

# Beefy Shopmade Tenoning Jig

Adaptable jig handles narrow, wide, and angled tenons

BY BOB VAN DYKE



I can think of at least half a dozen different ways to make a tenon, and I use them all. Often the best way to cut tenons is at the tablesaw, holding the workpiece vertically in a jig. But I find commercial tenoning jigs, even the old cast-iron monsters, extremely limiting and usually less than accurate.

I prefer this shopmade jig. It is a smaller version of the massive one I learned from my friend Will Neptune. It cuts all types of tenons equally well, from narrow ones for table aprons to wide ones for breadboard ends and angled ones for chairs. The jig's heart is its bridge, a thick lamination of plywood that straddles the

saw's rip fence. The bridge's mass helps to dampen any vibration that could lead to inaccurate tenons. Because it straddles the rip fence, the jig is infinitely adjustable, unlike versions that slide in the miter gauge, and its ability to work with the fence on either side of the blade means that the direction your saw's blade tilts is not an issue.

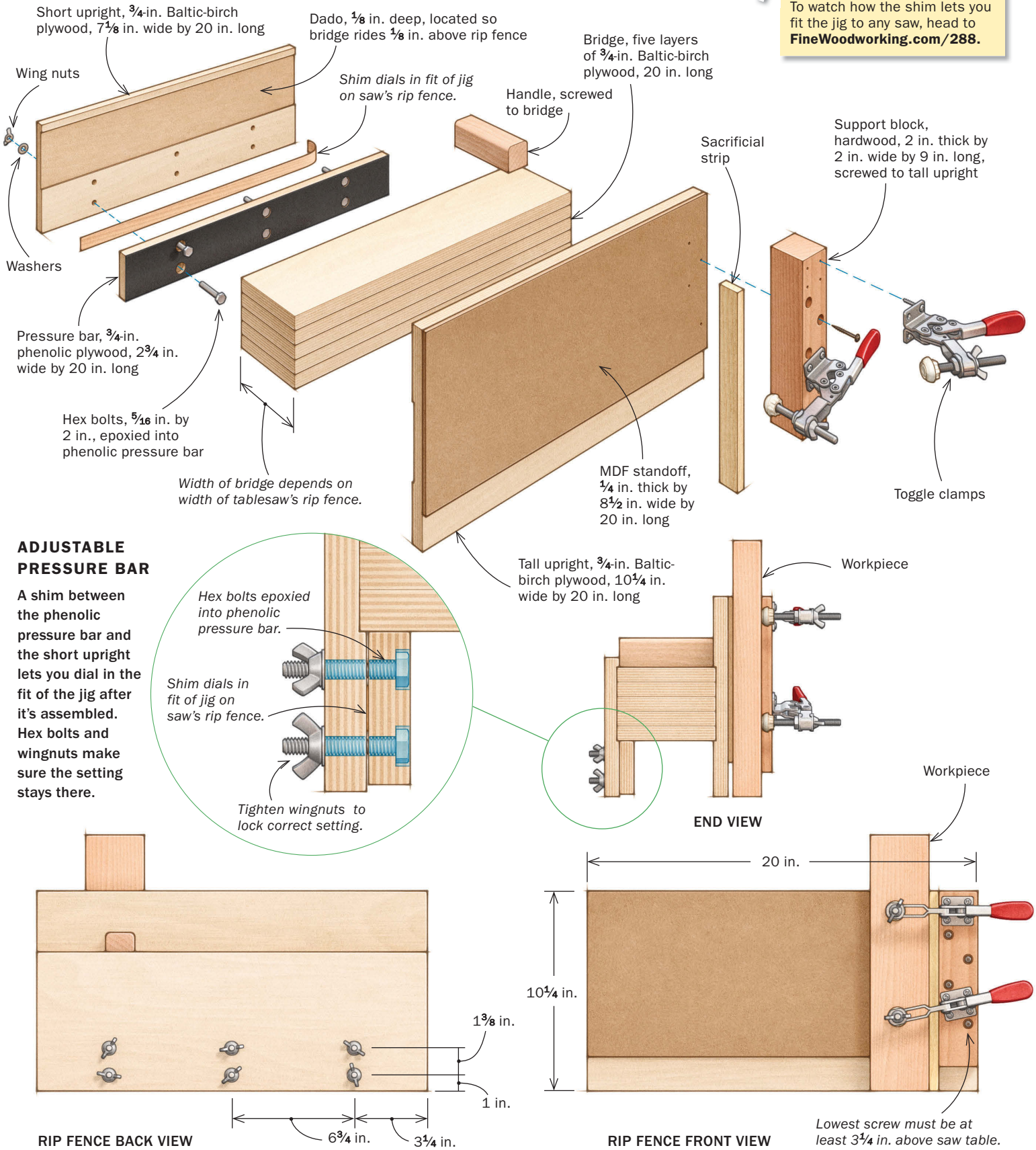
The bridge is housed between two uprights. The tall one sits perfectly square to the saw table and hugs the rip fence. The short upright helps trap the jig on the fence so it travels with zero side-to-side play, a crucial fit. I have a clever way to sneak up on

