

Learn your M&Ts

THE TRIED-AND-TRUE MORTISE AND TENON COMES IN MANY FORMS

BY MARIO RODRIGUEZ

The mortise-and-tenon joint is one of the most dependable methods for joining wood parts of almost any size, configuration, and angle. The joint has been around for thousands of years and is found in many ancient wooden structures worldwide. I once owned and restored an 18th-century timber-framed farmhouse and was

surprised that it stood perfectly plumb and strong after 200 years; it didn't lean or creak one bit, all thanks to the mortise-and-tenon.

If you're making a piece of furniture or other project that requires unflinching strength, durability, integrity, and good looks, the reliable mortise-and-tenon is a great choice—but which to pick? There are many variations of this fundamental

joint. You can keep it basic, or you can add flair to suit your design. I'll take you through the basics of the mortise-and-tenon, including its parts and how to size the joint correctly for your projects. I'll also show you a few fun variations—some of them don't even need glue.

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ANATOMY

MORTISE

The space that receives the tenon. Its width is often determined by the available tooling—chisel, router bit, mortiser.

TENON

The projecting part of the joint. The tenon is cut after the mortise and can be trimmed and adjusted for a tight fit.

WALLS

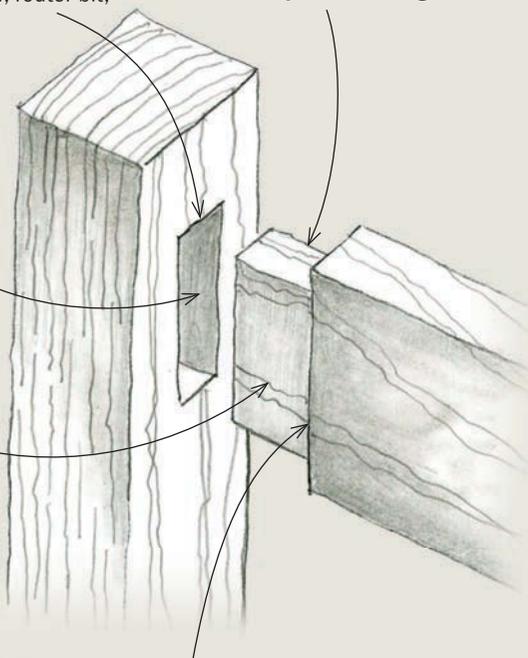
The sides of the mortise.

CHEEKS

The sides of the tenon. Compared with the walls, this part is more accessible and easier to adjust.

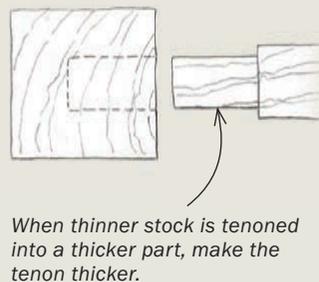
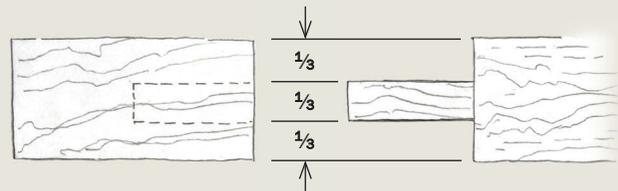
SHOULDER

The shelf at the base of the tenon, which adds support, rigidity, and aesthetics. A shoulder limits the tenon's penetration and determines the joint's angle, although it should be cut square to the tenon for strength. I usually use four shoulders on a tenon because it creates a stronger, better-looking joint.



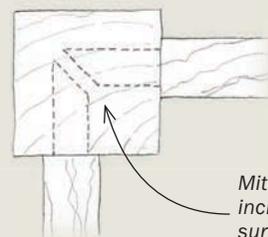
SIZING

The tenon should be uniformly thick. If it's too thick, it might split the mortise; if it's too thin, the joint will be weak. When sizing the joint, the tenon should be $\frac{1}{3}$ as thick as the thinnest material.



When thinner stock is tenoned into a thicker part, make the tenon thicker.

There are times when following the $\frac{1}{3}$ tenon rule would create a tenon that is too thin for its job. Take, for instance, a leg-to-apron joint, where the apron is 1 in. thick and the leg is 2 in. thick. Following the $\frac{1}{3}$ rule here would make a very weak table joint, so in this case I'd beef up the tenon to $\frac{3}{4}$ in. thick to make the joint more stout.



