use a scraper or sanding block to bring it the rest of the way.



Open the box and add the liner

Before I cut the box in two, I do the bulk of the surface prep on the outside faces. I cut these boxes apart with a handsaw as shown. To clean up the sawn edges, I stick adhesive-backed 220-grit sandpaper to a flat surface, and rub the box and lid on it with circular strokes and light, even pressure. Check your progress frequently; you don't want to sand a dip into either rim. Set the lid on the box to check for wobbling or gaps.

The liner doubles as a lip that aligns the lid and holds it in place. Mill up several feet of $\frac{1}{8}$ -in.-thick stock in a complementary wood, about $\frac{1}{2}$ in. wider than the depth of the box. Shellac and polish one face of the stock, and then, working piece

Slice off the top and add a liner

There is no better time to sand the outside than now. Then you can saw the box open and reveal the interior.

Score the box for sawing. Kellogg uses a marking gauge (shown) to score a line roughly one third of the way down from the top edge. To keep the saw on track, it also helps to follow with a stringing gauge to open up a thin groove.



Saw in stages. Saw a little bit into each side, going gradually deeper as you rotate the box. The groove from the stringing gauge helps keep the saw on track, but be careful nonetheless.

by piece, cut each section slightly over-length and trim the miters to fit.

Each piece should just slide into the box without putting much pressure on the joints. Watch for dried bits of squeeze-out in the corners that you missed earlier; it could hold the liner out of place.

Work your way around until all six liner pieces are dry-fitted, tight to the inside walls of the box. Then remove the pieces one by one and glue them in with a few drops of Titebond Translucent and a spring clamp. Once the glue has set, remove the spring clamps, and test the fit of the lid. What you are after is a lid that lowers itself on a cushion of air, and has slight suction as you take it back off.

Finally, lightly chamfer the banding on the top and bottom edges with a block plane, and shellac the outside. I apply two or three coats of freshly mixed, 1-lb. cut, super-blond shellac with a pad. The next day, I sand this base layer back with worn-out 400-grit paper, and then follow with three or four coats of a 2-lb. cut. I give it another day to cure, and then buff the surface with 0000 steel wool. Finally, I buff with a thin coat of a relatively soft wax, such as Briwax "Creamed" Beeswax. □

Clark Kellogg is a professional woodworker in Houston, Texas.



Plane and fit the liner parts. Use the edge-shooting jig from before to fine-tune the fit of these small pieces (right), dry-fitting and installing them one by one with a few dots of glue and a spring clamp (below).



Check the fit. You might need to lightly sand the liner pieces to perfect the fit. The goal is light suction when you lift the lid. Plane small chamfers on the top edges of the liner.

A Box that Earns Its Stripes

Got a tablesaw and tape?
Make a miniature masterpiece

BY ADRIAN FERRAZZUTTI

My first veneered box started when I noticed that some scraps destined for the fireplace were of contrasting colors. On a whim, I glued these offcuts into a thick block and then resawed that into slices of striped veneer. Cutting the slices into geometric shapes, I discovered that making patterns with contrasting veneer is a lot of fun and really gets the creative juices flowing. I've now made many of these veneered boxes and the process keeps evolving, but the basic tools and techniques remain simple.

Both the geometric veneer shapes and the rabbit joinery for the plywood core are cut on the tablesaw, but attention to detail elevates these small boxes into jewels.

Because of their scale, your eye sees every detail, so the workmanship must be crisp and clean. On the other hand, you won't need a vacuum bag to glue on the veneers; simple clamps and cauls work. Once you've pulled off



this project, you'll have the skills to tackle larger veneered projects with confidence.

Start with woods that catch the eye

Pick some woods with contrasting but complementary colors and mill them into strips a little over 2 in. wide by 16 in. long, varying in thickness from 1/16 in. to 1/2 in. Joint the face of each strip and then thickness plane each one to whatever thickness

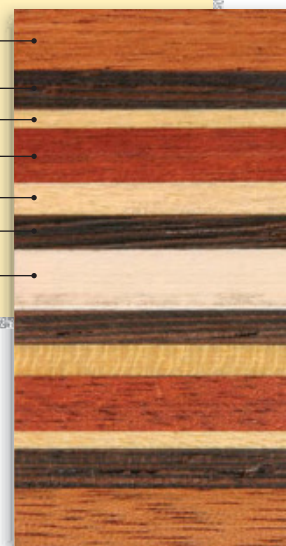
HOW TO MAKE STRIPED VENEER



CREATE A SYMMETRICAL SANDWICH

Choose contrasting wood species and mill them to whatever thickness looks right, but make sure the sequence is the same in both directions from the center of the block.

1/4-in.-thick mahogany —
 1/8-in.-thick wenge —
 1/16-in.-thick yellowheart —
 3/16-in.-thick bloodwood —
 1/8-in.-thick yellowheart —
 1/8-in.-thick wenge —
 1/4-in.-thick holly —



Glue the contrasting woods. Ferrazzutti uses a notched spreader to apply a liberal amount of yellow glue to the strips of colored woods.

makes an interesting stack of contrasting strips. For the pattern to work, though, the layers should be identical on both sides of the center layer. Also, when glued together, the block should be at least 2 in. thick and 3½ in. wide.

Place the glued strips in a clamping cradle to prevent them from skating around when pressure is applied. When dry, square up the block but remember to keep the two outside layers the same thickness.

Because the core of the box is plywood, you also need to veneer the inside and bottom of the box. You can pick one of the woods used on the outside, or use a different one. In this case, I used bubinga.

Glue a backer board to both the outside striped block and the block you are using for the inside. You can now resaw the whole of each block for veneer and still have a large surface to handle safely. I slice the veneer 1/16 in. thick or slightly thinner, jointing the block after each cut to remove sawmarks. You'll need a minimum of 14 slices to provide enough segments for the box along with some spares.

Tablesaw delivers precise pieces

Now cut the stack of striped veneer into the shapes needed to make the pattern. I do



Clamp firmly. Place the glued strips in a clamping cradle lined with packing tape to prevent sticking. Place a thick caul (also faced with tape) on top of the strips and apply plenty of pressure.

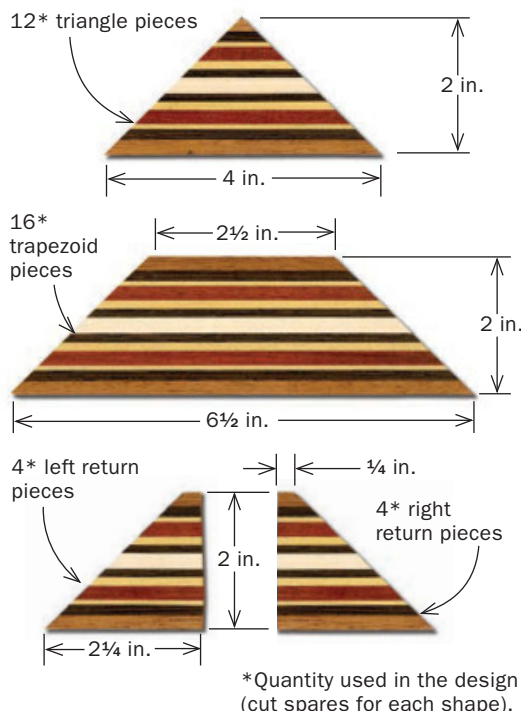


Resaw the veneer. After squaring the block and gluing a backer board to it, resaw 1/16-in.-thick strips of the striped wood for the box's exterior. You'll need to do the same thing with a block of solid wood for the interior.

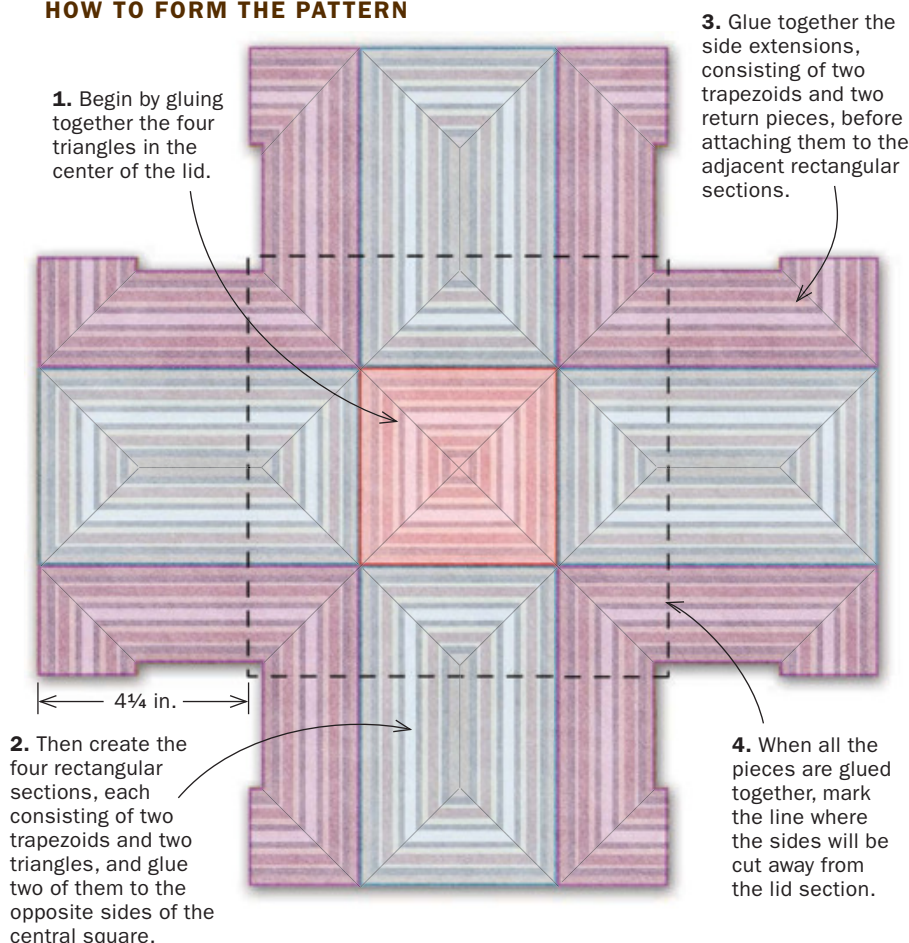
ONE PATTERN COVERS THE WHOLE BOX

SIMPLE CUTLIST

The flowing design on the outside of the box may appear complex, but it consists of just four simple shapes with all the angles cut at 45° on the tablesaw.



HOW TO FORM THE PATTERN



Online Extra

DESIGN YOUR OWN VENEER PATTERNS



Once you start working with striped veneer, you'll quickly want to create your own designs. The best way to start is to place a couple of mirrors on the veneer and then vary the angle between them to see potential patterns. To read and learn more, go to FineWoodworking.com/boxes.

this on the tablesaw using a clean, sharp crosscut blade and a simple sled. The sled's base is 1/2-in.-thick plywood, a little larger than the veneer, with a piece of 220-grit sandpaper glued to the top surface, backed by a 4-in.-tall fence. I clamp the sled to the auxiliary fence of a miter gauge, dial in exactly 45°, and cut through the base and fence of the jig. The sandpaper prevents the veneers from slipping as they are cut, and the edge of the sled tells me exactly where the cut will be.

My aim is to get all the joints crisp off the saw and not to mess around with planes and shooting boards. So after cutting the shapes slightly oversize, I tape them into tight stacks of matching shapes, and trim them to uniform size using the same jig. This leaves a crisp edge that shouldn't need any more fussing.

It's now time to assemble the veneer pattern for the top and sides of the box. Beginning at the center, tape the shapes into

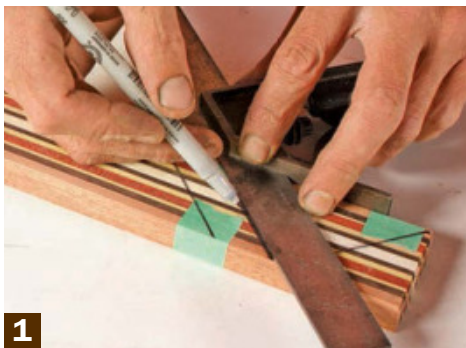
pairs and the pairs into fours, gradually working out to what will be the sides of the box (see drawing above). Once all the parts are glued together, I use a knife and a straightedge to cut away the side panels from the top panel.

The next step is to glue the striped veneer and the interior veneer to opposite sides of the Baltic-birch-plywood core. The top and bottom are pressed onto 3/8-in.-thick material and the sides are pressed onto 1/2-in.-thick material. To make this go quickly, I veneer the sides on one piece and the top and bottom on another.

Tablesaw makes joints easy, too

On the tablesaw, rip and crosscut the side panels square and to the same dimensions. Clamp a sacrificial fence to the rip fence, insert a wide dado stack, and then raise the blade into the sacrificial fence. Run one end of each side, pattern up, against the fence and through the dado stack to make

STACK VENEER TO ENSURE PRECISE CUTS



1

Lay out the segments. Tape together a stack of the striped veneers and lay out the geometric shapes, keeping them slightly oversize.



2

A nonslip sled. Crosscut the shapes on a dedicated sled whose base has sandpaper glued to it to hold the workpiece steady.



3

Uniform, precise cuts. After rough-cutting the shapes, tape them back together and trim them all to the final size.



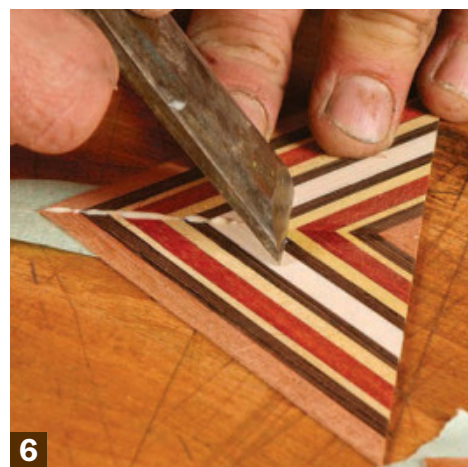
4

Begin assembling the puzzle. Use a straight-edge to align a pair of shapes and tape them together on their rougher, bandsawn faces.