# BUILT HEAVY FOR SMOOTH RESULTS

Only a few of the jig's dimensions are critical. Build it to your tablesaw and your work—and don't skimp on the mass, which dampens vibration for better cuts.

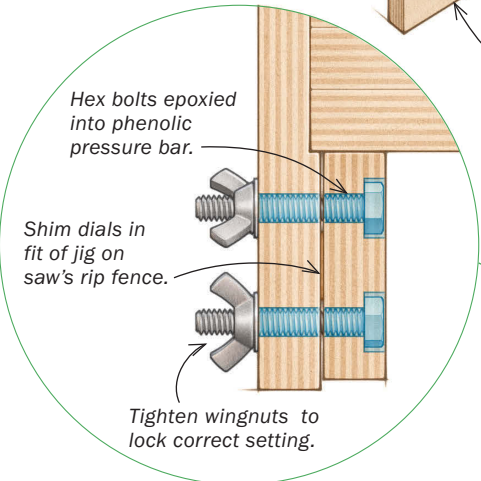
## Online Extra

To watch how the shim lets you fit the jig to any saw, head to [FineWoodworking.com/288](http://FineWoodworking.com/288).



### ADJUSTABLE PRESSURE BAR

A shim between the phenolic pressure bar and the short upright lets you dial in the fit of the jig after it's assembled. Hex bolts and wingnuts make sure the setting stays there.



# Make the body



**Glue up the bridge.** This central piece is five layers of plywood, giving the jig much of its necessary weight. Use thick cauls and plenty of clamps to guarantee even clamping pressure across this critical element.

the fit with an adjustable pressure bar after the jig is assembled, letting you easily fit the jig to your particular saw.

## A carefully built jig makes for accurate tenons

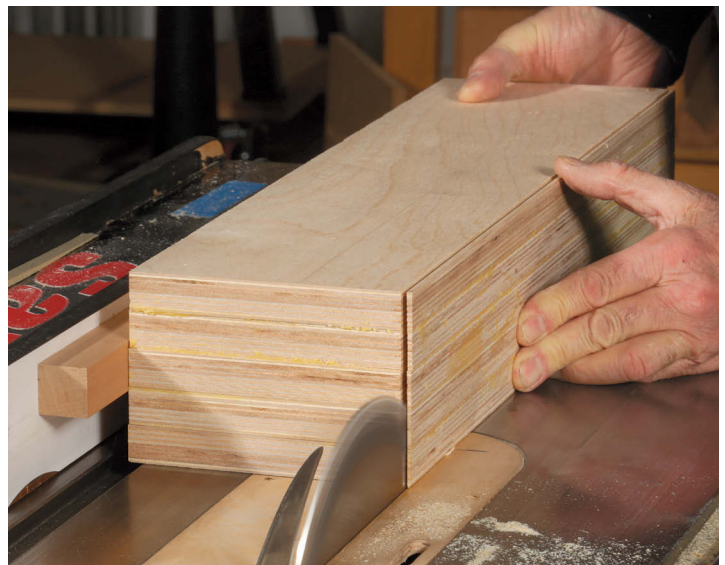
Precision is critical to this build; any inaccuracy in the jig will affect the accuracy of your tenons. So while the jig may look simple, you shouldn't underestimate the importance of building it well.