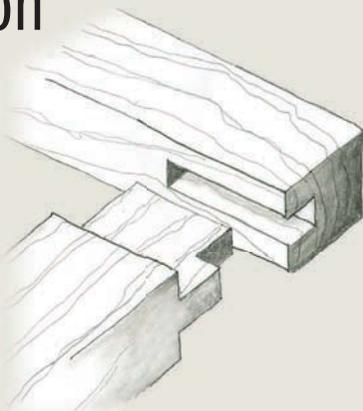
Tenons don't always need to have square ends. Where a pair may intersect, like with aprons entering a table leg, mitering the tenons maximizes their length.

Mitering tenons that intersect increases the joint's glue surface.

Single tenon

Haunched

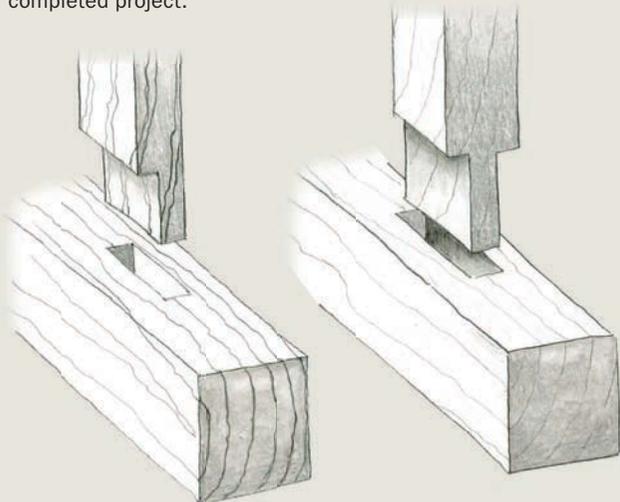
Haunched tenons extend to the exterior corners of the joint. The haunch increases the glue surface area on the cheeks for strength and helps maintain the joint's alignment. It often is used to hide a continuous groove that would otherwise be visible, as on a paneled door.



Fewer shoulders

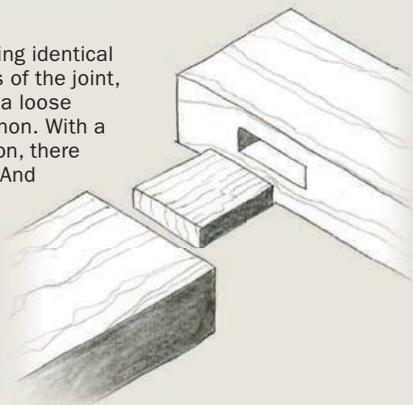
While I prefer mortise-and-tenons with four shoulders, sometimes it's better to go with fewer. Take, for example, the bareface tenon, which is shouldered on only one side. This allows a thicker tenon to be set into large, thick stock, which can benefit load-bearing constructions like work tables or platforms. I've used this joint when connecting rails to legs for a table.

A tenon with only two shoulders may appear in utilitarian woodworking, such as fences and gates. This construction speeds the work, but might expose a portion of the mortise on the completed project.



Slip

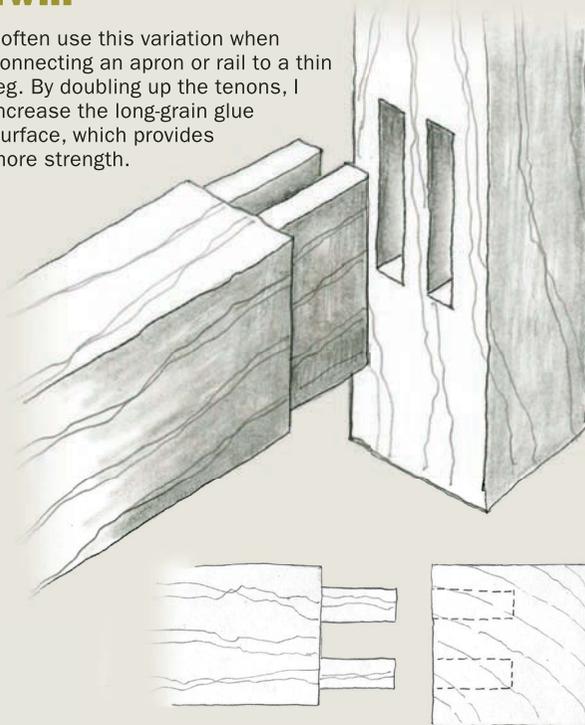
This joint involves cutting identical mortises on both parts of the joint, then joining them with a loose (instead of integral) tenon. With a properly fitted slip tenon, there is no loss of strength. And the ease and speed of construction makes it a great choice. I often choose a slip tenon when there are angles involved, avoiding the need to cut angled tenons.