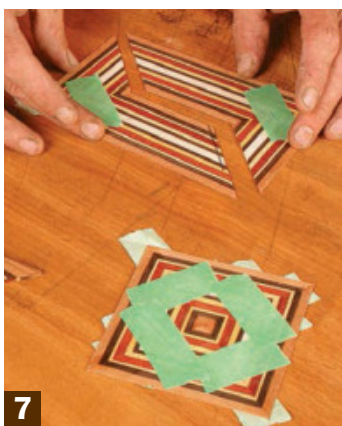
5

The hinge trick. Flip over the pair of pieces, open up the joint using the tape as a hinge, and apply a thin bead of glue.



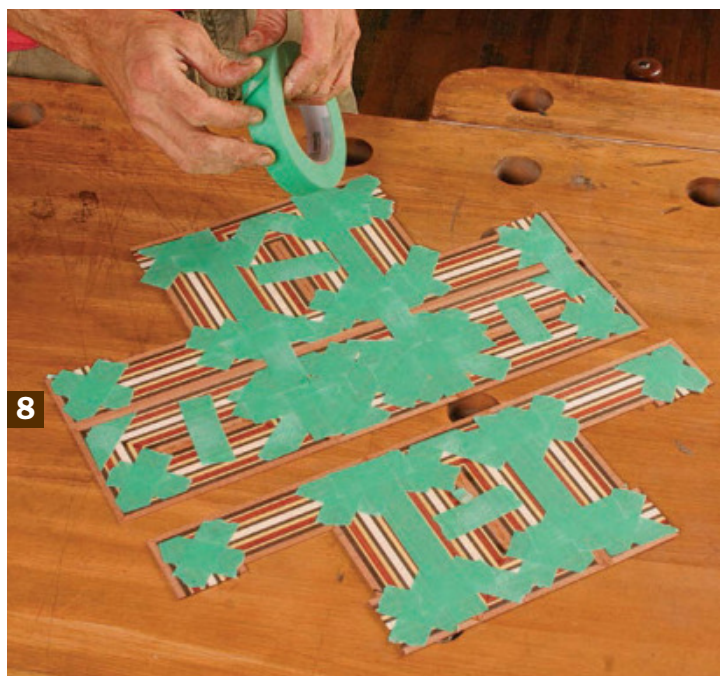
6

Close the joint. Use the back of a chisel to remove squeeze-out and bring the joint flush. Tape this face side while the glue dries.

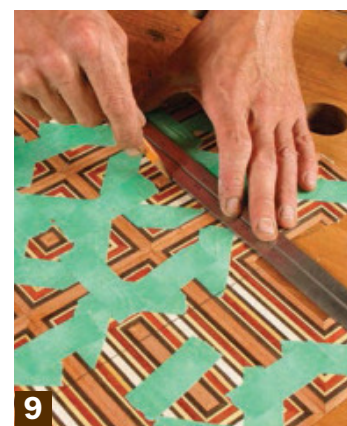


7

Work outward from the center. After the center square is formed, construct the four rectangles that adjoin it (above). After attaching the side extensions to two opposite rectangles, attach them to the center section (right). If necessary, you can improve the alignment by planing the edges lightly.



8



9

Cut away the side veneer panels. Align a straightedge with the ends of the side sections of veneer and mark where to slice the side veneers away from the top piece.

TURN THE PATTERNS INTO PANELS

GANG UP PARTS

Press the veneer. To speed things up, Ferrazzutti creates the box top and bottom on one piece of plywood, and all four sides on another. Before spreading glue, he uses veneer tape to hinge the veneer sections to the plywood.



TRIM AND RABBET THE SIDES



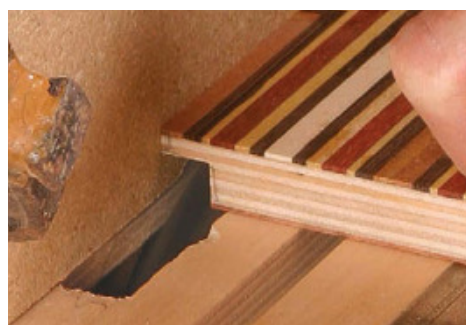
Saw the sides apart. Once the panels are dry, rip the plywood down the middle, leaving two sections, each with two side pieces.



Trim to size. After cutting the box sides to length, rip them to width. A piece of masking tape on the back corner prevents tearout.

a $\frac{7}{16}$ -in.-square rabbet. Each of the four corners will form a rabbeted butt joint, leaving a $\frac{3}{16}$ -in.-square rabbet at the outside corner. This is based on a $\frac{1}{2}$ -in.-thick core with $\frac{1}{16}$ -in.-thick veneers on each side for a total panel thickness of $\frac{5}{8}$ in.

The next step is to cut rabbets for the top and bottom panels. Leave the blade height alone but set the fence for a $\frac{5}{16}$ -in.-wide cut because the veneered top and bottom panels are only $\frac{1}{2}$ in. thick. Now run the top and bottom edge of each side, pattern up, against the fence and through the dado stack to make a rabbet $\frac{7}{16}$ in. wide by $\frac{5}{16}$ in. tall. When the top and bottom are dropped in, they also leave a $\frac{3}{16}$ -in.-square rabbet on the outside corners.



Rabbet three edges. Using a dado blade, cut a rabbet on the same end of each side piece and rabbet the top and bottom edges, too.

DIRT-SIMPLE JOINERY

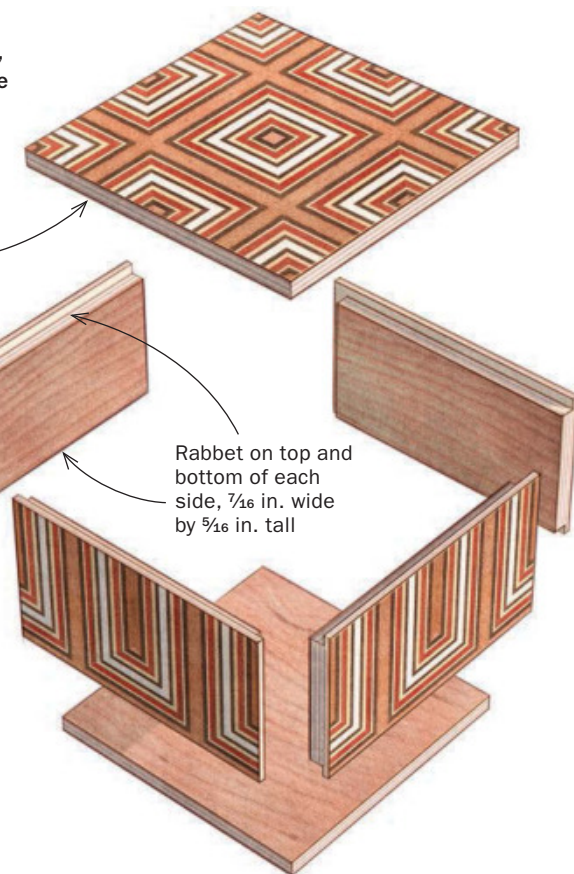
A rabbet cut at the top and bottom, plus one end, of each side holds the box together.

Top and bottom, $\frac{1}{2}$ in. thick ($\frac{3}{8}$ -in. plywood plus two pieces of $\frac{1}{16}$ -in. veneer) by roughly 8 in. square. Fit these to the assembled box.

Sides, $\frac{5}{8}$ in. thick ($\frac{1}{2}$ -in. plywood plus two pieces of $\frac{1}{16}$ -in. veneer) by $4\frac{1}{8}$ in. wide by $8\frac{1}{2}$ in. long

Rabbet on one end of each side, $\frac{7}{16}$ in. square

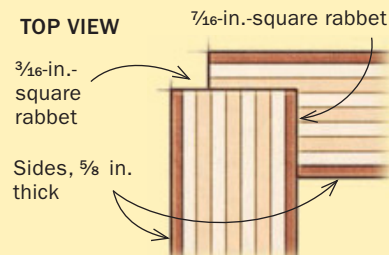
Rabbet on top and bottom of each side, $\frac{7}{16}$ in. wide by $\frac{5}{16}$ in. tall



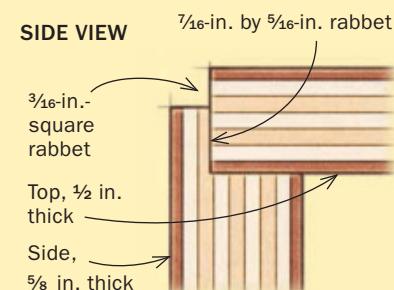
HOW RABBETS MULTIPLY

Rabbets along the top, bottom, and one edge of each side leave $\frac{3}{16}$ -in.-square rabbets along each edge of the box where the edging will go.

TOP VIEW



SIDE VIEW



With the joinery complete, sand the inside surfaces with 220-grit paper, tape off the areas that will be glued, and apply two or three coats of a clear finish. I prefer a wiping varnish, such as Minwax's Wipe-On Poly or Waterlox Original, for the interior and exterior, which offers an in-the-wood look and a little protection.

After a dry run, glue the box together, check it for square, and use a small block and a hammer to ensure the corners of the rabbets are flush (don't let them dry with steps). Let the squeeze-out harden on the inside corners, then pop it off with a sharp plane iron and apply another coat of finish.

Trim the top and bottom panels until they press in nicely without distorting the sides. When sizing the top, take care to keep the pattern lined up with the patterns on the sides. Tape off the glue area around the inside of the top and bottom, then apply some finish.

Using a stiff, flat surface as your table, glue on the top of the box and clamp each corner of the box to the stiff surface. Let this sit for a half hour, remove the clamps, and pop off the squeeze-out around the inside corners with a sharp plane iron. Glue in the bottom the same way, but because you won't be able to get at the squeeze-out, adjust the amount of glue you use based on how much squeeze-out you got with the top.

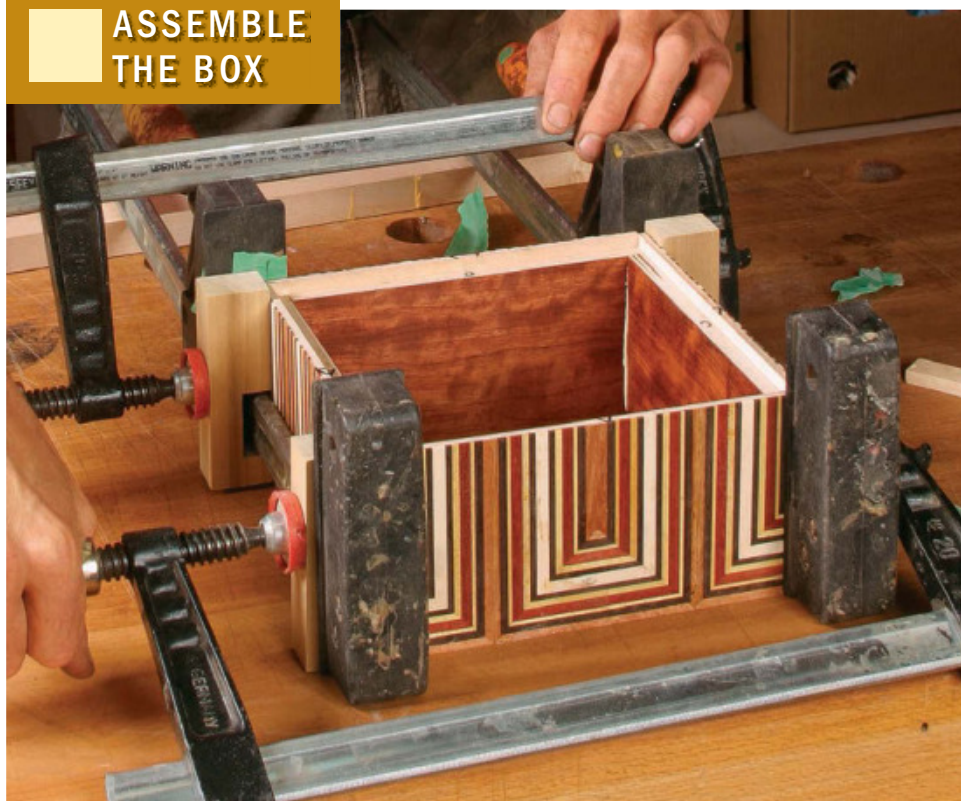
Add the trim and cut open the box

The box has hardwood trim (I like to use holly or ebony) on the corners, around the top and bottom edges, and on the contact surfaces of the lid and the base. Set up a rabbeting bit in a router table to clean up and enlarge the existing corner rabbets to $\frac{1}{4}$ in. square.

Mill the stock $\frac{9}{32}$ in. square with enough pieces to go around the top, bottom, and sides. Cut four pieces for the corners about $\frac{1}{4}$ in. shorter than the total height of the box. Use a block plane to chamfer the inside corner of the edging to help it seat better in the rabbet, then round over the outside corner slightly so that the tape used for clamping is less likely to break.

Apply glue to the rabbet and set in the edging so that each end extends into the rabbets on the top and bottom. Stretch-clamp three or four strips of tape on each corner, let it sit for about an hour, and

ASSEMBLE THE BOX



Sides first. To ensure even pressure along each corner joint, Ferrazzutti starts with a pair of parallel clamps. He then places four notched cauls over the bars of the parallel clamps and applies pressure to the cauls with a pair of bar clamps.

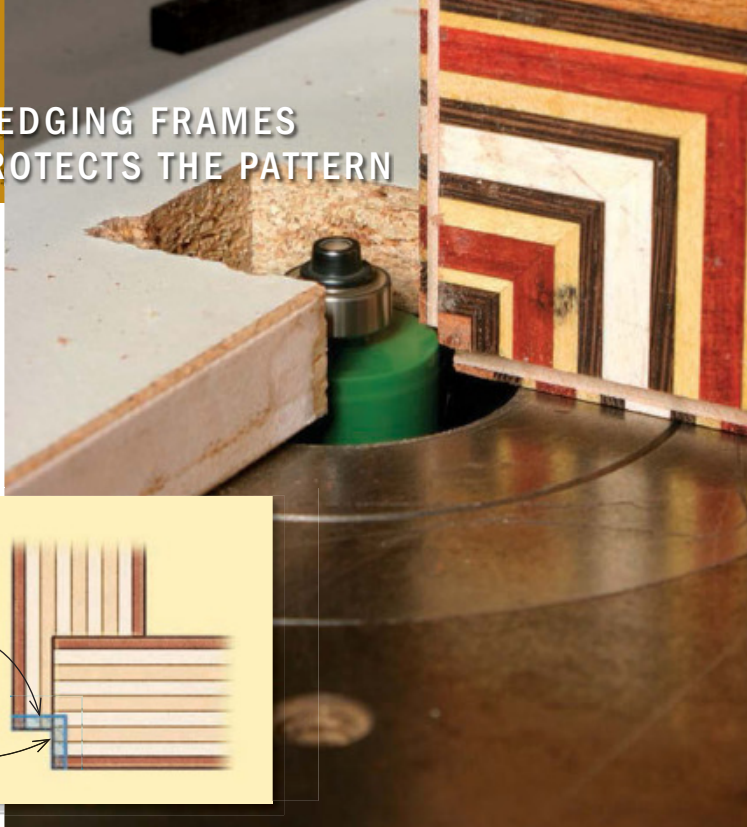


Add the top and bottom. When cutting these pieces to fit into their rabbets, make sure that the veneer pattern is aligned. Then glue and clamp them into place.