The first step is to glue up the five layers of plywood for the horizontal bridge. I used  $\frac{3}{4}$ -in. Baltic-birch plywood here, but I've used MDF to make this jig before. Both work well. MDF is heavier, but plywood holds screws better, so it's your call. The finished width of the bridge is the width of your rip fence plus  $\frac{3}{4}$  in. for the phenolic bar,  $\frac{1}{4}$  in. to accommodate the two  $\frac{1}{8}$ -in.-deep dadoes in the uprights, and  $\frac{1}{16}$  in. extra for fitting the jig to your saw later.

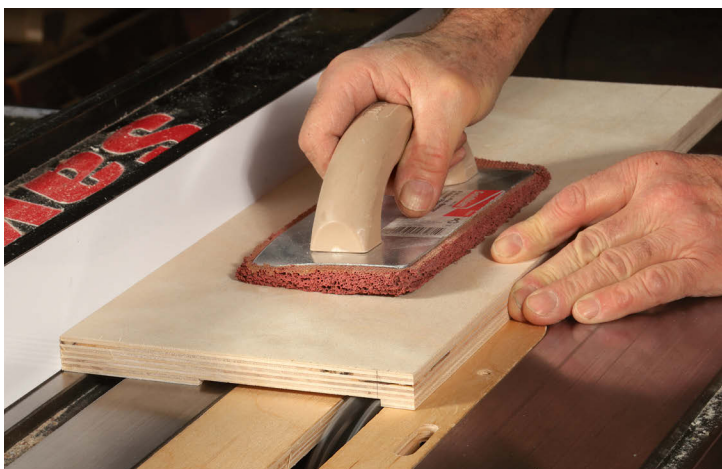
Make the layers about  $\frac{3}{8}$  in. wider than the finished bridge so there will be plenty of extra width to trim after the glue-up. To bring the glued-up stack to final size, begin by truing one edge of the bridge at the tablesaw. Tack a straight stick to the middle of the stack on one side and reference that against the rip fence. Then reference the cleaned-up edge off the fence to rip the blank



**Tack on a temporary straightedge to true the first edge at the tablesaw.** After scraping off the glue, nail a straight stick to the middle of an edge of the bridge (top). This stick is the reference surface for the rip fence (above), letting you square and straighten the first edge.



**Flip the workpiece to finish the cut.** The workpiece is too thick to rip in one pass, so you'll need to flip it face for face before the second cut. Finish by using the newly sawn edge to rip the bridge to width.



**Dado the uprights to locate the bridge.** The bridge should fit snugly. Position the dado so the bridge rides above the rip fence. You want the jig to ride on the saw table, not the fence. After this, drill the holes for hex bolts.



**Dry-fit the jig to see if the tall upright needs shimming.** It is critical that the tall upright is perfectly square to the table, since any inaccuracy here will impact your tenons. Shim if necessary (right). The short upright just gets screwed in place after getting predrilled for the pressure bar's hex bolts.

to width. If you have a jointer and planer with carbide knives, you can use those too. The plywood will ruin straight knives, though.

