

# Handsome Tool Chest with a Heavy-Duty Base

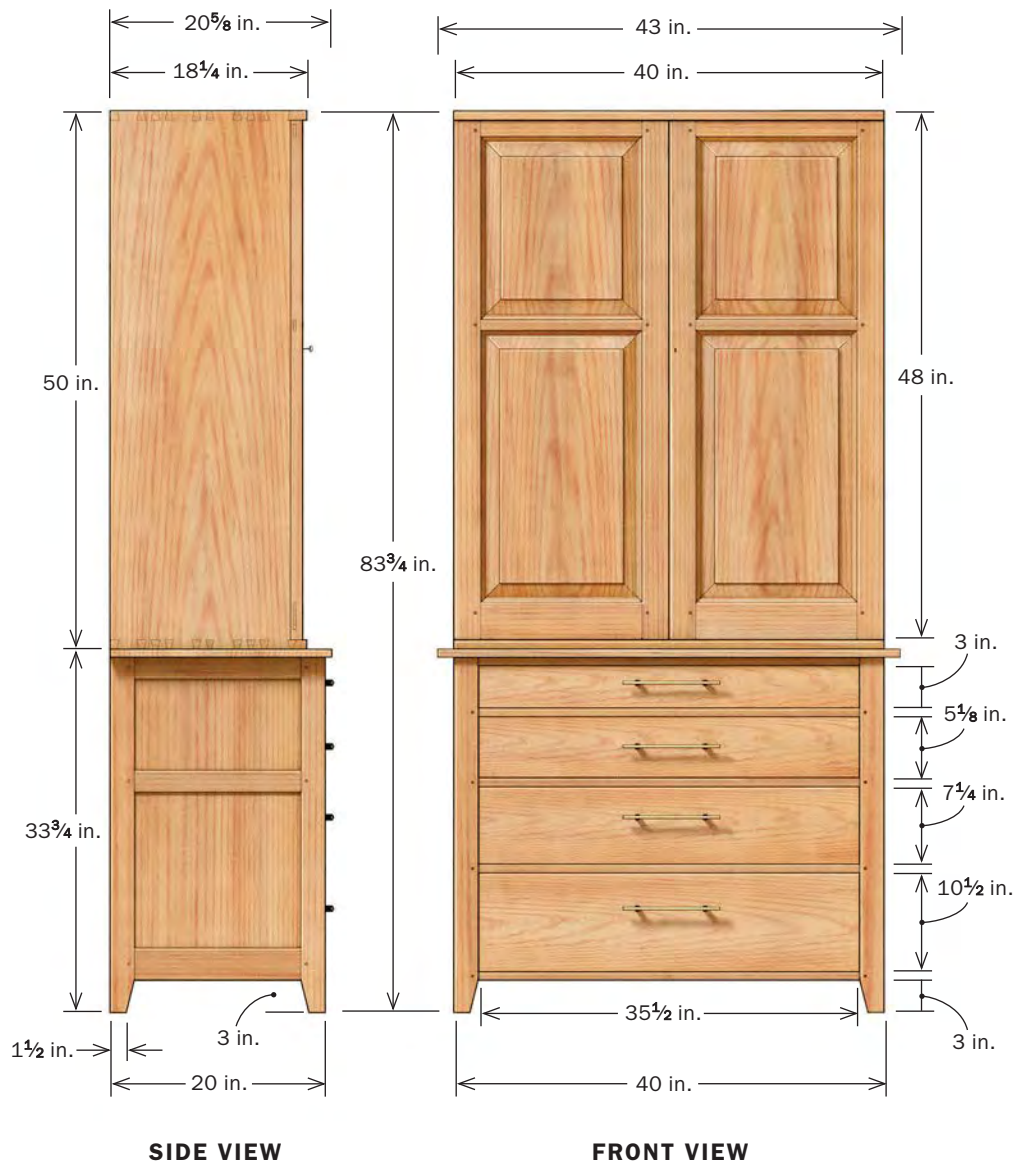
Traditional skin conceals a modern skeleton