SOLID EDGING FRAMES AND PROTECTS THE PATTERN

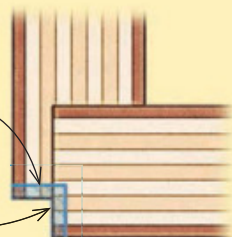
Clean up the corners. Use a rabbeting bit in a router table to enlarge the corner rabbets where the sides meet. Don't do the top and bottom edges yet.



TOP VIEW

Final rabbet,
¼ in. square

¾ in.-square
rabbet



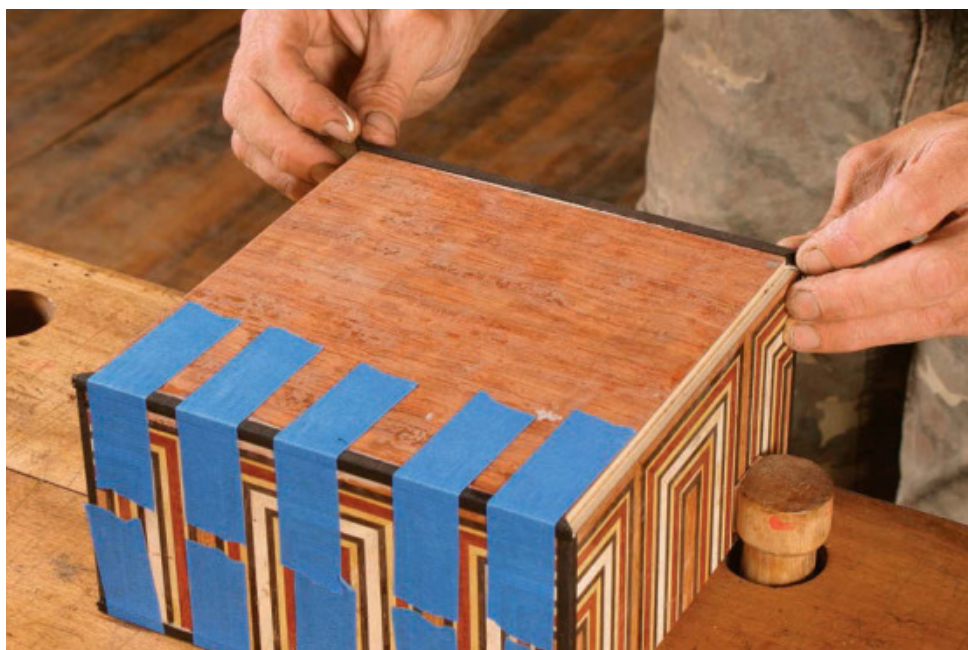
Apply the edging. Blue masking tape supplies enough force to hold the corner edging in place while the glue dries.



Bring it flush. Use a block plane followed by a cabinet scraper to bring the corner edging flush with the box sides.



Now the top and bottom edges. Use a rabbeting bit to trim the ends of the corner edging and enlarge the rabbets around the top and bottom of the box sides (above). This edging has mitered corners, so apply it to opposite sides to make fitting the last two pieces easier.



then peel off the tape. Use a fine-set block plane and then a cabinet scraper to bring the edging flush with the sides, taking care not to damage the veneer.

With the side corners complete, rabbet around the top and bottom of the box, taking care not to blow out the side corners you just glued on.

The top and bottom edging gets mitered, and it's best to glue two opposite edgings on the top and bottom first. This avoids cross-grain tearout when smoothing them flush and makes fitting the miters on the remaining edge pieces much easier.

The lid should be at least 1¼ in. deep; a thinner lid has a greater chance of springing or twisting. Sawing off the lid on the tablesaw may seem a risky procedure, but with a few simple tricks it's really nothing to fear. Get a good, clean crosscut blade, make a zero-clearance throat plate, and set the rip fence so it is dead parallel with the blade. Set the blade height so it will just break through the box. After each cut, insert a couple of the kerf shims, and stretch tape over the saw cut to hold the lid tightly in position.

The last step is to cap the plywood that you just exposed. Using the same wood as the edging, mill some strips ¾ in. wide and a fat ⅛ in. thick. When the lid is closed, the thickness of the two cap edges should visually equal the ¼-in. corner edging.

Before gluing on the caps, I use a block plane followed by a cabinet scraper to correct any twist in the lid so that it rests on the body without rocking.



SAW OFF THE LID AND COVER THE CUT

Shim it as you cut. First, to eliminate tearout, apply a piece of tape around the box where the cut will be made. Then apply a piece of tape to each lower corner of the box so it won't rock. Now cut the first side, insert two pieces of wood equal in width to the sawkerf, apply a piece of tape across the box, and then cut the next side. Repeat until all four sides are cut.



Cap the core. After cutting off the lid, glue strips to both parts of the box to conceal the plywood core. The front corners are mitered, but the back corners are butt joints that will be concealed by the quadrant hinges. Apply the sides last.

I miter the front corners of the cap strips but leave the back corners as butt joints; this prevents a tiny piece of the mitered corner from blowing out when routing for the quadrant hinges.

The idea is to have the inside edges of the caps flush with the inside faces of the box so that there is minimal trimming to do. The outside edges protrude, but will be trimmed after glue-up. A bonus of having the strips slightly wide is that if a mitered cap strip gets trimmed too short, a light pass on the inside edge with a plane makes the strip longer, so you don't have to cut another piece.

Glue on the front and back caps, waiting about an hour before trimming them flush. Then cut the side caps with a miter on the front and let the back extend over the edge. Apply glue and stretch tape across the miter joint and the butt joint, pulling the side cap tightly against the adjoining caps.

After installing the hardware, I finish the box using 320-grit and 400-grit disks on a random-orbit sander. You don't want to hand-sand, as this forces different colored dust into the pores of other woods. I finish the outside in the same way as the inside. □

Adrian Ferrazzutti is a professional woodworker in Guelph, Ont., Canada.



Power sanding only. Hand-sanding will force different-colored sawdust into the pores of the contrasting wood, spoiling the appearance. Use a random-orbit sander to smooth the outside of the box (left). Finish the box with a clear coat of your choice (below).



Simple Box-Joint Sled



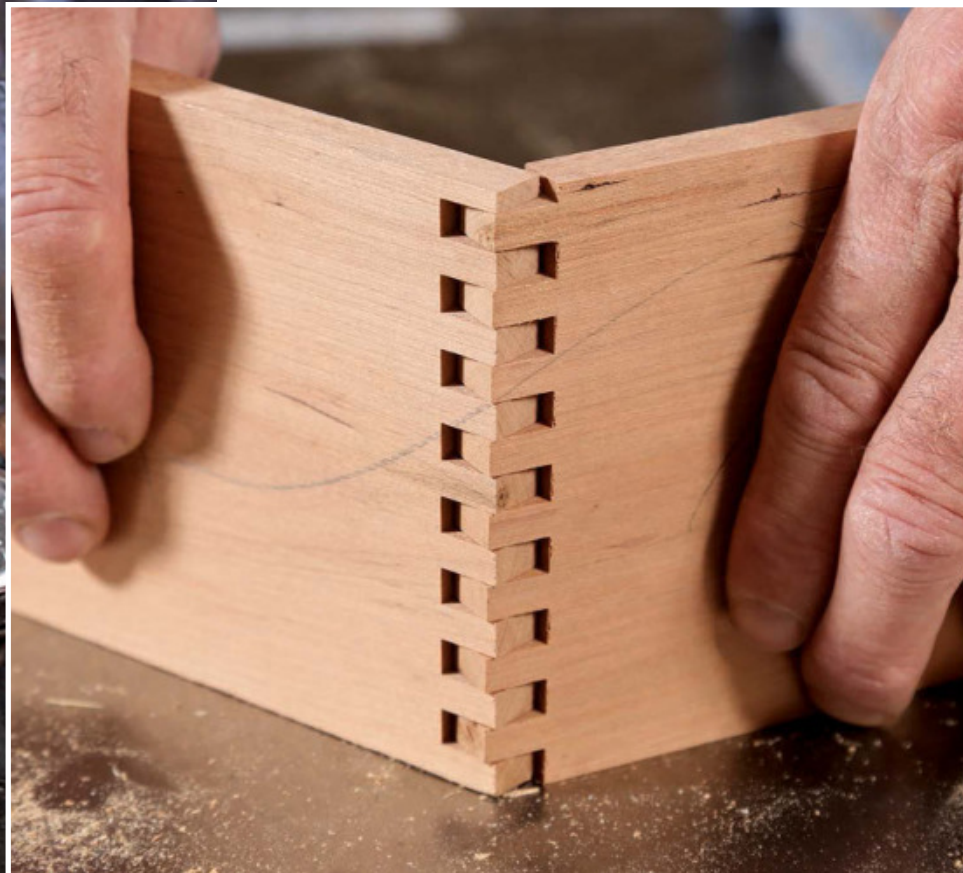
The strength and style of finger joints come easy with this straightforward sled

BY DOUG STOWE

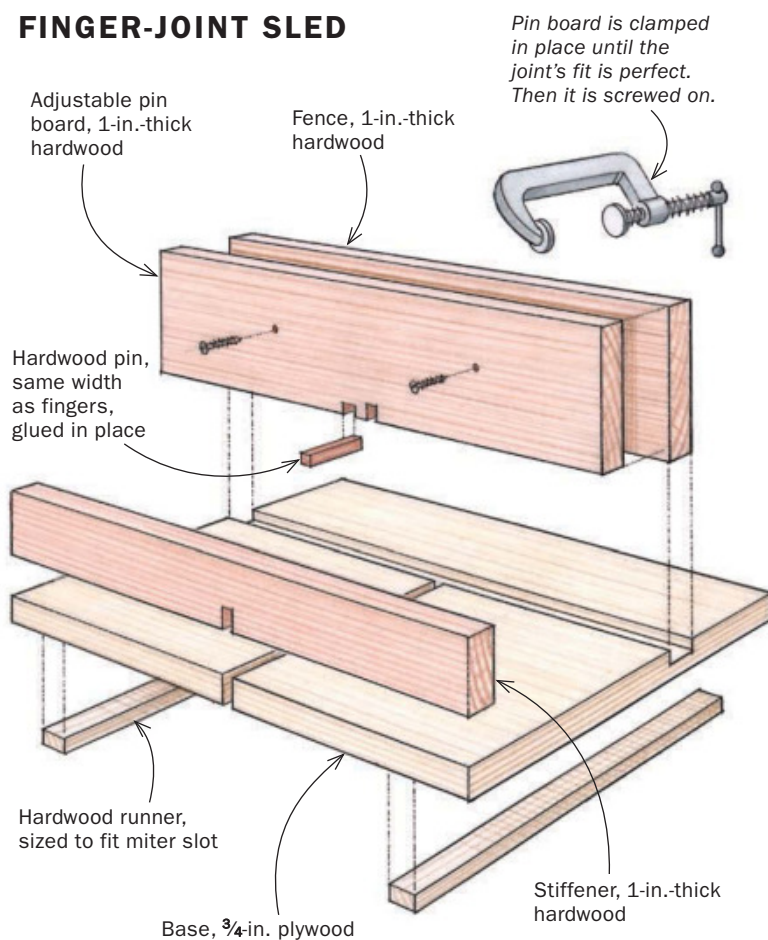
Finger joints, also called box joints, are incredibly strong thanks to all their long-grain glue surface interlocking finger by finger. But these joints have distinct advantages beyond strength. Once you have a jig set up, they are quite quick to make. And the pattern of end grain vs. side grain at the corners creates a pleasing visual rhythm. The joint also can be scaled up, as in some Greene and Greene pieces. Luckily, finger joints offer all this while being very easy to cut.

Soup up a crosscut sled

While you can make finger joints using a jig clamped to the miter gauge of your tablesaw, a dedicated sled is the better choice.



FINGER-JOINT SLED



Because it has two runners instead of the gauge's one, it provides a more stable and reliable platform.

A standard combination blade will work, but if using a single blade, I prefer rip blades because of their flat top, which leaves a cleaner joint than a combo blade's alternate top bevel. Similarly, for fingers wider than a standard sawblade's $\frac{1}{8}$ -in. kerf, you can use a regular dado stack, but I like box-joint blade sets, which come with a pair of blades that leave a flat-topped kerf in two fixed widths. Alternatively, you can send a typical dado stack to a saw sharpener to have the teeth ground flat on top.

Start by building a small crosscut sled, making sure the fence is square to the blade. Clamp a board to its fence and cut a kerf in

MAKE THE JIG

First cut. With the adjustable pin board clamped to the fence of a crosscut sled, saw a kerf through it. Stowe fits scrapwood stops into his miter slots to limit the jig's travel so he doesn't expose too much of the blade at the end of the cut.



TIP

SPECIALTY BLADE FOR BOX JOINTS



For finger joints wider than the standard $\frac{1}{8}$ -in. kerf, you can use a specialty box-joint blade set. These cut a flat-topped kerf and work by stacking two blades, either inside to inside or outside to outside, for a pair of fixed widths.



Fit the pin. Remove the pin board and fit a hardwood pin into the kerf. You want a friction fit. Glue the pin to keep it stable.



Offcut approximates spacing. While you'll fine-tune the fit later, placing an offcut from the pin stock between the pin and blade will get you pretty close.



Clamps for now. For your test cuts, the pin board should be clamped to the sled's fence, allowing you to hold things temporarily in position as you home in on a perfect fit for the fingers.

it. Remove the board and fit a hardwood pin into the kerf. A tight fit is best. Glue the pin in place.