Now for the dados in the uprights. Referencing off their bottom edges, cut a  $\frac{1}{8}$ -in.-deep dado whose width is the exact thickness of the bridge. Locate the dados so the bridge will ride just above the rip fence without touching it. These dados need to be consistent in depth. If they're not, a light shave with a router plane should help. Later on, you'll through-bolt the short upright to the phenolic pressure bar, which slides against the rip fence. Drill these holes now. To ensure they line up, use double-sided tape to attach the phenolic to the inside face of the upright. It should sit about  $\frac{1}{8}$  in. above the upright's bottom edge.

Assemble the main body. Because it's crucial the tall upright is square to the saw's table, check it during a dry-fit and again during glue-up. Shim it if necessary. I use Old Brown Glue, since it allows extra time to adjust the clamps for a perfectly square assembly. After the glue dries, I screw the shorter upright to the bridge.

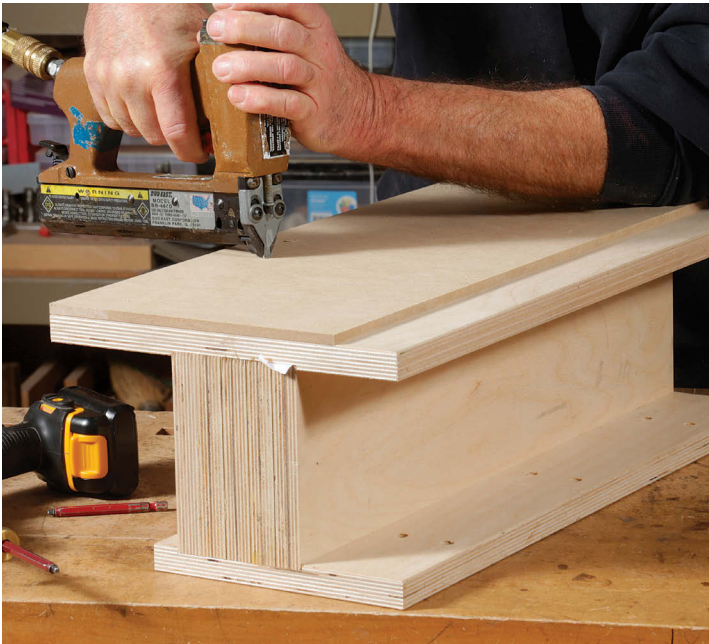
Give the jig a test run to see if you need a shim under either upright to make the tall upright square to the saw table. I usually use tape, although I'll glue on veneer if it's really bad.

### Equip the jig with support blocks and standoff

With the main body of the jig made, it's time to make the support blocks and MDF standoff. Attach a piece of  $\frac{1}{4}$ -in.-thick MDF to the

# Outfitting the jig

## STANDOFF AND HOLD-DOWN CLAMPS



**Sacrificial MDF standoff prevents waste from getting trapped.** The MDF's bottom edge should be  $1\frac{3}{4}$  in. above the bottom edge of the base. This creates a gap that prevents offcuts from getting trapped between the blade and the jig.

face of the tall upright with brads or double-sided tape. It should be flush to the top edge and have a  $1\frac{3}{4}$ -in. gap at the bottom. This gap prevents any scrap from a cheek cut getting trapped between the blade and the jig.

Next, make a support block from 2-in. stock. If you modify your toggle clamps the way I do (see the tip in "Jigs for Routing Perfect Curves," *FWW* #283), you'll be able to clamp all workpieces thinner than the support block. And it's easy to customize the blocks for thicker parts when the need arises. Because the support block also registers the workpiece, install its leading edge square to the saw table. Using double-sided tape, add a thin sacrificial strip between the support block and the workpiece to back up the cut, preventing tearout. You'll need a second block for tenoning wider stock, so make that now too. Finally, add the handle.

### Adjustable pressure bar eliminates side-to-side play

Turn your attention to the phenolic pressure bar and dialing in its fit until the jig slides smoothly along your fence. While I like phenolic here because it slides well, MDF or Baltic-birch plywood also works fine. You'll just need to keep it waxed so it slides better.

