

# Strong Tenons in

# Skinny Legs

BY TIM COLEMAN

### Get sturdy joints without

**F**or a table or cabinet-on-stand, my preferred joinery method is the mortise and tenon. The typical arrangement is to have two single tenons of the same thickness entering the leg at the same setback from its face. This simplifies the process for cutting both mortises and tenons because the machine setups are the same

for both sides of the leg and both aprons. But my furniture designs often have slender, curving legs, and I frequently shape the top of the leg as it joins the apron. With these narrow or shaped legs, the room for adequate joinery quickly shrinks, and a one-size-fits-all approach doesn't work.

In these situations I need to be creative in the way I lay out the tenons, using different arrangements from each side of the leg, and varying the length, thickness, and number of tenons. This is the best way I've found to pack a lot of joinery into these small spaces without compromising the strength of the leg or having to beef up the dimensions of the parts and ruin the light

### compromising your design

appearance I'm after. By the way, these solutions work for narrow frame members of all kinds, not just legs and aprons.

My Stencil Table, Star Cabinet, and Fall Front Cabinet are examples of this joinery in action. Each piece is a different take on how you can maximize the space to create strong joints that will resist racking and twisting. Let's look at the table first.

#### With wide aprons, interlock the tenons

The Stencil Table (opposite page) has legs that are just 1¼ in. square at the top and aprons that are 3 in. wide. To get the most out of that narrow space, I created an interlocking joint, with two tenons from one direction passing above and below a tenon from the other direction. The key here is finding a balance between material

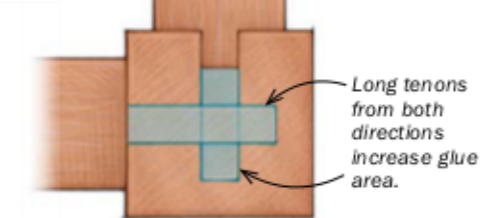
removed for the mortises and the size of the tenons. When a joint fails, it is often the mortised part that breaks, not the tenon. So the thickness and length of the tenon must be sufficient to hold the joint firmly while leaving enough material on the outside of the mortise and above to resist cracking. You need to leave at least ¼ in. of material on the outside of the mortise; less, and any



#### STACK THEM

For his Stencil Table, Coleman was able to use long tenons by stacking and interlocking them, taking advantage of the apron height.

#### TOP VIEW



Long tenons from both directions increase glue area.

**Graceful table with strong bones.** Coleman had to compress the joinery to preserve this table's delicate proportions.

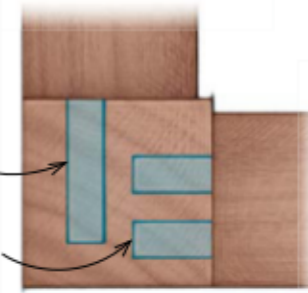


#### OR DOUBLE THEM UP

With a narrow apron and leg, Coleman made the aprons thicker to allow him to double up the tenons in one direction and use a longer tenon in the opposite direction.

Long tenon is used on longest span.

Double tenons increase glue surface, compensating for their short length.