BY NATHANIEL BRAWLEY HILL

When it came time to build a permanent cabinet for my hand tools, I wanted something that reflected my love of traditional joinery and of Shaker and American period furniture. A chest-on-chest design fit the bill nicely. For the upper cabinet, I designed a through-dovetailed, solid-plank carcass with fielded frame-and-panel doors—very traditional in appearance and construction. But for the lower cabinet, which would contain large drawers with heavy loads while also supporting an upper cabinet full of tools, I chose a hybrid structure, one that combines a solid-wood frame-and-panel outer carcass with a biscuited Baltic-birch plywood interior case. The plywood inner case adds significant rigidity to the structure and provides flat surfaces that are ideal for the installation of heavy-duty mechanical drawer slides. The result is a cabinet traditional on the outside, modern on the inside, and extremely sturdy. This article includes full drawings for the whole chest-on-chest, but the text and photos focus on building the hybrid bottom cabinet.

## Beginning the bottom

I began the bottom case by milling all the solid parts to size—but leaving plenty of extra length. My mantra is: Cut to length last!



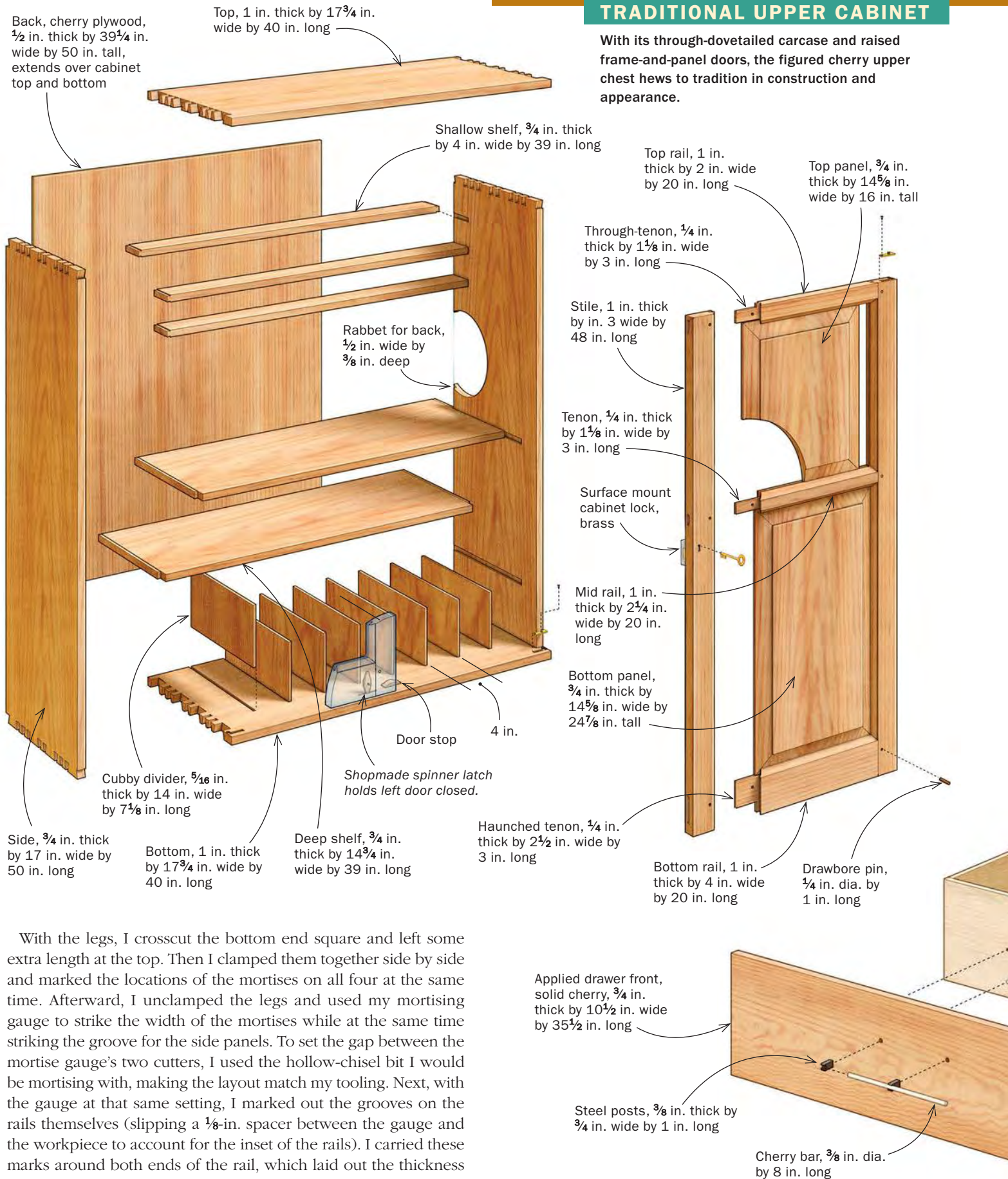
This affords flexibility when matching grain and dealing with snipe, gives me some insurance in case I drop a workpiece, and provides an easy way to knock joinery apart during test fitting.

