Quick, Sturdy Bookcase

Learn to taper sliding dovetails for easier assembly

BY MARTIN MILKOVITS

In my home, bookcases show up in every room, serving not only as places to store our growing collection of books, but also as places to display art and other items of interest. This butternut-and-maple bookcase is a versatile piece, big enough to hold a good number of books and/or collectibles while small enough to fit in almost any room.

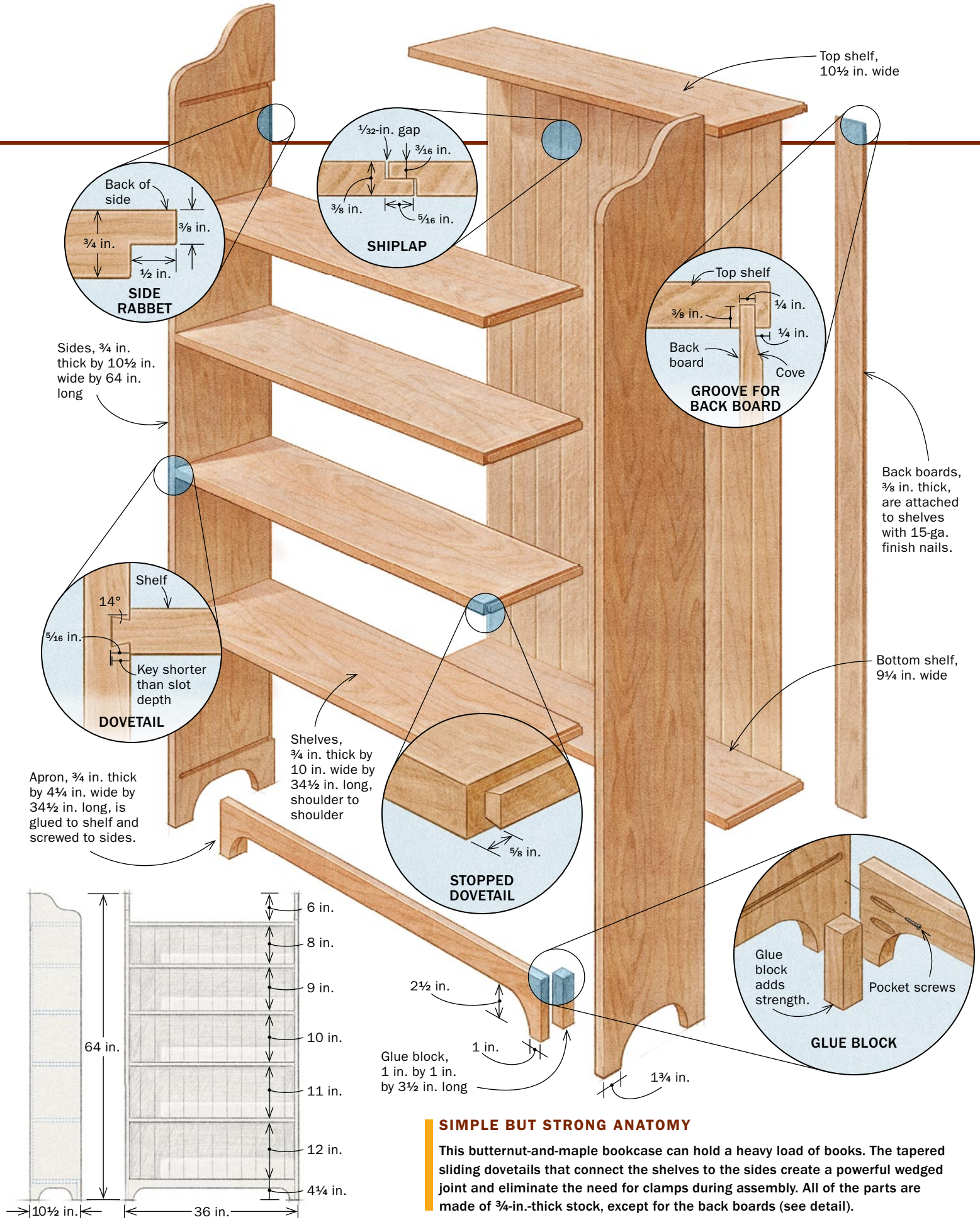
The design is understated, with bracket feet and gentle curves along the tops of the sides, and maple back boards contrasting softly with butternut sides and shelves.