Before you clamp the pin board back into place against the fence, grab an offcut from the pin stock. Because the pin's width matches the kerf—and the fingers—this will help you zero in on the joint spacing. Push the offcut against the side of the sawblade, and slide the pin board over until the pin abuts the offcut. Clamp the pin board here.

Dial in the fit

I advise making a run of fingers on two scrap boards to dial in the spacing and make sure the final fit is consistently tight. Align one corner of a board against the pin

and make the first cut. Then fit that first notch over the pin to make the second cut. Continue walking the fingers over until you've finished that edge. Repeat these steps on a second board.

Aim for a friction fit. It's good to have a bit of room for glue, but avoid visible gaps. If you need to tighten the joint, loosen the clamps and tap the pin board so the pin moves away from the blade; to loosen the fit, tap the pin board in the opposite direction. When the joint is just right, screw the pin board in place. As long as you're making boxes with the same joint spacing and using the same blade (or combination of blades), you won't need to readjust the jig.

Making boxes

Compared with making two test boards, building a four-sided box with finger joints requires only a few extra, albeit important,

HOW TO GET THE FIT JUST RIGHT



Form some fingers. Cut fingers on two pieces of scrap stock. Straddle the pin securely. Clear any dust that collects, since it can throw off your accuracy.

steps. First, set the sawblade's height a little higher than the thickness of the stock so the fingers can be sanded flush later. Push the workpiece against the pin to create a full finger with the first cut. Then cut fingers across the rest of the board. The next part's crucial: To cut the fingers on the other end, flip the stock over end for end. If you don't, the joints will not align. Do this for a pair of parts, either the front and back or the two sides.

Whichever pair you tackle second, you'll approach differently, making the first cuts while using an already-cut piece as a spacer. For this, take a just-cut piece and place the first finger between the pin and blade. Slide an uncut piece up to it and make the first cut. This offsets the mating fingers, allowing the two boards to interlock. To keep track of which parts need to start with a spacer, I cut the initial notches for all four ends that require the spacer, then remove the spacer and form the rest of the fingers.

I prefer to cut the fingers while the stock is slightly overwidth, and trim to width only after I know exactly where the final finger falls. This lets me deal with any error that may creep in. For instance, when making a box with $\frac{1}{4}$ -in. fingers, one would expect the dimensions to fall at some exact $\frac{1}{4}$ -in. increment, but they often do not. If the $\frac{1}{4}$ -in. finger fits best in a slot that's an extra $\frac{1}{64}$ in. wide, over the course of 5 in., that would add slightly more than $\frac{1}{16}$ in.



TOO TIGHT

You shouldn't have to force the parts together. To open up the joint, slide the pin toward the blade.



TOO LOOSE

Since this joint relies on glue, avoid visible gaps. The fingers are too loose if you pick up two joined pieces and one falls off. To close the gaps, slide the pin away from the blade.



JUST RIGHT

A perfect fit is when the parts slide together without being forced or hammered.

USING THE SLED



Screws set the fence. When you've established the perfect fit, screw the pin board in place. This jig will now work with any box you make using this blade.



Offcut sets the blade height. Raise the blade about $\frac{1}{64}$ in. above the stock to create a cleanup allowance. The fingers can be sanded flush to the box sides following assembly.

FIRST SET

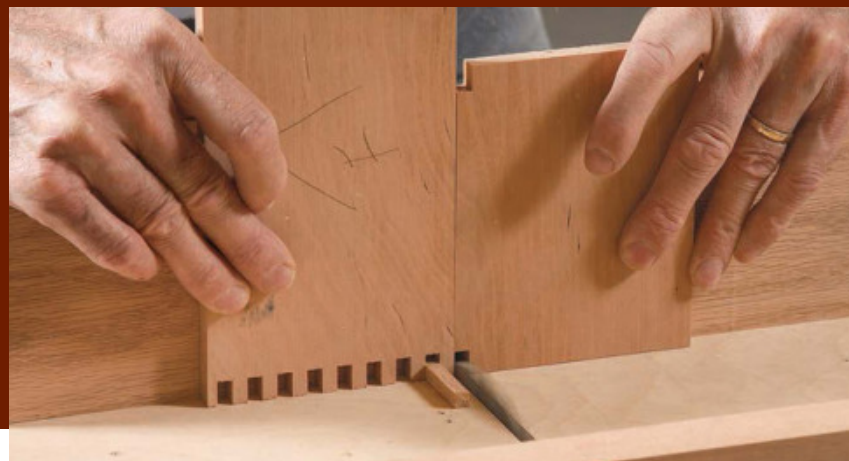


First finger. Align one corner of a board against the pin and make the first cut.



The pin registers the cuts. Complete the kerfs across the end of the board. Stowe starts with the front and back boards.

SECOND SET



Second set needs a spacer. For the first cuts on the second pair of boards, use an already-cut piece as a spacer. Put its first kerf over the pin, and slide an end up to it. Stowe cuts the first notches on each end of both boards, before removing the spacer.



Finish the fingers. Remove the spacer and complete the remaining cuts.



Groove for the bottom. To prepare for a bottom panel, Stowe routs $\frac{1}{8}$ in. above the lower edge. Two parts get a stopped groove, two get a through-groove.



Trim the excess. Stowe cuts the fingers in stock that is a little wide and rips it to width later. This lets him clean up any cumulative error, like the thin finger on the right, that may have crept in.



Glue the fingers. Apply a drop of glue to the edges where the parts slide together. The glue will spread as the fingers interlock.

For all your cuts, make sure the parts are nested carefully over the pin. If the stock isn't placed accurately and held down throughout the cut, the box sides won't come together correctly.

To install a bottom, I use a router table and a $\frac{1}{8}$ -in. bit to run a groove. I generally locate the groove $\frac{1}{8}$ in. from the lower edge when using $\frac{1}{8}$ -in. Baltic-birch plywood for the bottom. Two of the parts will have a finger at the bottom edge, and they get stopped grooves; the other two parts get through-grooves.

One great thing about a box with well-cut finger joints is that clamps are often unnecessary. But keep some handy just in case a corner needs persuasion. If it does, be sure to clamp close to the joints and not at the middle of the box, where the pressure will flex and distort the sides. □

Doug Stowe, based in Eureka Springs, Ark., is a box maker and woodworking instructor.



Wrap up. Assemble the sides around the bottom. If the parts are cut well, clamps may not be needed. Friction is often enough to hold the pieces. Check for square before letting the glue set.

Finishing Boxes

Easy ways to protect the wood and line the interior

A box is a deceptively complex piece of woodworking. Small components must fit precisely. Surfaces inside and out must be as close to flawless as possible in order to withstand close scrutiny. There are lots of nooks and crannies where finish can pool. Also, one small box may be made from several woods chosen for their contrasting grain, color, or figure. So the choice of finish becomes critical.

Like many other woodworkers, boxmakers Doug Stowe and Dave Shaw experimented with different finishes until they settled on the one that works best for them. Stowe uses Danish oil. Shaw finishes his boxes mainly with hand-rubbed shellac.

The right finish for a box doesn't always have to come from a can. A luxurious lining of suede cloth or velvet imparts its own special look and feel. Woodworker Emily Palm uses those fabrics in conjunction with wooden dividers to line her oiled hardwood boxes.





Danish oil: durable wipe-on finish

BY DOUG STOWE

A good combination.
This type of finish combines oil and urethane, which is harder than oil alone.

I finished my first boxes with Deft brush-on lacquer, but because I worked and finished in the same space, the fumes were horrid and dust settled on the surface. I started using Watco Danish Oil, but it never really looked like the wood had a finish. I tried Minwax Antique Oil, but I wasn't happy with the smell.

When I discovered Deft Danish Oil, my problems were solved. Now I finish in the same room that I use to cut wood, and the odor is tolerable. The oil heightens the contrast between the local woods I use, making the inlay patterns more distinctive.

When designing a box, think about how and when you'll finish it. In my experience, larger boxes or complex designs of any size should be broken down into their essential components and finished before assembly. But with small, simple boxes, you can apply the oil after finish-sanding and assembly.

I sand on a 6x48 belt sander up to 180 grit, paying close attention to avoid putting too much pressure in one spot. I finish sanding by hand or with an orbital pad sander to 320 grit.

Then I apply a heavy coat of Danish oil. It often helps to rag on a second coat of oil on the outside. Most of the boxes I make are small enough to hold in my hand while being oiled. With a larger box, I oil the insides and sides, then flip it over onto sticks to oil the bottom.

About an hour later, I'll begin wiping the box to remove and redistribute excess oil. Using a rag slightly damp with oil helps to work the finish into the wood. If the boxes still seem wet, I'll go through them all again, paying extra attention to places where excess oil might collect, such as the areas around joints or floating panels.

I put small boxes or components on sticks and let them dry overnight. Next day, I repeat the oiling and wiping. I've found that it pays to be conservative on the second oiling. I generally put a third coat on the outside of most boxes. You can build the finish to a sheen or use 0000 steel wool to dull the gloss.

Doug Stowe, author of Taunton's Complete Illustrated Guide to Box Making (The Taunton Press, 2005), works in Eureka Springs, Ark.

Finish in stages.
With larger boxes, sand individual components and apply oil before final assembly.



Flow it on and wipe it off. Apply liberal amounts of oil with a rag (above) or brush. After an hour, wipe off the excess oil (right). Repeat the oiling once for the interior, twice for the exterior.



Shellac offers a few options

BY DAVE SHAW



Some years ago I used nitrocellulose lacquer on my boxes, but I could only spray that stuff outside. Worse, bugs would land in it, leaving interesting trails across the surface. I still use lacquer occasionally, but I've switched mainly

to dewaxed shellac, whether I want something nearly invisible or a high-gloss French polish.

Begin by mixing fresh shellac to a 2-lb. cut. While the flakes dissolve, take the time to make the pieces of the box as flawless as possible. Steam out any dents. Scrape and sand the outside to 220 grit to remove all remaining blemishes. Also sand the pieces for interior dividers or trays to 220 grit.

When I'm ready to finish, I dilute the shellac to about a ½-lb. cut. Exact proportions aren't critical, for this is a very forgiving finish.

I get better, more uniform results if I apply the shellac before I glue up the box. Blue painter's tape keeps



Dilute the shellac. Mix dewaxed pale blond shellac to a 2-lb. cut, then add more alcohol until the liquid is a pale yellow (left). Make a pad by wrapping lint-free cotton padding in muslin (above) and apply the shellac.





shellac out of areas to be glued. Use a pad to put a few thin layers of shellac on each piece. (Use a lint-free rag or paper towel to apply shellac to small pieces or to work it into grooves.) If I'm coloring the wood, I'll stop here to apply a dye. The shellac controls blotching. If not, the shellac dries in minutes, so you can pad on more coats almost immediately until you have the sheen you want. Stop when the wood begins to look shiny or when it stops changing color. Let the shellac dry and then finish-sand with 600-grit paper or, better, a gray abrasive pad.

For a very hard, clear finish, use shellac as a thin seal coat under spray lacquer. I've had good results with water-based lacquer and aerosols such as Behlen's Master Jet Spray Lacquer. Let the lacquered pieces cure for a week, then begin rubbing out the finish. If the sandpaper clogs too much, let the finish cure for another week.

My boxes always get a coat or two of Clapham's lavender-scented beeswax polish at the end. It gives the wood a wonderful sheen and makes the shop smell good.

Dave Shaw makes boxes, bowls, and furniture in Tucson, Ariz.



Finish before assembly. The first pass of shellac (above) will begin to pop the wood grain. Keep rubbing on finish until it has the depth and sheen you like. Dowels, later used in joinery, make convenient holders (left). Before assembling the box, go over each piece lightly with a gray abrasive pad.

Padded lining adds a final touch

BY EMILY PALM



Lining a box with fabric not only protects the items inside, but also greatly enhances the overall look of the piece. In my boxes, I line the bottom and removable trays with thin foam pieces wrapped in velvet, synthetic suede, or other luxurious fabrics. I also fit fabric around thicker foam to create holders for rings and other small pieces of jewelry (see facing page).

Choose the fabric with the same care you used to select the wood for the box. Because the color of wood can vary dramatically from board to board, what looked good next to, say, cocobolo last time might clash with it now. Keep in mind, too, that real suede will tarnish silver; synthetics make better lining fabrics.

I like to use Darice Foamies 2 mm foam sheets, available at craft and fabric stores. These sheets have one paper-backed adhesive side. You could use cardboard, but flexible foam is better. It makes the lining feel upholstered because it gives when you touch it.

Mark the foam sheets with the dimensions of the box or tray. Whenever possible, take measurements directly from the dividers fitted inside the box, rather than trying to measure interior dimensions of the box itself. Be sure to allow for the thickness of the fabric—as much as $\frac{1}{16}$ in. per side for thicker velvets, as little as $\frac{1}{64}$ in. per side for suede cloth.

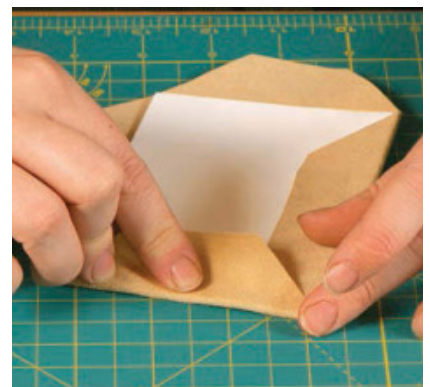
Use a straightedge and a craft knife to cut the foam sheets to

Rich, protective lining.

Synthetic suede cloth feels like the real thing but won't tarnish silver.



Cut the padding to size and glue on the fabric. Fit the foam to the box and trays, leaving a slight gap to accommodate the fabric (above). Spray a light coat of adhesive on the back side of the fabric and on the side of the foam sheet that is not preglued (right). Palm puts paper towels and cardboard under the foam and fabric to catch overspray.



Trim and fold. Attach the fabric to the foam sheet, then miter the corners (top). Remove backing from the preglued side of the foam sheet, then carefully fold over the excess fabric (above).

How to make ring holders



Just about any box becomes more useful if you add ring holders, which look like slotted pieces of soft foam. The slots are fabric folded around pieces of thick foam.

I use high-density rolled foam, the same stuff used for sleeping-bag pads. It's available at craft and fabric stores, in $\frac{3}{8}$ -in. or $\frac{1}{2}$ -in. thicknesses, and cuts with scissors or a sharp craft knife.