Once all my stock was milled, I began to lay out the joinery. Although the majority of my joinery is cut with power tools, I still do the layout with the aid of marking knives and a Japanese-style mortise gauge. Scored lines not only help ensure accurate layout, but the knife lines help prevent tearout when you cut to the lines by machine.



## TRADITIONAL UPPER CABINET

With its through-dovetailed carcass and raised frame-and-panel doors, the figured cherry upper chest hews to tradition in construction and appearance.



With the legs, I crosscut the bottom end square and left some extra length at the top. Then I clamped them together side by side and marked the locations of the mortises on all four at the same time. Afterward, I unclamped the legs and used my mortising gauge to strike the width of the mortises while at the same time striking the groove for the side panels. To set the gap between the mortise gauge's two cutters, I used the hollow-chisel bit I would be mortising with, making the layout match my tooling. Next, with the gauge at that same setting, I marked out the grooves on the rails themselves (slipping a  $\frac{1}{8}$ -in. spacer between the gauge and the workpiece to account for the inset of the rails). I carried these marks around both ends of the rail, which laid out the thickness of the tenons so they precisely matched the mortise layout.

# HYBRID STRUCTURE LOWER CABINET

The exterior retains a traditional appearance, but the plywood inner case increases the cabinet's rigidity and load-bearing capability while providing excellent mounting surfaces for mechanical drawer slides.

## SOURCES OF SUPPLY

### DRAWER SLIDES

Knape and Vogt, KV86500FM heavy duty soft close  
knapeandvogt.com

### CABINET LOCK

Surface mount cabinet lock, Whitechapel, 172L21  
whitechapel-ltd.com

### DRAWER PULL STEEL POSTS

Whitechapel, 58CABLOCK1  
whitechapel-ltd.com



## THE SIDES ARE A SANDWICH



**All the mortises.** At his hollow-chisel mortiser, Hill chops mortises in the leg for the drawer dividers and then for the rails.



**A groove connects the mortises.** With a slotting cutter at the router table, Hill cuts a stopped groove in the leg for the solid-wood panels. The groove is aligned exactly with the rail mortises, it's just not as deep.



**Rail tenons quickly cut.** After establishing the tenon shoulders with a crosscut blade, Hill uses a dado blade and a miter gauge to cut the cheeks. He first cuts one cheek of each tenon, making several passes and using the rip fence as a stop. When one cheek is cut on all the rails, he flips them, adjusts the blade height, and cuts the second cheeks.



**Panels get tongues.** A rabbet cut around the perimeter of the side panels produces a tongue sized to fit the grooves in the legs and rails.



**Dry-fitting the side unit.** With the legs, rails, and panels fitted, Hill dry-assembles the solid-wood parts of the side unit.