But you can use this construction method to build a bookcase in any style. The shelves are attached to the sides with sliding dovetails, which provide a mechanical connection that will never pull apart. Sliding dovetails also are used to connect cabinet tops to bottoms, to join vertical partitions to shelves, to attach molding to case sides, to connect breadboard ends to tabletops, and to attach drawer fronts to sides. In this case, I stopped the dovetails for a clean look on the front of the piece. The back boards are shiplapped to allow for wood movement.

Why taper the dovetail?

A sliding dovetail has two parts: the slot and the dovetail key. Here the slots are routed into the case sides, and the keys are cut on the ends of the shelf. When you use this joint in wide stock, binding is a common headache during glue-up. The joint goes halfway home, then the glue makes

Photos: Thomas McKenna; drawings: John Hartman



SIMPLE BUT STRONG ANATOMY

This butternut-and-maple bookcase can hold a heavy load of books. The tapered sliding dovetails that connect the shelves to the sides create a powerful wedged joint and eliminate the need for clamps during assembly. All of the parts are made of ¾-in.-thick stock, except for the back boards (see detail).

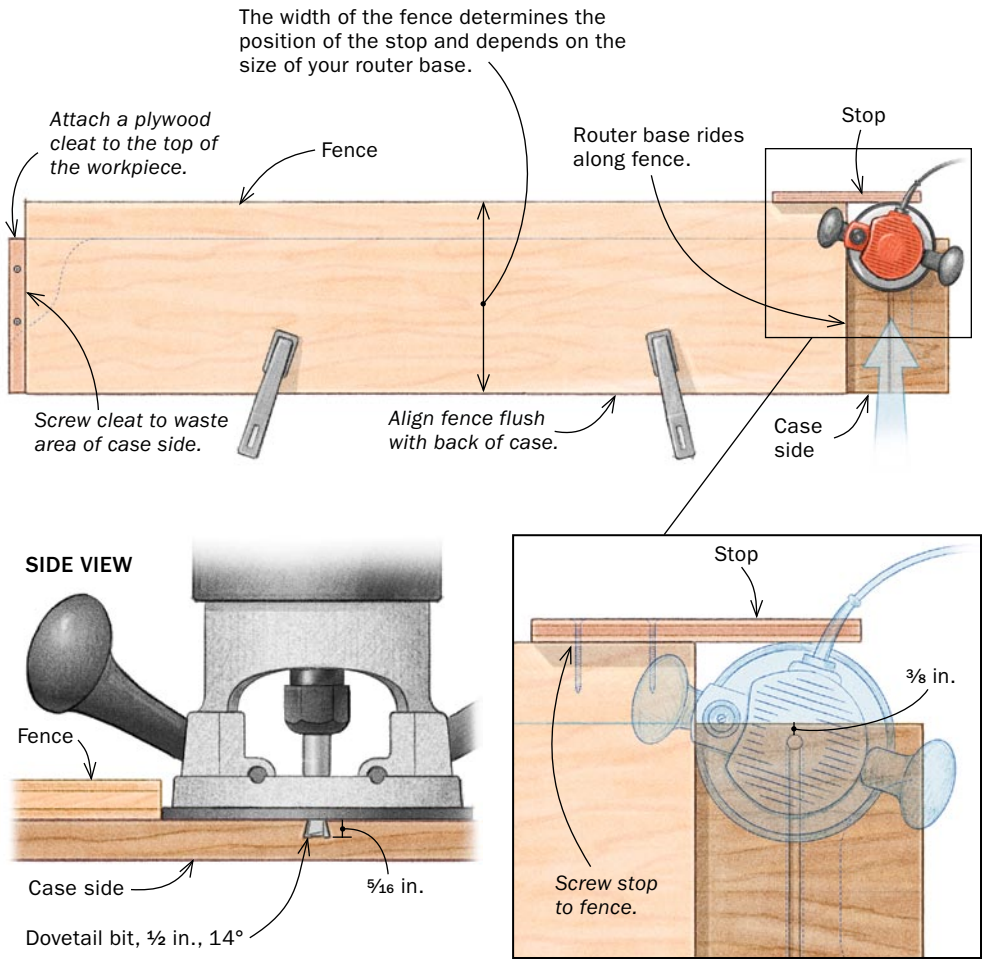
Tapered slots in two steps

To ensure consistent results, the slots for each shelf are routed using a long fence and a plywood cleat. After the first pass, add a shim between the fence and cleat, then use the same router setup to taper the slot.