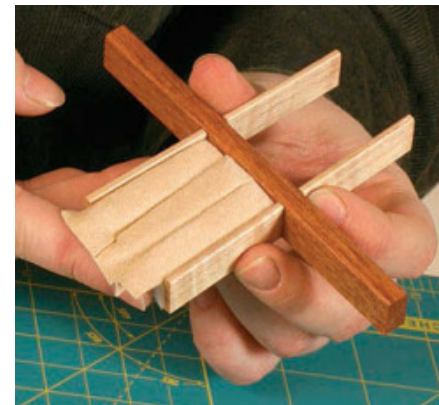
Trim three or more pieces to fit snugly inside one compartment of the box; exact dimensions will depend on the size of the box. As with a liner for the bottom of a box, be sure to allow for the thickness of the fabric.

Cut a piece of fabric an inch or so wider than the foam pieces, and about twice as long as the compartment. Spray the wrong side of the fabric with adhesive, then accordion-fold the fabric between the foam pieces (photo, above right).

Finally, carefully trim away most of the excess fabric, leaving only small flaps on the ends. Wrap those flaps over the sides and tuck them in place with the end of a blunt knife. — E.P.



Shape the ring holders. Accordion-fold the fabric over small blocks of resilient foam.



Test and trim. Cut away most of the excess fabric and check the dividers' fit.



Fit and smooth. Fit the ring holder and divider into the box and smooth the fabric into place.

size, then test to be sure they fit snugly. Once you've glued on the fabric, it's too late to make adjustments to the foam core.

Fabric can reflect light differently from different sides, especially if it has a nap, so orient all the foam sheets in the same direction on the cloth. Rough-cut the fabric to size, allowing about 1 in. extra all around to fold over the edges of the foam sheets; you don't have to be exact because the extra fabric doesn't show.

Iron the fabric good side down, using steam and a low or medium heat setting. Then spray adhesive to the back side of the fabric and to the plain side of the foam sheet (not the paper-backed adhesive side). I use Duro All-Purpose Spray Adhesive. Like similar products, it carries a list of safety warnings; I try to do my spraying outside.

Keep the fabric good side down. Turn the foam sheet so that the side you've sprayed with adhesive faces down, and press it onto the fabric. Smooth it with your fingers to be sure it adheres uniformly. Trim the fabric corners on a diagonal, staying about $\frac{1}{16}$ in. away from the foam at the corner; if you cut right up to it, the foam will peek through. Peel away the backing to expose the adhesive, then fold the fabric edges over. Press the fabric down and smooth out wrinkles.

Fit the finished liner inside the box. Run a table knife around the edges to tuck in and smooth the edges.

Emily Palm, the owner of Blue Heron Woodworks, makes boxes and hair accessories in Petoskey, Mich.



Refine the fit. As a final step, run an ordinary table knife around the lining to smooth the edges in place.

Hinges and Locks

Elevate any box with high-quality hardware

BY ADRIAN FERRAZZUTTI



Perhaps the fussiest aspect of making my contrasting veneer box (see pp. 68–75) is installing the quadrant hinges and, to a lesser extent, the lock. While you could eliminate the lock and substitute a nice pair of butt hinges with a positive stop, it's worth going the extra mile to make this box the best it can be. With their stop built in, quadrant hinges make any box look and function much better. A mortised-in lock and escutcheon create a true heirloom.

Quadrant hinges reward precise installation

The trickiest part is getting the hinges dialed into position so that the lid closes dead flush on all four sides. With a veneered box, there isn't much room to flush the lid to the body (or vice versa) without running the risk of exposing the core as the veneer gets too thin. For this reason, while you can install quadrant hinges by hand, I recommend Brusso's router template (model No. TJ-638), designed for their smaller quadrant hinges (No. HD-638). The jig and hinges are available at brusso.com, where you'll also find comprehensive instructions. You'll also need a 1/2-in.-outside-dia. bushing guide and a 5/16-in.-dia. straight bit.

Use a laminate trimmer or a router to cut the hinge mortises, setting the bit depth to match the thickness of the hinge leaf. But before installing the hinges, check that the leaves align when closed; if they don't, grind or file them until they do. Otherwise, you'll have to fuss with modifying each mortise to get the lid to fit flush. Once all four mortises are made, insert the hinges and check their fit, marking which leaf goes in what mortise.



Router template eases hinge installation



With an awl, mark the holes for the center screws only. Drill for these screws and install the hinges using steel screws of the same size and thread as the brass ones supplied with the hinges. In this way you reduce the chance of snapping a brass screw. Close the lid, checking how it lines up with the body. If the stars are aligned, it will be spot on. If not, there are two things you can do: Locate the screws in the remaining holes off center in whatever direction you need to shift the lid; or, if necessary, grind away some of the leaves so they can be pulled forward in the mortise. Then remove the center screw and try it with the other screws in conjunction with grinding.

Once the lid is fitting well, outline the mortises for the stays with a pencil. Remove the hinges and excavate the mortises with a drill and chisel so that half the stay goes into the body and half into the lid. For the stays to drop in properly, the mortises have to extend



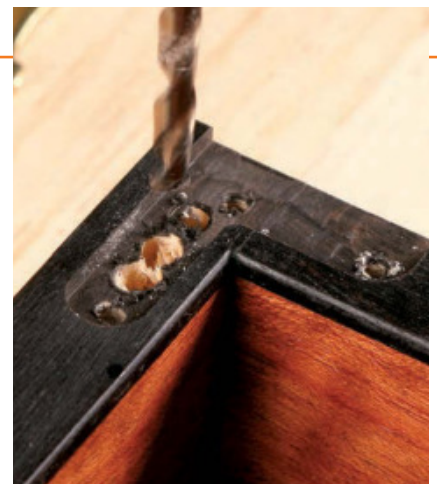
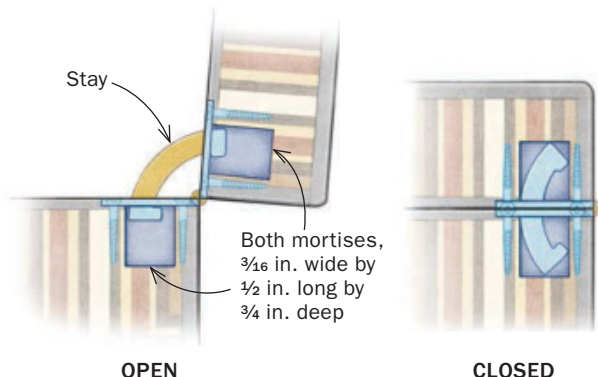
No chisel work. Although you can cut the hinge mortises by hand, it is much quicker and more accurate to use a dedicated router template in conjunction with a straight bit and a bushing guide.



Directional drilling. To ensure that the hinge is pulled into the mortise, use an awl to locate the screw hole slightly off center when attaching the first screw. Use a single steel screw at this point to avoid damaging the brass ones.

MAKE ROOM FOR THE STAY

Quadrant hinges have a stay that controls how far the lid of the box can open. When the lid is closed, the stays slide into mortises cut in the box sides and the lid.

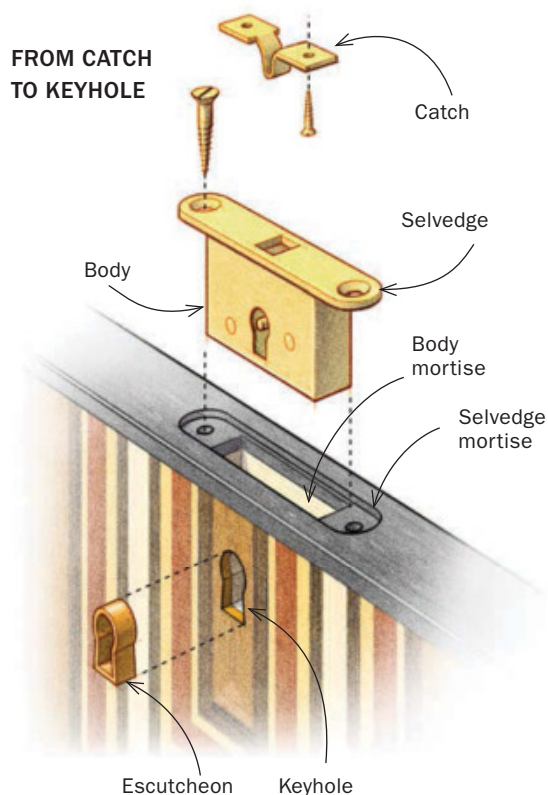


Mark and mortise. With the hinge in place, mark the location of the stay mortise. Remove most of the waste with a drill, then square up the sides with a chisel.

Install a lock in 3 steps



FROM CATCH
TO KEYHOLE



STEP 1

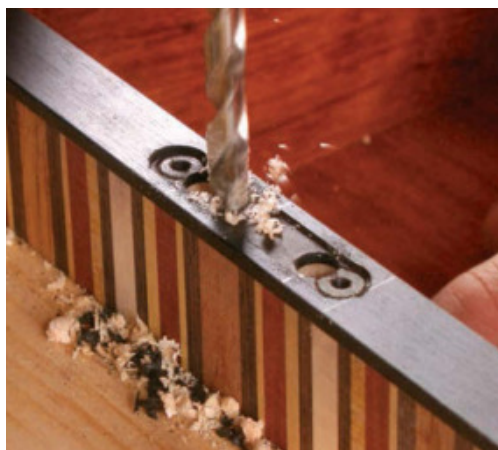
INSET THE LOCK



Mark the screw holes. With the lock upside down, center it on the front of the box, and then mark and drill the screw holes.



Define the shallow mortise. Use a larger brad-point or Forstner bit to drill partway into the screw holes. This will create the two ends of the mortise for the lock's selvedge. Now you can scribe the edges of this shallow mortise and chop out the rest with a chisel.



Make the deep mortise. Drill and chop out a deeper mortise for the body of the lock, and then test the fit.

almost to the screw holes, well beyond the traced outline. Install the hinges again, checking that the lid closes and the stays aren't hitting the mortises. If all is good, move on to installing the lock.

A lock and an escutcheon complete the box

I had trouble finding a delicate lock suitable for a small box, but I eventually found one by Viola at leevalley.com; item No. 00F10.07. The lock has a tiny $\frac{5}{16}$ -in. by $1\frac{13}{16}$ -in. selvedge (the plate attached to the locking mechanism) that matches the width of the hinges.

With the lock upside down, center it on the front of the box and mark the outline of the selvedge. There are various ways to

mortise for the selvedge: I use a $\frac{5}{16}$ -in.-dia. four-fluted end mill bit in a horizontal mortiser. You could also use a router fitted with an edge guide, clamping a block of wood to the inside of the box flush with the top for support. Or use an awl to mark the two screw locations in the selvedge, and then use a $\frac{5}{16}$ -in.-dia. brad point or Forstner bit to drill the two ends of the mortise. You can then chop out the center using a chisel.

With the lock upside down, keep checking the fit until the selvedge drops in. The mortise should be slightly shallower than the thickness of the selvedge so that after the lock is installed it can be sanded flush with the wood. Then create

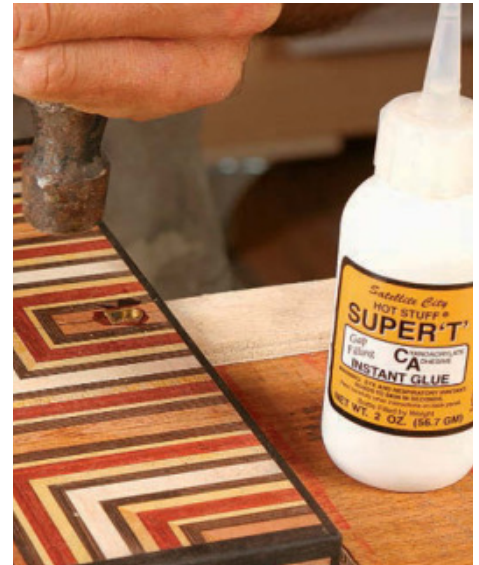
STEP 2 INSTALL THE ESCUTCHEON



Locate the key pin. Measure the distance from the top of the lock to the key pin and mark the location.



Cut the keyhole. After drilling a hole to locate the key pin, remove the lock, insert a scrap of wood to fill the lock mortise, and chisel a hole for the key and the escutcheon.



Install the escutcheon. Use a mixture of cyanoacrylate glue and sawdust to attach the escutcheon. File and sand it flush with the wood.

the 1/4-in.-wide mortise for the body of the lock using the same drilling and chopping method you used earlier. The mortise must come close to the screw holes so that the lock body drops in.

Now it's time to attach the escutcheon. You can use the oval plate that comes with the lock and is attached with a couple of brass pins, or you can use the type that is inserted into the side of the box, outlining the keyhole. I haven't found a source for these to fit very small locks, so I make mine out of solid brass. In either case, locate what you think is the center of the keyhole and drill a small hole through the front of the box. Insert the lock again and check if the pin in the lock is in line with the hole in the box. If not, take a larger drill bit and force it to drill in the direction required to get the hole in line.

Continue to enlarge the hole until the metal key just fits and then attach the plate escutcheon, or continue to chisel away carefully for the inserted type of escutcheon. Glue the escutcheon in place using a mixture of cyanoacrylate ("Super") glue and sanding dust from the surrounding wood to fill any gaps. File and sand the escutcheon flush and move on to installing the catch.

It's a challenge to locate the catch or strike plate for a lock so that it lines up precisely with the lock, but I've found a foolproof method using tape (see photos below). Fit the catch, secure it with pins or screws, and test the lock. □

Adrian Ferrazzutti is a professional woodworker in Guelph, Ont., Canada.

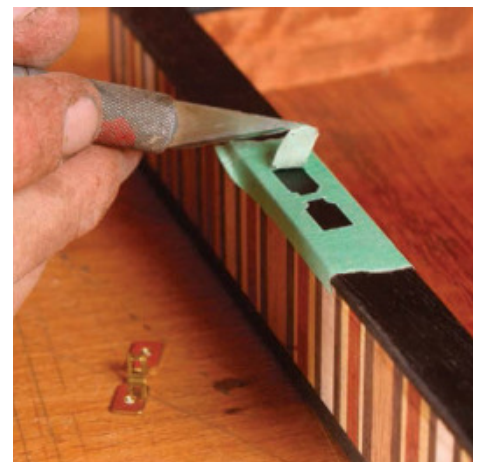
STEP 3 NEAT TRICK LOCATES THE CATCH



Use double-faced tape. With the catch locked into the body of the lock, apply two small pieces of double-faced tape to the back of the catch.