**Marking for pins and biscuits.** With holes for drawbore pins already drilled in the leg, a tap of the brad-point bit (above left) produces a center mark. After disassembly, Hill will offset the centerpoint mark toward the shoulder slightly so driving the pin will draw the joint tight. To mark for biscuits (above right), Hill clamps the side of the plywood inner case between the legs.



**Cutting the slots.** After disassembling the side unit, Hill cuts biscuit slots in the plywood panel and the legs. He adds a layer or two of tape to the plywood so that after glue-up the legs will be just slightly proud of the plywood.

## Leg and rail joinery

With layout complete, I dove into the joinery. On a hollow-chisel mortiser, I cut mortises in the legs for the rails and the drawer dividers. Then I moved to the router table to cut the panel grooves in the legs and rails using a slot-cutting bit. These are stopped grooves, so I marked the beginning and end of the bit's cutting radius on the router table and the fence. After cutting the grooves in the legs, I readjusted the height of the cutter to groove the rails.

I cut the rail tenons at the table saw. First I cut the shoulders with a crosscut blade, and then I cut the cheeks using a dado blade. With the workpiece held flat, I made several passes to cut one cheek, doing this on all the rails (and on a test piece). I then repeated the process for the opposite cheek of the tenons, starting out by using my test piece to adjust the blade height. I cut the tenons just a hair oversize, then skimmed the cheeks with a shoulder plane to get the fit that I like. Next, using



**Trim at the top.** Once the full side unit is dry-assembled, it gets trimmed across the top so the top rail, plywood panel, and legs are all flush.

## GLUE UP THE HYBRID SIDES



**Tenons and biscuits.** After pre-finishing the parts, Hill assembles the whole side sandwich in a single glue-up. He starts by inserting the rail tenons into one leg, then fits the plywood side panel onto its biscuits.



**Finish the sandwich.** The floating panels are slid into their grooves next, and then the second leg is put in place.

the same process, I cut the tenons on the drawer dividers.

To finish up the rails, I haunched the top rail tenons and cut a bottom shoulder on the bottom rail tenons. I did this quickly at the bench with a handsaw, then dry-fitted the joints, planing tenon cheeks where needed.

### Dry-assembling side frames

Once the rail tenons were dialed in, I dry-assembled the legs and rails and laid out holes for drawboring. I also took measurements for the solid-wood panels and for the plywood side pieces that fit between the legs. Then I tapped everything apart, drilled holes for the drawboring, and cut the solid panels and plywood to dimension. The panels are held in a groove, and at the table saw with a dado blade I ran a rabbet around each panel's perimeter to create a tongue that fits the groove.



**It's a cinch.** Hill applies pressure with bar clamps, and then cinches the rail-to-leg joints by driving the drawbore pins.



**The last link.** In order to transfer the top stretcher's dovetail onto the top of the leg, Hill first dry-fits the drawer dividers and the cabinet's back. After tracing the dovetail, he begins the sockets with a trim router, cutting close to his layout lines, and follows up with chisels.



**Biscuit layout.** The top of the plywood inner case gets biscuited to the plywood case sides and to the top stretcher. It gets blue taped to be sure it doesn't wind up proud of the parts it is joined to.



**Slots in the side.** To cut the biscuit slots in the plywood side panel, Hill clamped it with "bench puppies" like those described in "These Puppies Have Bite," FWW #253.

## The biscuiting begins

At this point I reassembled the frame-and-panel cabinet sides, pressed the side pieces of plywood into place, and marked for biscuits. I applied a strip or two of blue tape along each side of the inside face of the plywood before marking and cutting the slots. The tape offsets the slots by  $\frac{1}{32}$  in. or so, ensuring that the legs will be just slightly proud of the plywood when they are glued up.

After marking the biscuit locations, I removed the plywood to cut the biscuit slots in it; biscuit slots in the legs can be cut while the sides are still partially assembled. I then fully dry-assembled the sides and, using a crosscut sled on the tablesaw, trimmed the top of the legs and the plywood flush with the top rail.