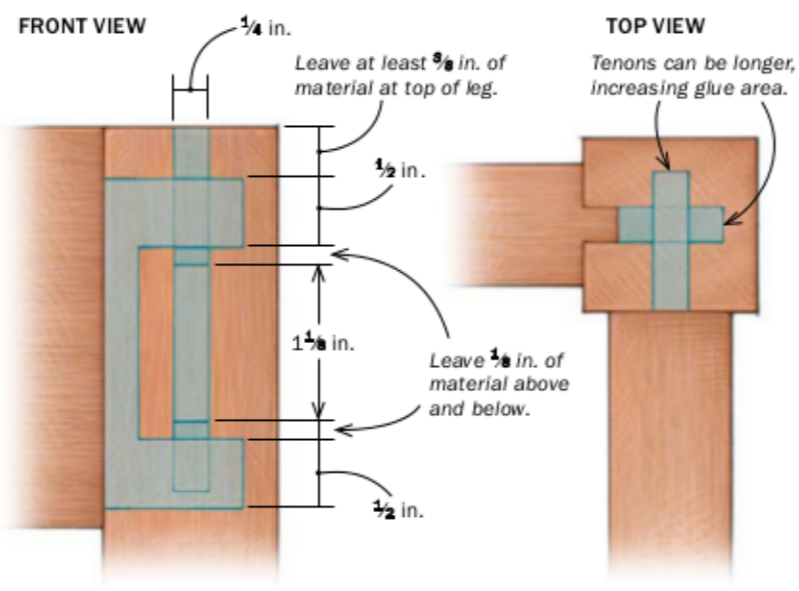
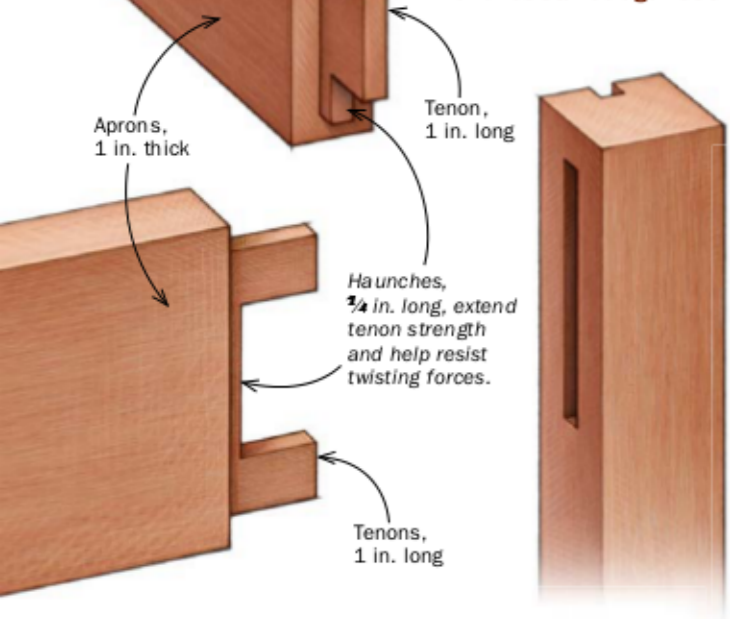


**Slender strength.** On his Star Cabinet, Coleman was looking for a slender base. So he doubled up the tenons and added stretchers.



# Wide aprons? Interlock the tenons

Instead of cutting short tenons, Coleman takes advantage of the apron height by interlocking the tenons at the top of the leg. This lets him use long tenons from each direction, increasing glue area and resistance against twist.



## DEEP MORTISES FIRST

**Steps to a stepped mortise.** Coleman does the deep part of the mortise (right), then resets the machine to cut the 3/4-in.-deep mortise for the haunch (below). He works one leg at a time, but to ensure alignment he references off corresponding faces.



racking force could cause the leg to split. Also, unless there's a haunch, set the tenons at least 3/8 in. below the top of the leg. Any closer, and that weak end grain area would not have enough meat to resist leverage from the top of the tenon.

In this example I was able to use 3/4-in.-thick by 1-in.-long tenons, which leaves plenty of material on the outside. Both tenon designs have a haunch that supports the apron along more of its width, increasing resistance to twisting. (For an example of a similar joint, see "Hall Table with Flair," pp. 66-73.)

### Double tenons for narrow aprons

Despite their slender components, the Fall Front (see photo, p. 61) and Star Cabinet (p. 57) stands must be strong enough to support the weight of the cabinet plus its contents. The shaping at the top of the leg is different in each piece, but the layout and execution of the joinery is the same.

In both pieces, there is a single, long tenon from one direction, and a pair of side-by-side tenons from the other direction (the fall-front has one narrower tenon on the outside to accommodate the curve at the top of the leg—see detail on p. 61). All tenons are 3/16 in. thick. The long tenon is 1 1/4 in. long, and the double tenons are 1 1/2 in. The double tenons have more overall glue surface than the single tenon, which partly compensates for their shorter length. As with

### Online Extra

To see how Coleman uses stretchers to add further strength, go to [FineWoodworking.com/extras](http://FineWoodworking.com/extras).