Stuck in the right place. Place some green tape on the lid and close it, pushing down onto the lock. Reopen it with the double-faced tape holding the catch in perfect position.



Locate the mortise. Cut around the catch with a sharp knife, severing the green tape. Remove the catch, peel away the cut tape, and mortise these areas.

4

DETAILS

Ways to Top a Box

Low-tech lids open without hinges

BY MATT KENNEY

Boxes are fun to make and can be a pleasant diversion between larger projects. With a bit of nice wood and a clever design, you can turn out a beautiful box in just a few hours. But there is one part of making a box that is never fun: installing high-quality hinges and getting them just right. And don't forget that you also have to buy them, for a box that might otherwise cost you nothing more than some leftover cutoffs.

You can avoid that hassle by making a box without hinges. Of course, you'll need another way to keep the top on, but the challenge of figuring out how to do that can lead to elegant and unique designs. Here are four great ways to do it. One is mine, and the others are from fellow woodworkers.

Matt Kenney is a woodworker in Connecticut.

1 INSERTS HOLD THE TOP IN PLACE

They're fitted to the inside after the top is cut free from the bottom.



Online Extra

To see how to make a bird's-mouth joint like the one on this box, go to FineWoodworking.com/boxes.

4 TIP THE LID AND STAND IT UP

The lid rocks back on tapered side rabbets when you press down on the back, allowing you to lift and stand it in a deeper back rabbet.

3 DROP THE TOP INTO A RABBIT

The sides do all the work and hold the lid securely in place.

2 ONE BOX TOPS ANOTHER

Make the lid and then build the bottom to fit inside it.



1 Inserts hold the top in place

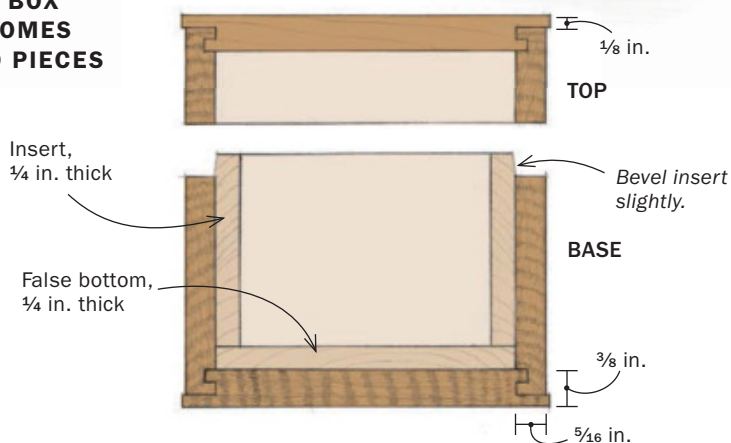
One of my favorite ways to make a box is to glue up the sides, top, and bottom as a single unit. Once the box is assembled, I simply slice it in two. One half becomes the box, the other, the lid. To avoid hinges, you need some way to align the lid with the box. The answer is a handsome liner that extends above the edge of the box and keeps the lid snugly in place.

—Michael Pekovich



Cut off the top on the bandsaw. All four edges end up level—something that never seems to happen at the table saw, where you cut into one side at a time. To smooth the bandsaw cuts, just rub the parts on a sheet of sandpaper stuck to a flat surface, like your table saw's table.

ONE BOX BECOMES TWO PIECES



TIP

DESIGN INSERT FOR GREATER FUNCTION



This box was made to hold tea packets. The cutouts make the contents easier to retrieve.



Fit the inserts. Do the ends first and then the front and back. For each side, miter one end at the table saw, mark the length directly from the box, and then miter the second end. The goal is a snug fit, so no glue is needed.



Bevel their top edges. Otherwise, the top won't fit easily over them. Mark the inserts so that you know how wide to make the bevels. The only practical way to do the job is with a block plane, because the inserts are small and the bevels are shallow.



2

One box tops another

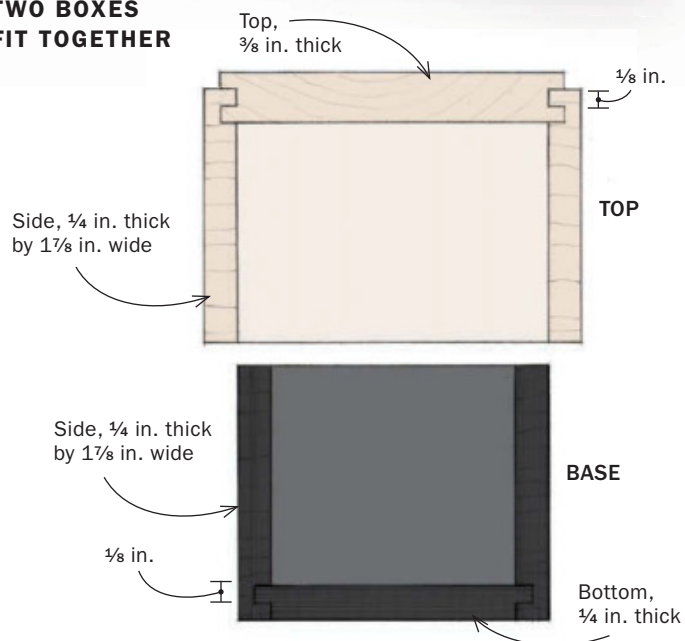
See this box as a stripped-down version of box No. 1. Here, the bottom of the box acts like its own box liner. The lid nests over it almost completely, so lifting it off is like revealing a hidden box. Make the two out of contrasting woods for a more surprising revelation.

—M.P.



Glue up the top first. Treat it like a box without a bottom, using blue tape at the corners to create clamping pressure on the miter joints.

TWO BOXES FIT TOGETHER



How to make the bottom box. Attach an L-shaped fence to a miter gauge to prevent tearout. Start with pieces that are longer than the side's final dimension and make the first miter cut on each one (above). Then mark each side for final length by putting the mitered end inside the larger box and marking directly from it at the opposite end (right). To cut it to length accurately, line up the mark with the miter cut in the L-shaped fence on the miter gauge.



3 Drop the top into a rabbet

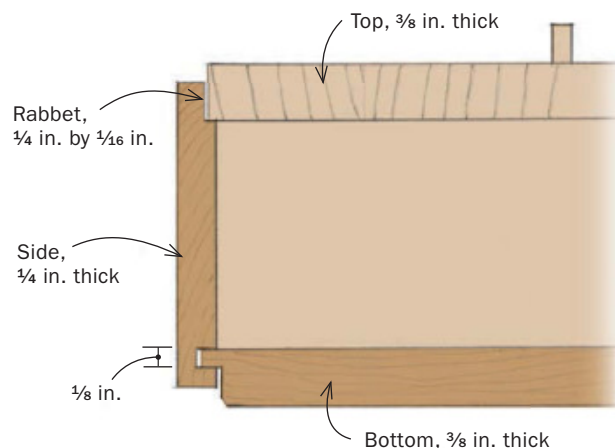
I wanted a box with a modern look and a thin top. So I gave a contemporary turn to the old trick of holding the top in a rabbet, putting in a full-height divider that splits the top in two (something that would have required four hinges in a traditional box). By the way, the lifts are attached with cyanoacrylate glue.

—M.K.



ROUT THE RABBETS

Align the router table's fence with the bit's bearing. Keep the side pressed down firmly; small deviations in the rabbet's depth are noticeable on a little box. (The groove is for the box's bottom.)



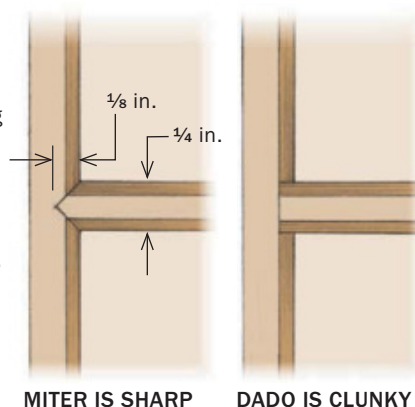
V-GROOVE BIT DIVIDES BOX



It should be as wide as the divider is thick and set up to cut its full width. Use a large backer board to keep the side square to the bit, and stop the cuts when they reach the bottom groove.



You could leave the divider inside the box, but it looks better full-height, separating the top into two parts. To join the divider to the sides, the best choice is a bird's-mouth joint, because it has a cleaner look that echoes the mitered corner joints.



The same bit shapes the divider's ends. Attach a zero-clearance face to your fence and align it with the middle of the bit. You shouldn't need to adjust the bit's height.



Fit the divider. Do it after gluing up the box (use blue tape in place of clamps). If the divider is long, plane a shaving or two from one tip and re-route it.



Cut the two-panel top. Square one end of your lid stock, mark and cut the longer side to length, and then mark, cut, and fit the shorter one from the adjacent section.

4

Tip the lid and stand it up

The lid of this box is a more sophisticated version of a lid in a rabbet, with the rabbets functioning like a hinge. The side rabbets are sloped at the back and the back rabbet is deeper than the other three. To open the box, you press on the back of the lid, bringing up the front edge so you can grab it. It rocks gently into the back rabbet, which holds it upright.

—John Nessel is a furniture maker in Minneapolis.



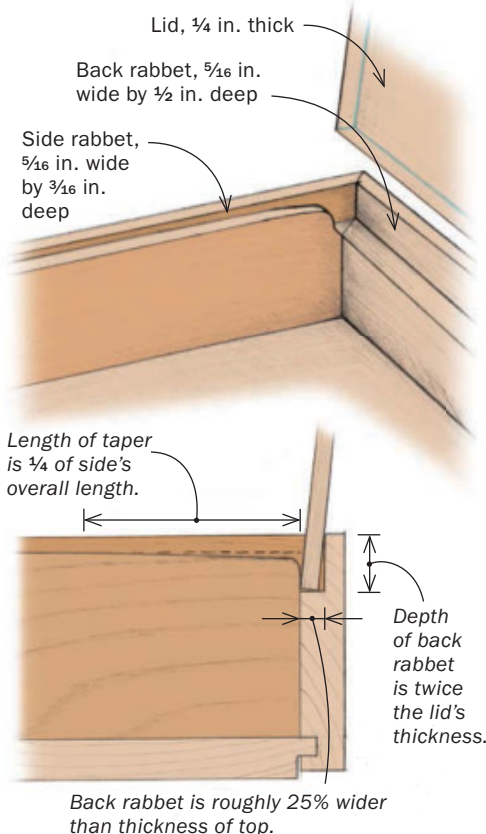
1. Press down. Because the side rabbets are tapered toward the back, the lid's front edge raises up.

2. Lift. The back edge turns smoothly down the rounded corner of the side rabbets, as if it were hinged.

3. Enjoy. The back rabbet is wider than the top is thick, so the lid leans back, coming to an easy rest.

MODIFIED RABBETS ACT LIKE HINGES

The back rabbet functions like a built-in stop, holding the lid slightly past vertical so that it won't fall forward.



Start with straight rabbets. The back one is deeper to hold the standing lid (above). Next, square off the end of the side so that the miter doesn't stick into the back rabbet. Then taper the side rabbet. Start at the back corner and take a slightly longer stroke each time. The final stroke should be the taper's full length (right).



Round the ends. Pencil in the layout. Then use a flat chisel (left), making a big chamfer first and then nibbling away ever smaller facets. Smooth the arc with sandpaper.

Picking the Perfect Hinge

The right choice will help you design and build better boxes

BY DOUG STOWE

Selecting just the right hinges to fit each special box can be a daunting task. There are so many types that it's tough to make the right choice. And you don't want to make a box before choosing the hinges—that's like painting yourself into a corner. To help you wade through the options, here I'll give a brief look at the different hinge types and their applications.

There are three main criteria to consider when you're deciding which hinge will be right for your box. First is appearance. Do you want to see the whole hinge on the outside of the box, see a proud brass barrel at the back, or just glimpse a barely visible barrel tucked into the lid joint? Another key factor is the size of the box and the weight of the lid. Some hinges are more robust than others, but in certain cases you can use multiple pairs of less substantial hinges to bear the weight. One aspect of hinge choice that tends to be forgotten is the installation difficulty. Some hinges simply screw right to the surface, some require cutting a complex mortise, and some require a specialized cutter to make a slot for the hinge. Understanding each type's strengths and weaknesses will let you refine your box design and find that perfect hinge each time.

Doug Stowe is a professional furniture maker and box maker in Eureka Springs, Ark.

Surface-mount hinges

Visibility: Can be seen on exterior whether closed or open.

Strength: Available in sizes for almost all applications.

Installation: Easy to moderate. Inexpensive hinges are simply screwed to the surface. Higher-quality hinges are recessed into the surface.

Cost: \$2 to \$30 per pair

Surface-mount hinges come in several forms and are generally available at hardware stores and big home-improvement stores. Depending on the type, they can be nailed or screwed in place.

Surface-mount hinges are visible when the box is closed or open. So if you want to accentuate the hinge and draw attention to the back of the box,

surface-mount hinges are a great choice. If you prefer a more subtle or hidden hinge, move along.

These hinges are available in a range of sizes capable of accommodating most boxes and lid weights. But you must check the screws' length against the thickness of the box body to make sure they won't pop through the inside. This can be overcome by using a different-size screw or filing down the screws that came with the hinge.

Many craftsmen are drawn to the use of surface-mount hinges by the simplicity of their installation. There are no mortises to cut or holes to drill other than the pilot holes for the screws. While they are one of the easier hinges to install, it's still important to make sure the hinge barrels are in line and that you leave some space between the top and body at the hinge to let the box close fully.



Line up the barrels. It's important to keep the hinge barrels aligned so the box works smoothly. Clamping a straightedge in place makes alignment easier.



HINGE SOURCES

leevalley.com

woodcraft.com

rockler.com

smartboxmaker.com

craft-inc.myshopify.com

Leave space at the back. When marking the lid for the hinge pilot holes, use business cards at the back corners to space out the lid. This tiny gap will allow the lid to close fully and avoid any binding at the hinge side of the box.



RECESSED HINGES: MORE WORK, BUT WORTH THE EFFORT

A few manufacturers make surface-mount hinges that require recessing into the box top and body. These take more work, but the hinges are still visible and this variety are typically more able to support heavy lids.