Begin by epoxying hex bolts into the phenolic. These will go through the corresponding holes in the short upright and let you lock the bar in place via wingnuts when you shim it to its correct setting.

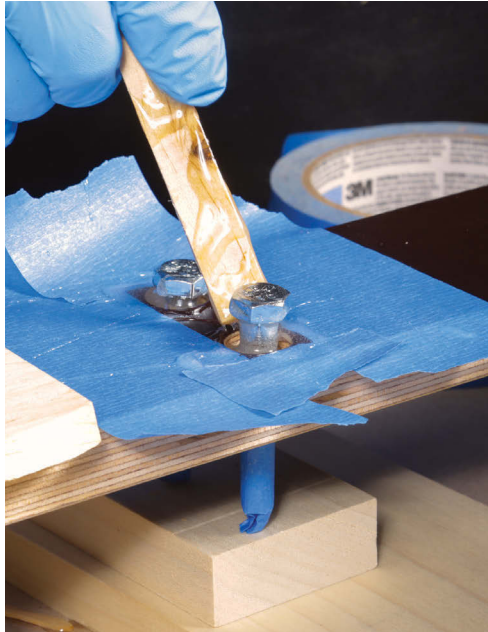


**Install the vertical support and toggle clamps.** This block both supports the workpiece and holds toggle clamps. Install it square, and mount it about 1 in. above the saw table (above). Then double-stick tape the zero-clearance sacrificial strip in place (right). This strip backs up the workpiece, limiting tearout on the back of the cut.



## ADJUSTABLE PRESSURE BAR

**Epoxy hex bolts into the phenolic pressure bar.** The bolts' heads are recessed in counterbored holes filled with epoxy. Van Dyke simplifies the process by using a block to temporarily raise the heads above the holes as he applies the adhesive. He then removes the block so the bolt heads cure within the pool of adhesive. When the epoxy is dry, scrape or sand it flush to the phenolic.