Drawings: Christopher Mills

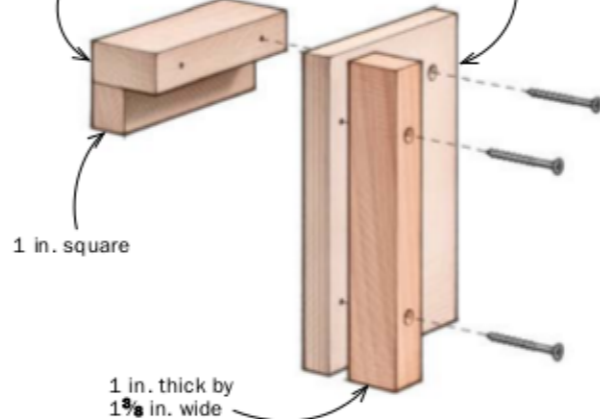
## MAKE TWO TENONS FROM ONE

### TENONING JIG

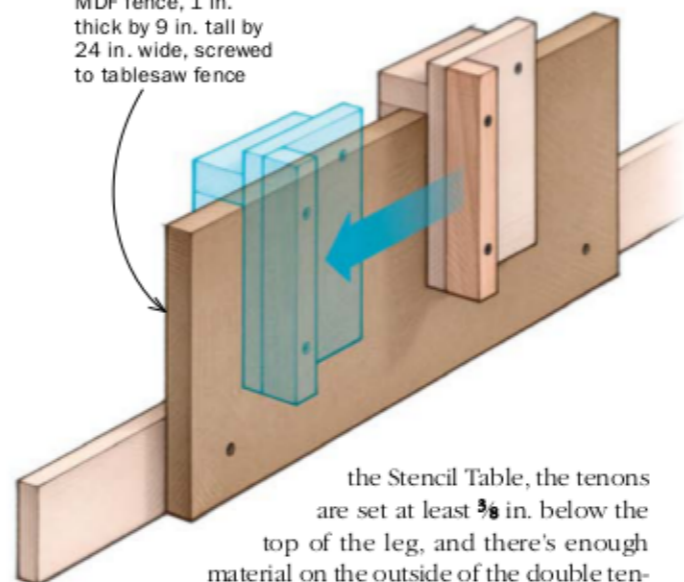
1 in. thick by 2 in. wide

1 in. square

3/4 in. thick by 5 1/4 in. wide by 7 1/2 in. long



MDF fence, 1 in. thick by 9 in. tall by 24 in. wide, screwed to tablesaw fence



the Stencil Table, the tenons are set at least 3/8 in. below the top of the leg, and there's enough material on the outside of the double tenons to maintain structural integrity.

The single, long tenon is a bit stronger than the double tenons because its length helps it resist leverage. So I use a single tenon on the apron that runs side to side. The legs are farther apart here so there is more stress on these joints than those that run front to back. Before shaping the legs, I cut the mortises using a hollow-chisel mortiser. Then I cut the tenons. I make all the tenons the same length and trim the shorter ones later. This way the shoulders are all cut at the same setting, and the blade height to cut the tenon cheeks is the same. It helps to have extra stock the same size as the aprons to use as setup pieces.

The shoulders are cut first at the table saw. Then I use the bandsaw to cut the cheeks. The final cheek