Hinges with built-in stops. Some surface-mount hinges—most commonly found on higher-quality versions—come with mechanical stops cast into the hinge, which keeps the lid from falling back when the box is opened.



Butt hinges

Butt hinges give boxes a clean, traditional look. They come in a range of sizes and quality, from inexpensive, stamped-steel versions to high-quality solid brass. Brass hinges are much more rigid in use, so they are more suited to heavier lidded pieces. In addition, some have built-in stops, which saves the effort and cost of having to buy or make a stop to keep the lid from falling backward.

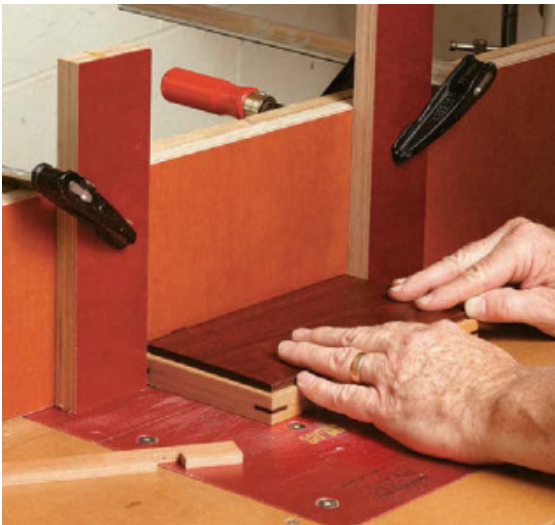
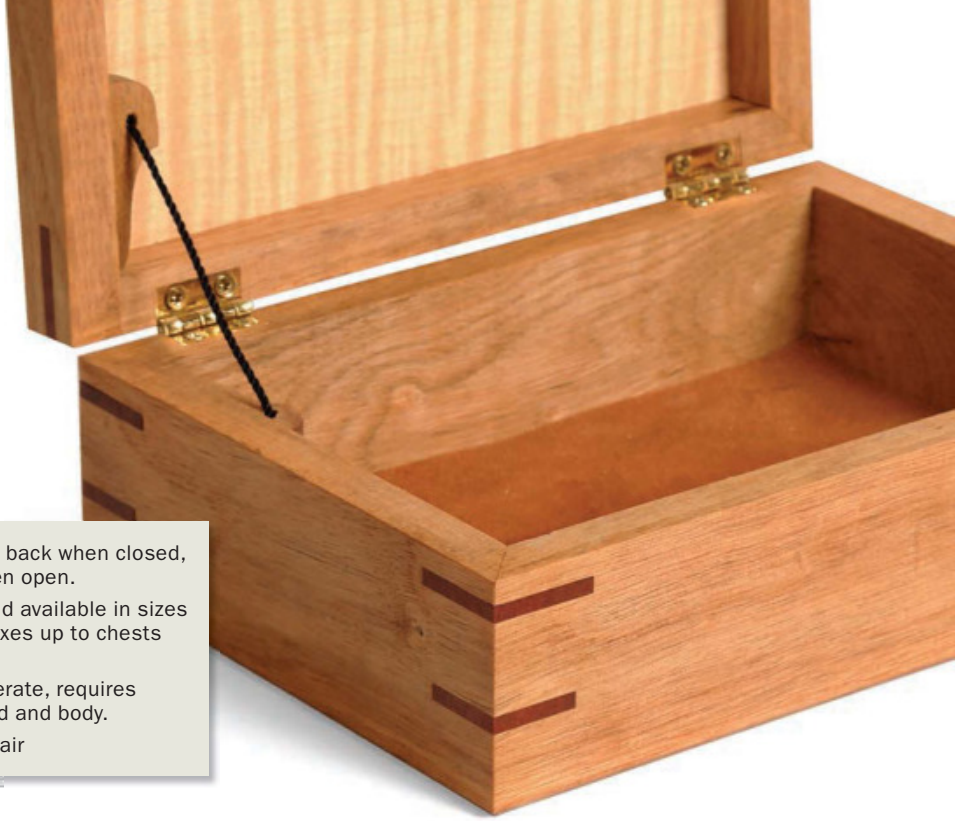
The mortises must be aligned and in plane, but when installed carefully the butt hinge is hardly visible at the back of the box and is quite good at aligning the front edge of the lid with the body of the box.

Visibility: Barrel visible at back when closed, hinge leaves exposed when open.

Strength: Fairly strong, and available in sizes to accommodate small boxes up to chests and doors.

Installation: Easy to moderate, requires aligned mortises on the lid and body.

Price: \$1.50 to \$80 per pair



Mortises for butt hinges. The router table makes quick and accurate work of removing the majority of the waste. The corners can be squared up with a chisel before installing the hinge.

BUTT HINGES WITH BUILT-IN STOPS

To keep the lid from falling all the way back, hinges need a stop that holds the lid at roughly 95°. Some hinges have stops that are designed into the hinge mechanism (below), while others require an additional stop, such as a shopmade string stop (top photo) to keep the lid from falling back.



Blocky in the back. Most stopped butt hinges have a squared-off knuckle, as compared to the rounded knuckles of the non-stopped varieties.

Side-rail hinges

These finely crafted, premium hinges are available with or without stops, and they have a minimal profile at the back of the box for a clean look. Side-rail hinges are mortised into the box sides and lid. These hinges can support heavier or larger lids because they place the stress at the corner of the box where the body is strongest. One thing to consider when mounting side-rail hinges is the type of joinery used on the box. If you're using miter joints, the placement of the screw closest to the barrel has a tendency to fall directly along the joint line between the side and back, which can weaken the joint when the hinge is stressed. For that reason, I prefer to use side-rail hinges on boxes made with dovetails or finger joints.

Except for the location, installing side-rail hinges is similar to butt hinges. Routing out the mortise usually works exceptionally well, as many side-rail hinges have a round end to their leaves that matches a standard straight bit.

Visibility: Small knuckles at the back can be seen when closed, leaves are visible when box is open.

Strength: Strong, suited for heavy-lidded boxes.

Installation: Moderate, requires aligned mortises along the narrow box sides and lid.

Price: \$10 to \$60 per pair

A few ways to stop. Side-rail hinges come with or without stops, which can use either a captured arm or an internal stop engineered into the knuckle.



Quadrant hinges

Quadrant hinges feature a built-in stop and are placed at the corner of the box back and side with legs that get mortised into each side. When the box is open, the complexity and unique mechanism of the hinge is fully visible. These hinges offer excellent support for heavy-lidded boxes, but are one of the most challenging hinges to install, as they require routing shallow mortises into the sides and back of the box, and an additional deeper mortise in the sides for the stop arms. I've made templates for installing this hinge that ease the mortising operations, and a few companies sell routing templates specifically designed for their hinges which are invaluable at setting them up successfully. Because of the complexity of the install, I usually reserve quadrant hinges for special projects that require their strength and aesthetic.

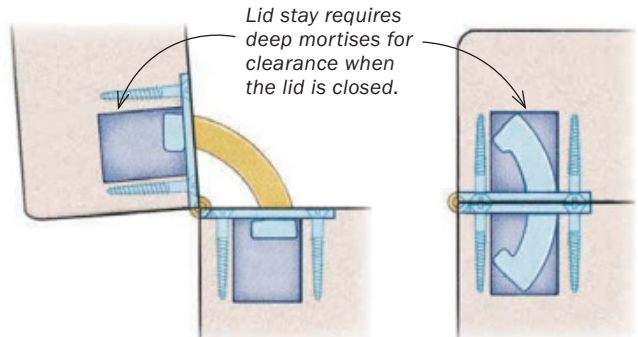


Visibility: Knuckles visible at back when closed, leaves and stop visible when open.

Strength: Very strong, suitable for large boxes with heavy lids.

Installation: Challenging, requires three separate mortises in both the lid and body.

Price: \$10 to \$70 per pair





Barbed hinges

Barbed hinges are one type that my students always want to use in class, but may avoid in their own shops due to the special equipment required. The leaves of a barbed hinge have hooks and are pressed into a thin slot made in the box top and body.

Once pressed in, they stay put without screws or glue.

Barbed hinges are almost completely invisible whether the box is open or closed because the leaves are housed in the box sides. These hinges affect the look of a box because they require a chamfer that lets the lid open and acts as a stop.

These lighter-duty hinges are perfectly suited to small boxes up to 5 in. by 8 in., where the stress of a heavy lid isn't an issue. For larger boxes, you can use two pairs of barbed hinges in sequence to provide the necessary support. Manufacturers also offer barbed hinges that come with leaf springs built into them to help keep heavier lids closed tightly.

Barbed hinges require a special blade for cutting the thin slot in which they are installed. The cutter is mounted in a drill press and the piece is fed into the cutter using a fence and stops.

After that, a simple chamfer along the back allows the hinge to function. While the cutter is sold separately and requires special setup, the advantage of these hinges—which has caused me to use them for thousands of my boxes over the last 40 years—is that they simply press in place with no glue and no screws.



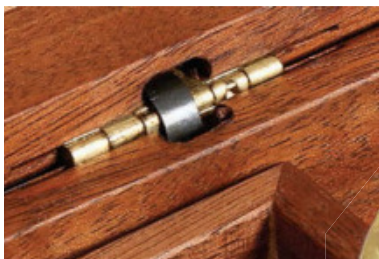
Slot cutter

Visibility: Only the thin hinge barrel is visible whether open or closed.

Strength: Weak, ideal for smaller boxes but multiple hinges can be used to add strength.

Installation: Easy, but requires a special cutter to make the slot for the hinges.

Price: 30 cents to \$1 per pair



Spring aids in closure. Some hinges are equipped with a leaf spring that helps keep the box closed, but extra clearance holes are required.



Slots cut at the drill press. The thin-kerf slotting tool is mounted into a standard drill press, and a fence with stops is positioned to set the depth and spacing of the slots.



Push into place. After chamfering the lid and the body, press one leaf into the slot until it reaches the barrel (left). The barbs grab securely and hold the hinge in place. Seat the opposite leaf into the slot in the other side, and squeeze the hinges into place (above).



Barrel hinges

Barrel hinges are very common on small boxes. They come in two varieties—5 mm mini and standard—both easily obtained through a handful of online woodworking supply companies. Once installed, the only visible parts of the mini barrel hinges are the small round knuckles, whether open or closed. Like barbed hinges, mini barrels require a chamfer at the back to allow them to open and to act as a stop. Standard barrel hinges, also called expanding link barrel hinges, use a complex armature to allow the hinge to open without the chamfer, and when the box is closed they are invisible. When open, the brass armature and the barrel are exposed.

Mini barrel hinges are perfect for boxes of small to modest size, no larger than about 3 in. by 5 in. Bigger sizes are doable, although I would consider using three or more hinges to carry additional weight. Full-size barrel hinges are intended for larger boxes or small cabinet doors, and come in a variety of sizes that can handle lids of almost any weight or size.

Both types are installed by drilling perfectly aligned holes in both the body and lid, and then pressing the knurled hinge bodies into the holes. The mini barrel version gets a drop or two of PVA glue before being inserted and aligned. The regular barrel hinges have an expanding collar that is engaged with a small flathead screw. Once they're inserted and aligned, it's just a matter of tightening the screws and locking in the hinges.



Visibility: Only the small round knuckle is visible on the mini-barrel when open or closed. The standard is invisible when closed and the linkage and barrels are visible from inside when open.

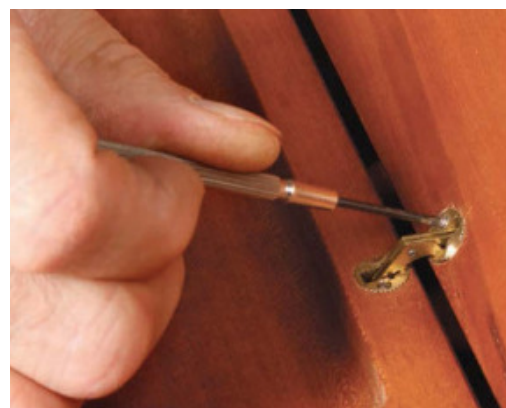
Strength: Mini barrel is weak, ideal for smaller boxes, but multiple hinges can be used to add strength. Standard hinges are fairly strong, and sizes are available to handle boxes all the way to cabinetry.

Installation: Easy, both only require an aligned, drilled hole. Mini barrel requires a chamfer at the back like the barbed hinges.

Price: \$2 to \$12 a pair.



Mini barrels get glued in place. To keep them from pulling out, a small amount of glue is placed in each hinge hole. After that, place the hinges in one side, align them to open in the right direction, and squeeze them into place.



Alignment is critical on barrel hinges. Both barrel hinge types need to be aligned with extra care to make sure they don't bind. Use a small square on the fully expanded hinge. A small screw expands the barrel in the hole to lock it in place. This also means that the hinges are easy to remove, unlike the mini barrel type.

Distinctive

6 ways to take your next box to the next level

BY DOUG STOWE

PULLS

Don't ignore a box's calling card. Use it as an invitation to open the box and as a set of instructions that tells people where to put their hand and how to open the lid.



FEET

Standing on a distinctive set of feet, a box takes on a life of its own as a piece of furniture. Without them, it tends to blend in and look like an accessory.

Box Details



Online **Extra**

Learn how to build beautiful boxes in a video workshop with Doug Stowe. Go to FineWoodworking.com/boxes.

DIVIDERS

Open interiors quickly become a jumbled mess, but a few dividers keep jewelry sorted and organized. Arrange them to suit the contents.

As a professional box maker, I've thought a lot about what it takes to turn a humdrum wooden container into a unique and desirable piece of furniture. I've learned that the appeal of a box is due in large part to the details, like the shape and size of the pull. That's why I approach every new box as a design opportunity, a chance to create new and distinctive details that allow my boxes to stand out. But there's more to it than design. You also need to be able to make these parts, which can be a challenge because they tend to be very small. That's forced me to develop accurate and

safe techniques for machining them. I'll share some of my designs for feet, pulls, and dividers and demonstrate the techniques I use to make them. Even if you don't want to make the exact designs I do, you can use my techniques to make your own safely and accurately.

Doug Stowe makes boxes and furniture in Eureka Springs, Ark.

Feet can raise your box above the crowd

A box that sits directly on a table or dresser tends to blend in and get lost. But one raised by feet or legs makes a clean break from the surface beneath it.