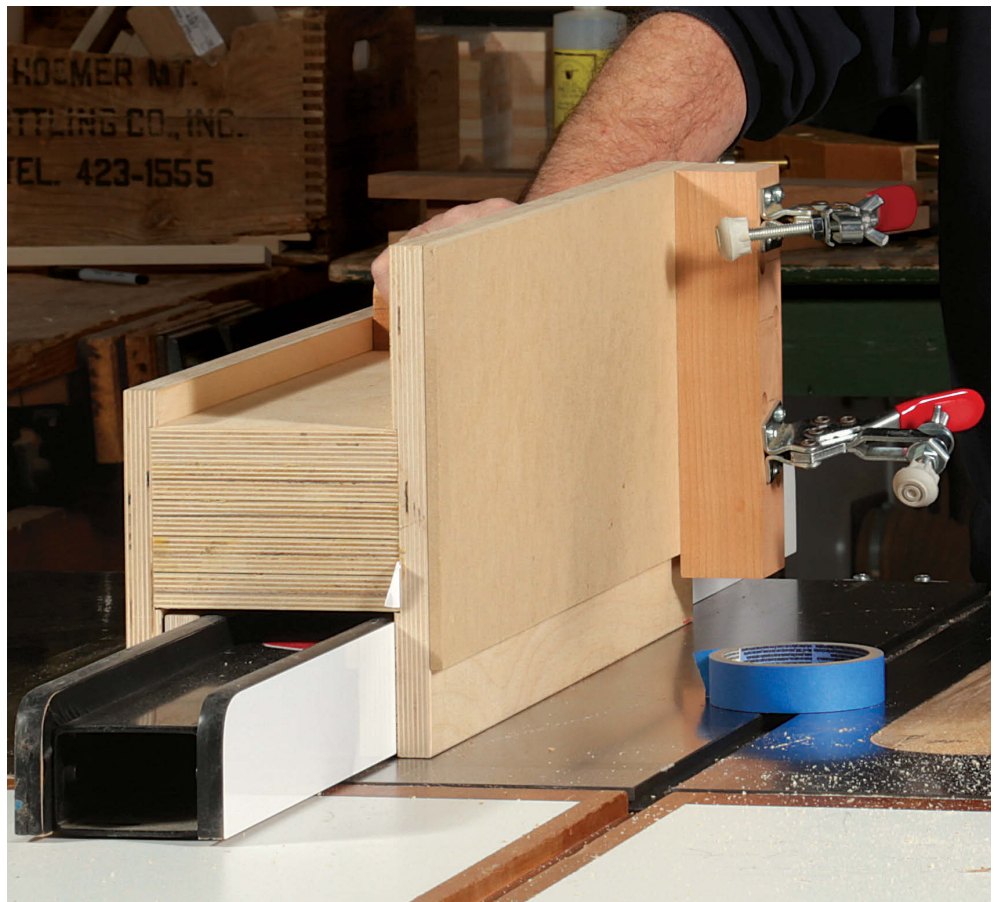
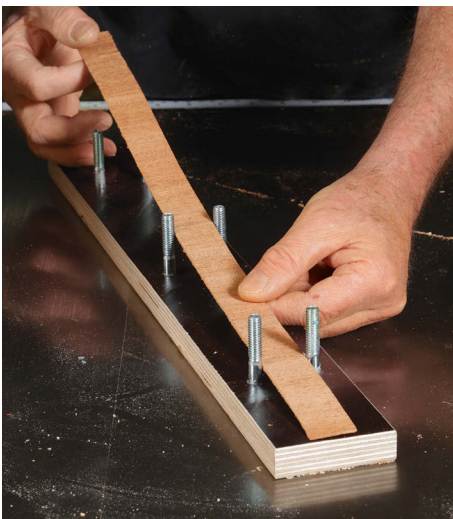
After the epoxy sets, begin fine-tuning the jig's fit by taping a strip of  $\frac{1}{16}$ -in.-thick veneer between the bolts. Test the jig to determine if you need to shim it more or less. Plastic or brass shim stock or a few layers of tape also work great.

### Now cut some tenons

With this jig, you can make tenons easily and, more importantly, accurately. I have found that when I dial in the fit on one tenon, the rest will need little to no adjustment with a shoulder plane.

Cutting tenons with the stock held vertically requires cutting the shoulders and the cheeks separately. The shoulder cut is done with a crosscut sled, a miter gauge, or a pusher block with the end of the stock running against the fence.

As for the cheeks, there are a few different methods for cutting them vertically, and this jig does them all well. One is to cut the first cheek and then flip the board face-for-face to cut the second. This centers the tenon, but any adjustments need to be done very carefully since the flip doubles any errors. Another method, especially useful for offset tenons, is to cut the first cheek on all the workpieces and then adjust the fence to cut the second. A



**Shim to adjust the pressure bar's fit.** The shim should run the length of the bar (top left). Van Dyke starts with  $\frac{1}{16}$ -in. veneer, having built the bridge overwidth by that amount. Then bolt the bar in place and test how the jig travels. Tighten the wingnuts until they're finger-tight (bottom left). Check to see how the jig rides (above). If necessary, use a thinner shim or pad out the existing one with tape.