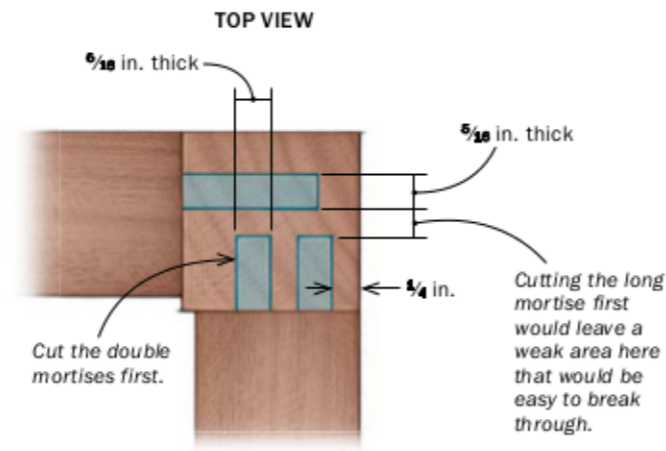
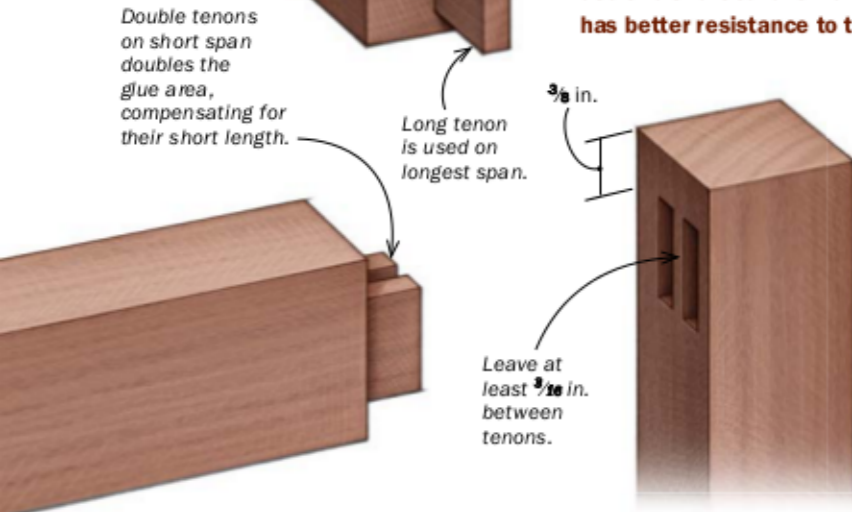
**Cut and flip.** After cutting the tenon cheeks and shoulders, Coleman uses a shopmade tenoning jig (see drawing, left) and a flat-top rip blade to excavate between the stacked tenons. Make a cut and then flip the apron end for end to make the same cut on the opposite end (left). Then adjust the fence and repeat. When you're close, check the fit (below) and trim where needed.



Photos, except where noted: Thomas McKenna

# Narrow aprons? Double up the tenons

When faced with a narrow apron and leg, Coleman makes the apron thicker in order to use two short tenons from one direction and a long one from the other. The long tenon has better resistance to twisting, so he uses it on the longest aprons.



## DO THE DOUBLE MORTISES FIRST

**Far one first.** Set up the mortiser to cut the outside mortise. Do all the legs at the same time, referencing off the same faces.



**Spacer saves time.** To locate the second mortise, Coleman uses a spacer block placed between the workpiece and the fence of the mortiser. To determine the spacer thickness, simply add the width of the mortise to the space between. So a pair of  $\frac{5}{16}$ -in.-wide mortises with  $\frac{1}{4}$ -in. space gets a  $\frac{9}{16}$ -in.-thick spacer.



cuts on the tablesaw are just skimming cuts using my shopmade tenoning jig (see drawing, p. 59). This method removes any chance of a trapped cut, and makes it easier to dial in the setup. My ultimate aim is to get the tenon thickness right off the tablesaw.

I do the double tenons essentially the same way. After cutting the shoulders at the tablesaw, I remove the material between the tenons first because it's easier to adjust the thickness of each tenon on the outside cheek. Here I use a flat-top-grind rip blade and my shopmade tenoning jig.

After the inside is removed, I make the cheek cuts, first with the bandsaw and then with the tablesaw. □

Timothy Coleman is a renowned furniture maker and designer ([timothycoleman.com](http://timothycoleman.com)).

## TACKLE THE TWO TENONS

**Shoulders first.** Coleman makes all the tenons the same length, so all the shoulders can be cut with the same fence setting and blade height.



**Use the mortises as a map.** Lay the apron on the leg to mark the inside cheek cuts.



**Inside cheeks first.** To remove the waste between the tenons, Coleman uses a flat-top rip blade and a tenoning jig, cutting about  $\frac{1}{4}$  in. proud of the shoulder. He pares to the line later with a narrow chisel.



**Outside cheeks next.** Coleman removes most of the waste on the outer cheeks with the bandsaw.



**Eyeball the cuts.** Place the tenons over their mortises to mark how much needs to be trimmed on the outside.



**Final cuts.** Use a tenoning jig and a flat-top rip blade to skim the outside cheeks. Check the fit as you go.

## SHAPED LEG GETS NARROWER TENON

Coleman's Fall Front Cabinet has the same joinery as his Star Cabinet, except for one detail. The top of the leg is curved on the outside, so the outer double tenon is trimmed at the top to accommodate that curve.