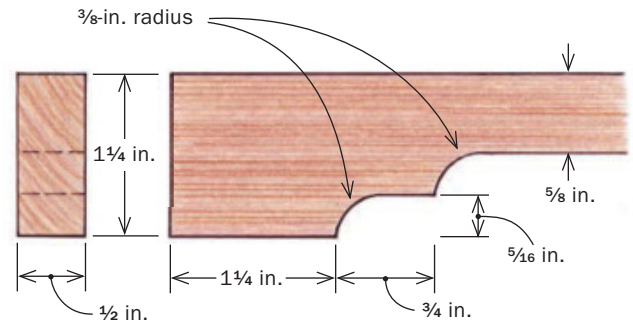
BRACKET FEET ARE ELEGANT AND STABLE

The curves and symmetry of a bracket foot add a graceful and formal base for a stately jewelry box like this one. The feet aren't very tall, so I make two at a time on a single blank (making use of both long-grain edges) to keep my hands well away from the router bit. On feet this small, any lack of symmetry would immediately be seen, so I use a stop block on the infeed side of the router table to start the cut for each foot.



Use a stop for symmetrical feet. After routing the lower arch on the foot, move the stop and fence to rout the higher one.

PERFECT PROPORTIONS



Rout halfway, then flip. There is no stop on the outfeed side, so don't risk getting too close to the foot on the trailing end.

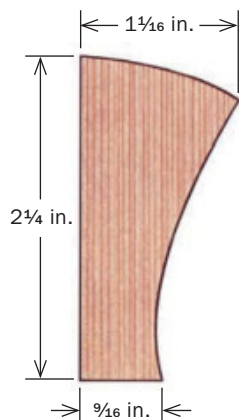


Cut the foot free, then miter the ends. Set the fence and rip all four feet at once so that they are the same height (left). Because the feet already are at final length, use a stop block so the miter is accurate and doesn't shorten the foot (above).

STILT LEGS ARE PLAYFUL

Because they are so akin to the body part they're named for, legs present an opportunity for levity. The mitered legs on this box give it an almost animated quality, and I like that playfulness. I use a template to rout the shape, making it extra long so that it can be clamped to a long blank (and then to my bench). The fence on the template ensures that the shape is routed square to the miter joint, which is cut prior to shaping.

A LEG WITH FLAIR

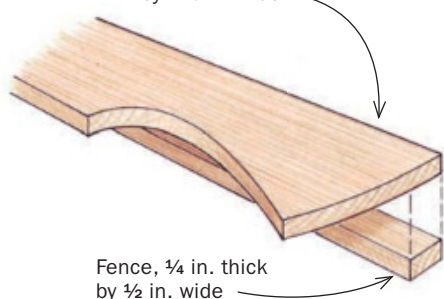


Cut the miter first. Miter the edge of a blank long enough for all eight halves needed to make the four legs.

TEMPLATE AND FENCE

Template, 1/4 in. thick by 1 7/8 in. wide

Fence, 1/4 in. thick by 1/2 in. wide



Clamp on the template. Place the workpiece against the fence of the template and clamp both so that they overhang the workbench.



Rout the shape. Use a flush-trimming bit so that the leg is an exact copy of the template. After routing the first half, flip the blank end for end and rout the second one.



Cut to length. A stop block guarantees that all eight leg halves are the same length, creating a box that won't rock after assembly. A pencil eraser is the perfect hold-down for small pieces.



Glue up the leg. Use a glue block to reinforce the miter joint and support the box from below. Packing tape and rubber bands add clamping pressure.

A close-up photograph of a wooden chest of drawers, showing a handle and the wood grain. The wood is a warm, reddish-brown color with a visible grain pattern. The handle is a small, rectangular piece of wood. The chest has a simple, rectangular design with a visible joint between the top and the body.

There are times when a pull shouldn't call too much attention to itself, like on this understated jewelry box. This one is just big enough to get a finger under and lift. Its small size might be a design plus, but it's a woodworking challenge. I overcome that problem by shaping the pull on a larger piece of stock and then trimming it to size.

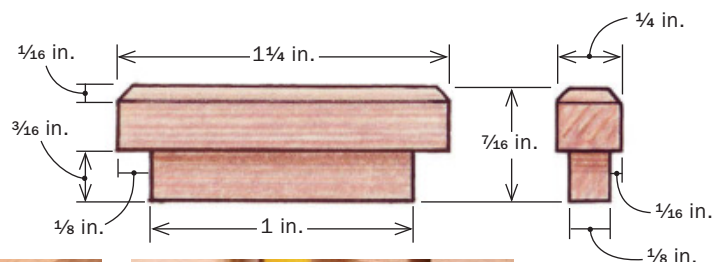
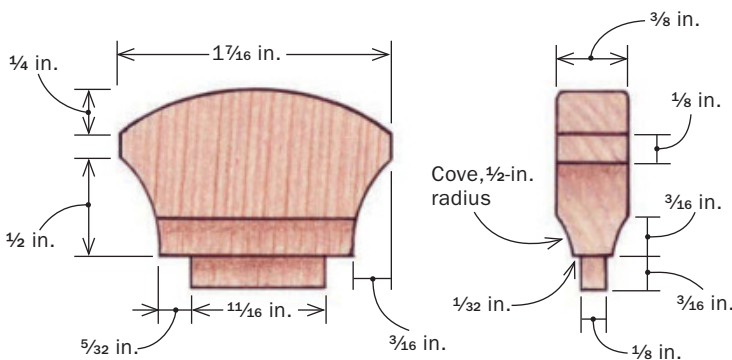


Diagram illustrating the dovetail joint setup. A 3/8-in. straight bit is shown cutting a dovetail into a 1/16 in. wide slot.



This pull starts as a long piece of stock and involves two router operations. A core-box bit creates a cove at the base, and a straight bit creates the tenon. Like the pull above, complete all of the shaping before cutting the pull from the blank.



1/2-in. radius core-box bit



A close-up photograph showing a wooden joint being drilled with a Forstner bit. The bit is positioned at the edge of a piece of wood, and a hole is being formed. The wood is light-colored, and the bit is dark. The image is part of a sequence showing the steps of creating a dovetail joint.

3/8-in. straight bit

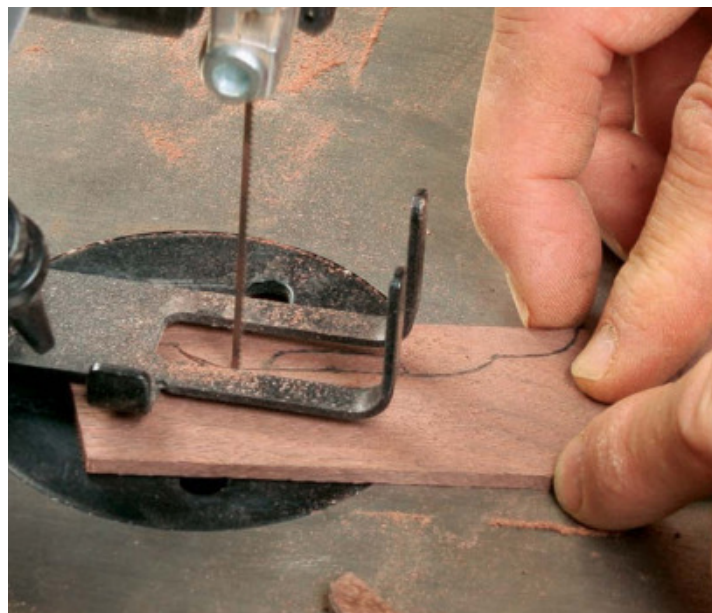
TWO-PART LIFT DOES DOUBLE DUTY

I use a pair of these lifts on opposite sides of boxes that need to be mobile, such as those for stationery. One part of each lift is mortised into the box and the other into the lid. When you pinch the two parts between your fingers, the lid is held in place and the box can be picked up. But the cutout in the lower part lets you get a finger under the upper part and take off the lid. Making the lift isn't particularly difficult, but it won't work if the shape isn't just right. So take your time with the design, tracing it onto the blanks and then refining the shape.



Draw the basic shape. Stowe uses a half-template cut from a manila folder so that the two halves of the pull are symmetrical.

Every other pull gets a cutout. Simply modify the existing template and trace the cutout onto two of the pulls already drawn.

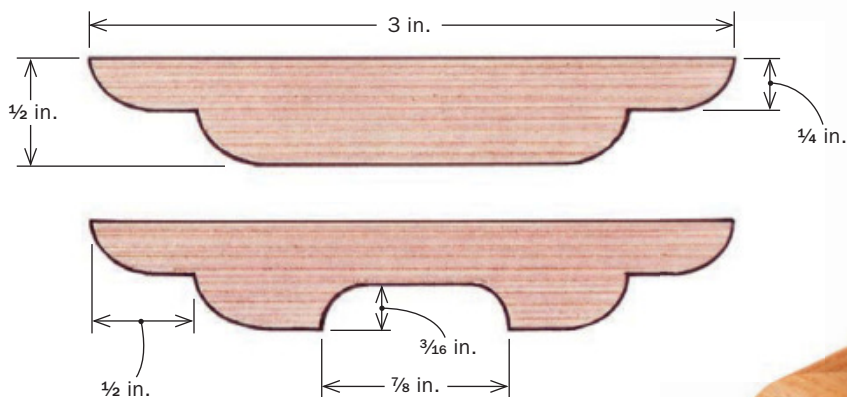


Rough out the parts. A scrollsaw is best because its blade is narrow enough to follow the tight curves.



Refine the shape with sandpaper. Stowe groups the pulls to make it easier to keep the edges square to the faces. He uses 1-in.-wide sandpaper glued to a pencil to get into the tight curves.

A PERFECT PAIR



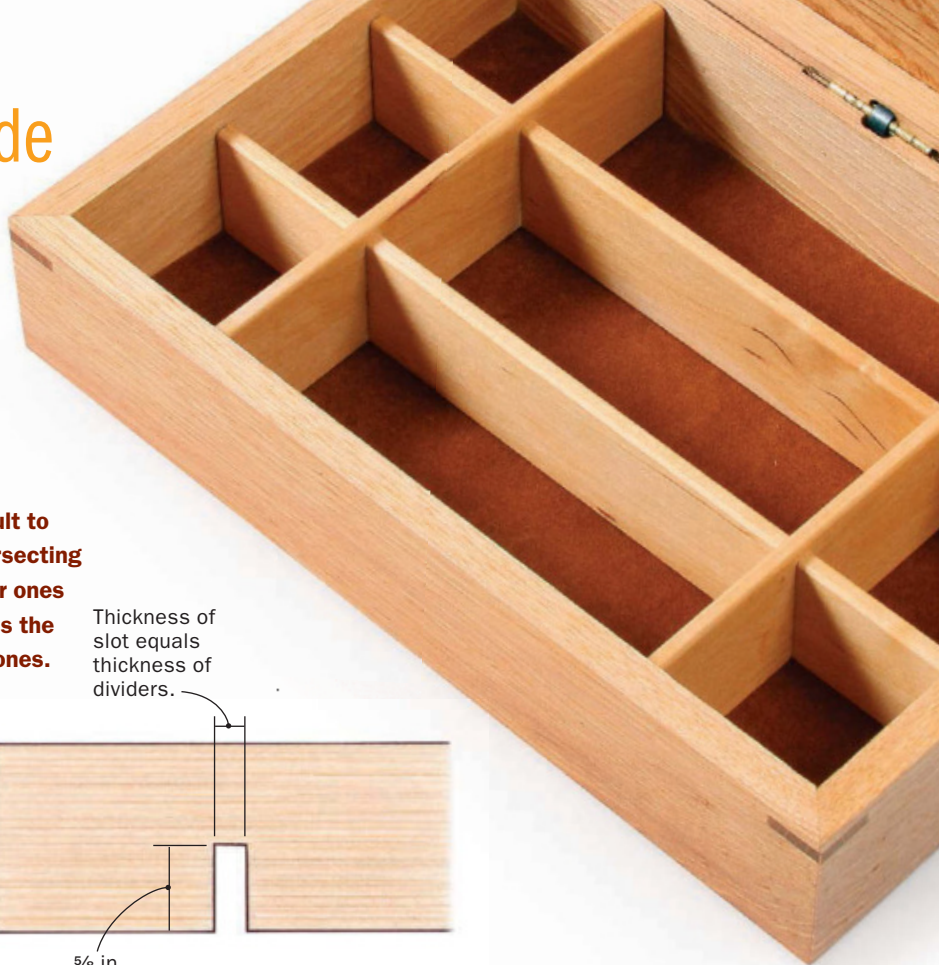
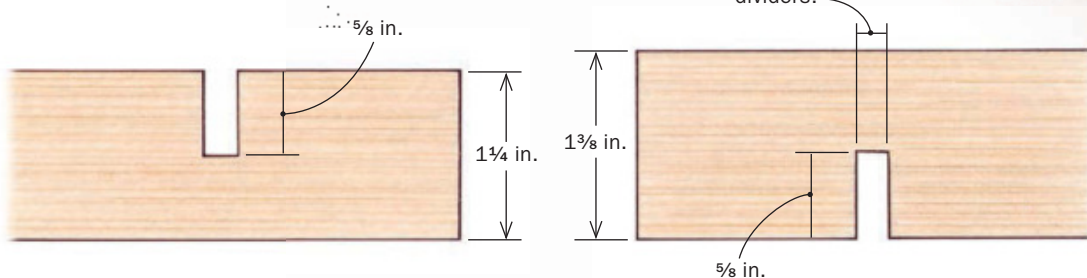
Dividers sort out the inside

Boxes with one large interior space become cluttered quickly. You can improve organization and utility with simple dividers, sized for the objects they'll hold, whether that is jewelry, minerals, tea, or keepsakes.

OFFSET DIVIDERS HIDE THEIR JOINTS

The bridle joint holding these dividers together isn't difficult to make, but it would be more visible from the top if the intersecting parts were the same height. That's why I make the shorter ones slightly taller than the long ones. The added height creates the illusion that the long dividers are mortised into the short ones.

Thickness of slot equals thickness of dividers.



Two stop blocks control slot width. Stowe makes the first cut with the divider pushed against the stop on the left. He makes the second cut with it pushed against the right-hand stop. Make test cuts to get the fit right.



Don't hold the divider with your hands. Use a clamp instead, so that your fingers are well away from the blade.



Hide the joint. The short dividers are taller than the long ones. That extra bit of material hides the slots.

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