FIRST PASS

Attach a cleat to each case side. *Screw the plywood cleat to the top of the inside case sides and perfectly square to the edges. Place screws in areas that will be wasted away when you profile the ends.*

Clamp the fence to the workpiece. *Align the front edge of the fence flush with the back of the case side and tight against the cleat at the top.*



the wood swell and the joint seizes. That's why I taper the joint slightly toward the front of the case. The taper—cut on one side of the slot and on the corresponding face of the key—makes it easy to slide the shelf in from the back without binding, and creates a wedging action in front as the shelf is tapped home.

The amount of taper is not that critical as long as it is consistent. I keep it to about 1⁄32 in. (about as thick as three business cards) per 10 in. of board width. With a taper like this, the joint can be almost completely assembled for trial fitting, and can be driven home with a few mallet blows.

Router method simplifies complex joint

Tapered sliding dovetails can be cut by hand, using saws and chisels, but this method can be imprecise and time-consuming. I prefer to use a router and a few simple jigs to do the job. The method is clean and allows you to dial in the fit of each joint. To avoid confusion, be sure to label mating parts as you work.

Cut slots with a handheld router—For strength, the slot should be no deeper than half the thickness of the side. Likewise, the thin part of the key should be at least half

Rout the slot. *Holding the router tight against the fence for control, cut until you reach the stop. Let the bit stop spinning before backing it out of the slot, or you could ruin the cut.*

the thickness of the shelf, and the length at least one-third the thickness of the shelf.

First, screw a ¾-in.-thick plywood cleat to the top of the case sides. Mark the shelf locations on each side, then make a ¾-in.-thick plywood fence to locate the slots in both sides. Cut the fence to a length that aligns the router bit with the lower shelf location, and rip it to a width that will place the router bit ⅜ in. from the front of the side. Screw a stop to the business end of the fence, and clamp the assembly in place (see drawing, facing page).

Set the router to make a 5⁄16-in.-deep cut and rout the slot across the side until you reach the stop. Next, remove the fence and place a shim between the rear edge of the cleat and the rear edge of the fence. Reclamp the fence in place, then pass the router through the slot to create the taper along the bottom edge. Repeat this operation in the opposite side of the case. Once you have both slots for the bottom shelf routed and tapered, trim the fence to cut slots for the next higher shelf and repeat all of the previous steps.

Now is a good time to cut the bracket feet on the bottom of the sides, as well as the profile on top. Clean up those edges before proceeding.

Cut keys on the router table—Place the same bit you used to cut the slots into the router table, and set the depth so that it's a hair less (0.005 in. or so) than the depth of the slots. This will create a tiny gap to make the sliding action easier. Using a test piece the same thickness as the shelves, adjust the fence and take light cuts on both sides until the test piece fits about halfway or more into a slot with hand pressure. Once you've reached that point, you are ready to rout the actual shelves.

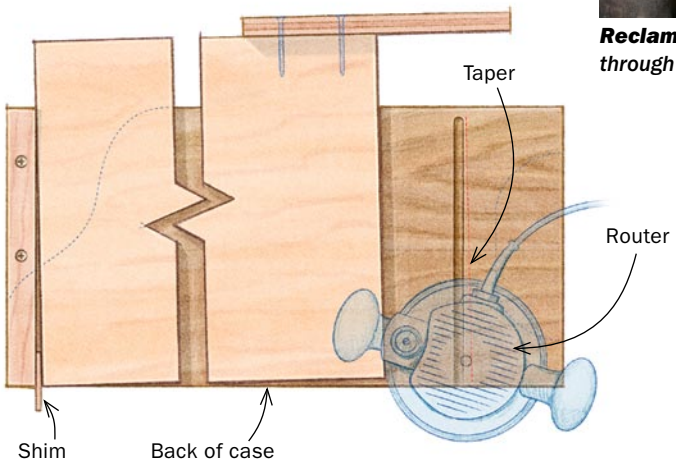
First, add a shim to the bottom rear of each shelf. The shim should be the same thickness as the shim used to taper the slots. Rout the top side of the key on each end of each shelf. Then flip each shelf to cut the bottom of the keys. At this point, each shelf should slide freely about halfway home but tight after that. To fit the shelves individually, make hairline passes