Next I fully disassembled the side units, tapered the bottom section of the legs, and prepared for glue-up by finish sanding and pre-finishing. Then I glued up the two side assemblies—the legs, rails and panels, and the plywood side panel.



**In the pocket.** For the top plywood panel, as well as the bottom one, Hill drilled for pocket screws, which reinforce the biscuit joints and function like clamps at glue-up to pull the joints closed.





**Starting upright.** Final glue-up begins with the side unit flat on the bench. Drawer dividers are inserted vertically, including the bottom one, which is already glued to the bottom plywood panel.



**Tip the case and fit the tenons.** The second side unit goes on with the case on its back, making it easier to align the biscuit joint and then insert the divider tenons little by little.



**Adjustable biscuits.** After the top plywood panel is in place, Hill slides it back enough so the biscuits across its front edge won't interfere with installing the top stretcher. Then he knocks the stretcher dovetails home.



**Pulling the top tight.** Next, Hill uses a bar clamp to pull the top plywood panel forward, closing the biscuit joint with the top stretcher. Then he drives the pocket screws, pulling the top panel tight to the side plywood panel.



**Pretty pins.** Drawbore pins bring the drawer dividers tight to the leg and add traditional punctuation to the joint.

## Putting it all together

When the glue cured, it was time to connect the two side assemblies. I dry-fitted the drawer divider tenons, then slid the back into its groove and clamped the whole thing tight. Now, with the cabinet's exact width determined, I could lay out and cut the dovetails connecting the top stretcher to the top of the legs.

Once the top stretcher was pressed into its dovetail sockets, I measured for the top and bottom pieces of the plywood inner box. I found it helpful to measure for these one at a time; I measured for the top piece with the cabinet upright and measured for the bottom piece with the cabinet upside down. After cutting those pieces to size, I set them in place, flush with the plywood side pieces, and marked for biscuits. I also marked for biscuits on the top stretcher and bottom drawer divider. Then I disassembled

everything and cut the biscuit slots for the top and bottom of the plywood inner box. When cutting the slots into the faces of the plywood sides I used bench clamps that I made after reading Timothy Coleman's article in *FWW* #253 ("These Puppies Have Bite"). They do a great job of securely holding large panels flat against the front of the bench. When I had the biscuits all cut, I glued the bottom drawer divider to the front edge of the bottom piece of plywood and set it aside to cure.

The next step was to glue the drawer dividers, the top stretcher, and the top and bottom of the inner case between the two side assemblies. I applied glue to all the tenons, mortises, and biscuit slots and put all the parts except the top stretcher in place, pulling the joints together with bar clamps. Before installing the top stretcher, I pushed the top plywood panel back about ½ in., taking

advantage of the lateral play of the biscuit joints. This provided enough clearance that I could install the top stretcher despite its having a row of biscuits already inserted along its back edge. Then I pulled the top plywood panel forward, closing its biscuit joints with the top stretcher.

I then drove the pocket screws to clamp the inner case joints, knocked in my drawbore pins, and dropped the back in place dry to square up the assembly. (Since it's much easier to install drawer slides with the back removed, I waited until later to glue it in.) After applying the final coats of finish, installing the drawers, and affixing the top, I began putting my tool cabinet to use. □

*Nathaniel Brawley Hill makes furniture and teaches woodworking in Los Angeles. See more of his work at [Brawleymade.com](http://Brawleymade.com).*



**Can't rack with the back.** Before the glue sets, Hill slides the back in place dry to help ensure the case is square.



**Hanging drawers.** The plywood inner case presents a perfect surface for hanging mechanical drawer slides. To simplify hanging them, Hill rests the slide on a spacer clamped to the case side as he drives the screws. He'll use the same spacer to hang the mating slide on the opposite side, and then he'll cut the spacer down to the appropriate height for the next slides.



**Heavy drawer opens with a soft touch.** Hung on heavy-duty, full-extension slides, the drawers glide like a dream even when loaded with heavy tools.