# Using the jig

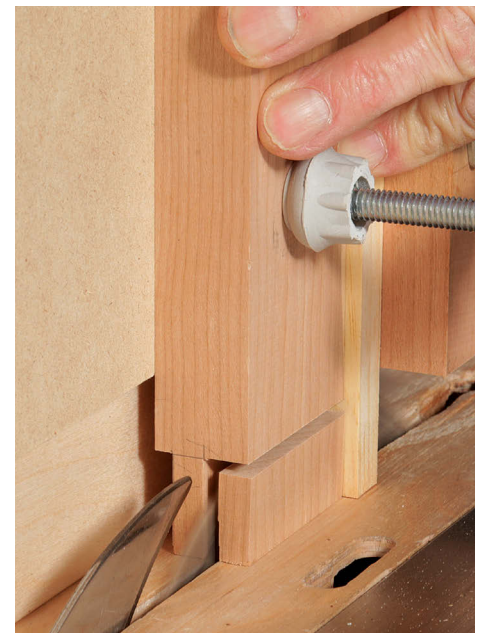
## BASIC TENONS



**Cut the shoulders.** With the end of the stock running against the fence, make a cut with a crosscut sled, miter gauge, or pusher block. Van Dyke usually cuts the shoulders before the cheeks, but he hasn't had a problem cutting them afterward.



**Put the workpiece in place and adjust the toggle clamps.** Keep the end of the stock square and tight to the saw table and the support block. Always support the jig when tightening the toggle clamps. Otherwise, it is possible for the saw's fence setting to slip.



**Vertical cut leaves smooth cheeks.** After dialing in the cut with a setup piece, Van Dyke cuts all the cheeks meant for that setting. The sacrificial strip will be needed as you move the fence for different cuts.

third option, which requires only one fence setting, is to use a spacer after cutting the first cheek. In my own work, I usually use a fourth method: twin blades with a spacer between them to cut both cheeks at the same time.

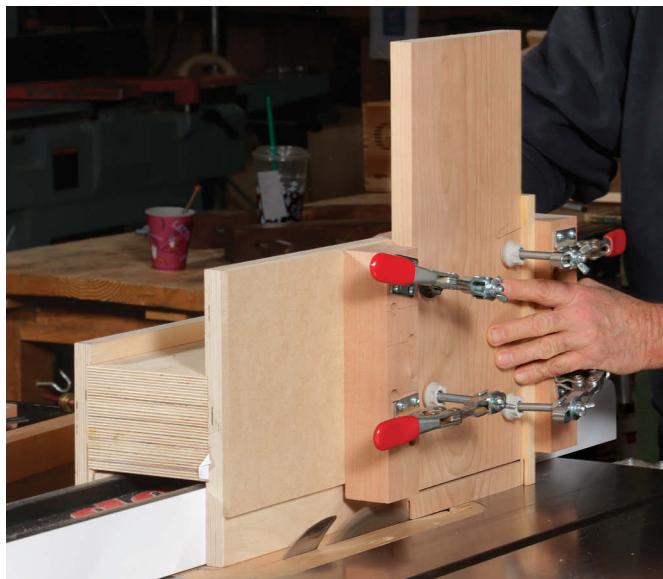
This fixture also excels at cutting wide tenons, like on a table's breadboard end or a lowboy's side panels. This is where a second support block with toggle clamps on the jig's far end comes into play. I use one for any board more than 6 in. wide. If the board is at all cupped, place it with the concave side out. This ensures that the clamps will hold the entire board flat.

With extrawide workpieces that won't permit a second support block, use hand clamps to replace the second set of toggle clamps.

Angled tenons present different challenges, and this jig accommodates them easily. Instead of angling the blade, I instead angle the workpiece with a wedge cut to the correct angle. The wedge goes between the work and the tall upright. □

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## ADD CLAMPS FOR WIDE STOCK



**Screw on a second support block for parts over 6 in. wide.** This extra clamping pressure ensures the whole workpiece stays flat against the upright.



**Replace the block with a clamp for very wide stock.** Depending on the size of your jig, a second block may not fit as your workpieces get wider. A hand clamp works just as well in these situations.



## ADD A WEDGE FOR ANGLED TENONS



**A wedge simplifies angled tenons.** Instead of angling the blade, Van Dyke puts a wedge between the workpiece and the tall upright. After cutting the first cheek, he moves the fence to cut the second. It's important to check with each pass to make sure the end of the stock is tight on the saw table.