SECOND PASS

Shim out the back side. *Place the shim between the fence and the cleat. Veneer tape is the perfect thickness (1⁄32 in.) to create the desired taper.*

Reclamp and rerout. *With the shim in place and the fence reclamped, run the router through the slot to add the taper.*

ADD A SHIM TO TAPER THE SLOTS



Trim the fence. *After routing both slots for the bottom shelf, cut the fence down to repeat the process on the next set of slots.*

Taper the keys

The keys are cut and tapered at the router table using the same bit that cut the slots, adjusted so that its height is a hair under the slot depth. Use a tall auxiliary fence to keep the long workpieces stable.

Test piece gets you started. *Take light passes along both edges of a test piece, made from a shelf offcut, until it slides halfway or more into a slot with hand pressure.*

Shim out the bottom rear of the shelves. *Use a shim of the same thickness used to taper the slots. Veneer tape is great because you can iron it on and take it off easily.*

TAPER THE DOVETAIL KEYS

Shim the rear edge of the shelf bottom and rout both sides of the shelf end.

across the top, straight side of each key until the shelf slides to within 1½ in. of being fully home with only hand pressure (see photo, bottom right). Use a small, angled sanding block to dial in the fit.

Next, use a handsaw and a chisel to trim ⅝ in. from the front of the keys. Refine the fit with the sanding block if needed. Now rout a groove under the top shelf, ¼ in. from the back edge, for the back boards. Next, rip the lower shelves to size along their back edges, and trim an additional ¾ in. off the front of the bottom shelf to accommodate the apron. Finally, cut the rabbets that hold the back boards.

Glue in shelves, then add back boards

Once you have all the shelves fitted to the sides, the hardest work is done. Now's the

Fine-tune the fit. *Keep making hairline passes on the router table to get the key to slide closer to home. To micro-adjust the fit, use a sanding block cut to the same angle as the dovetail bit and attach adhesive-backed P120-grit sandpaper to it (top). The goal is to get the shelf to slide with just hand pressure until it is about 1½ in. from being fully home (bottom).*

Assembly: no clamps required

Once the shelves are fitted, mill up the back boards and the apron. Cut the shelves at the back to their final widths, then cut the groove under the top shelf for the back boards. Finally, after you've rabbeted the sides for the back boards, you can break out the glue.

Trim 5/8 in. from the front of the key. *Use a handsaw to remove most of the waste, and clean up the cut with a sharp chisel.*

Push and pound. *Stand the sides rear-edge up on an assembly bench. To install each shelf, place a spot of glue inside the corresponding slots near the front edge. Push in the shelf as far as you can by hand and fist, then rap the shelf home with a mallet. When installing the bottom shelf, put the apron in place to serve as a stop. Later you can screw the apron into place.*

Online Extra

For a full finishing recipe for this project, go to **FineWoodworking.com/extras**.

time to glue up the case and cut and fit the back boards and apron.

The maple back boards are ripped to random widths no wider than 3½ in. Once the boards are cut to final size, use a raised-panel cove cutter to rout a ¼-in. tongue along their tops. Then rout the rabbets along their sides to create the shiplap.

To glue in the shelves, stand the sides rear-edge up on an assembly bench. Place a spot of glue inside the corresponding slots near the front edge, slide in the shelf as far as you can with hand pressure, then tap the shelf home with a mallet.

After installing the apron and glue blocks, the piece is ready for finishing (the back boards are finished before final installation). For this bookcase, I sprayed on Deft clear lacquer.

After you have the back boards in place, the bookcase is ready for your collection of Russian nesting dolls. □

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Nail in the back boards in order. *Slide the top edges of the boards into the groove under the top shelf. To avoid misses, mark the shelf locations across the back, then nail each board to each shelf with 15-ga. finish nails.*