Multi-tenons

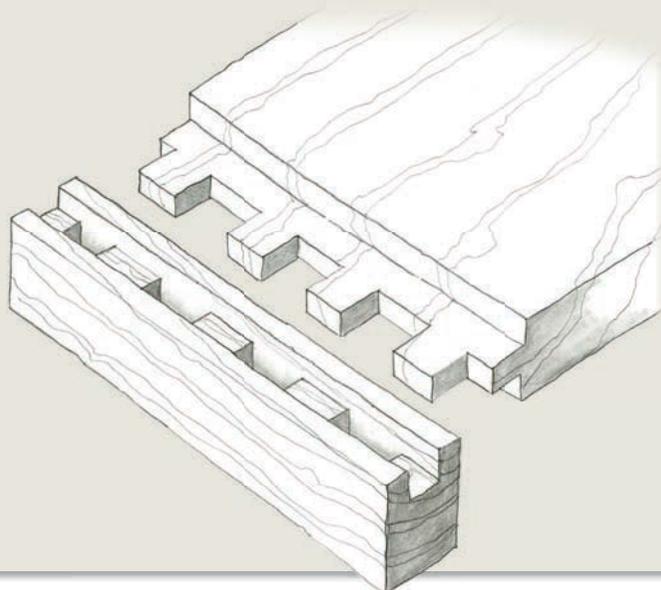
Twin

I often use this variation when connecting an apron or rail to a thin leg. By doubling up the tenons, I increase the long-grain glue surface, which provides more strength.



Crenelated

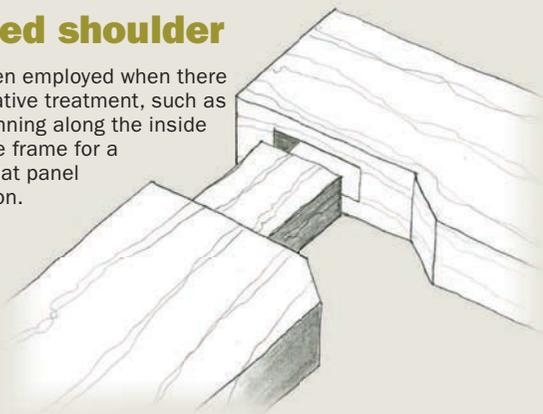
A crenelated tenon doesn't maintain a uniform length. Instead, it goes up and down, like a castle parapet. It's shaped like this because a long, wide tenon might create weak walls in the mortise, causing it to separate from the tenon and encourage wood movement within the joint, possibly leading to joint failure. The intermittent shorter tenons preserve the integrity of the mortise. Crenelated tenons are often used on breadboard ends, which help keep tabletops flat.



Specialty tenons

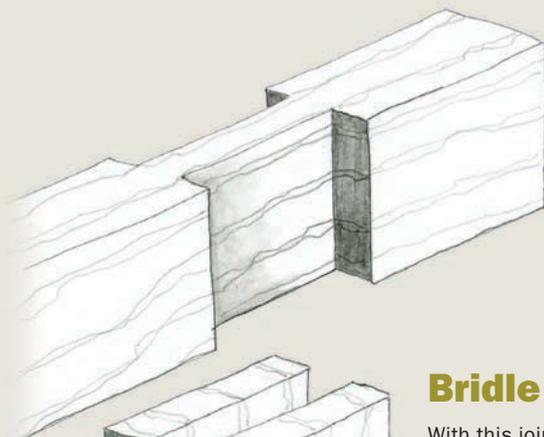
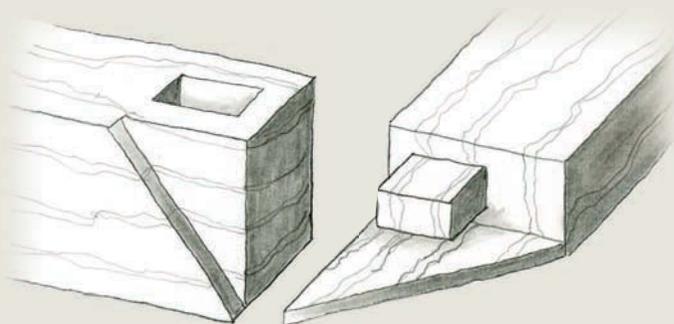
Mitered shoulder

This is often employed when there is a decorative treatment, such as a bead, running along the inside edge of the frame for a raised or flat panel construction.



Mitered face

This variation has a thin portion of the face mitered, combining the strength of a mortise-and-tenon with the visual appeal of a miter.

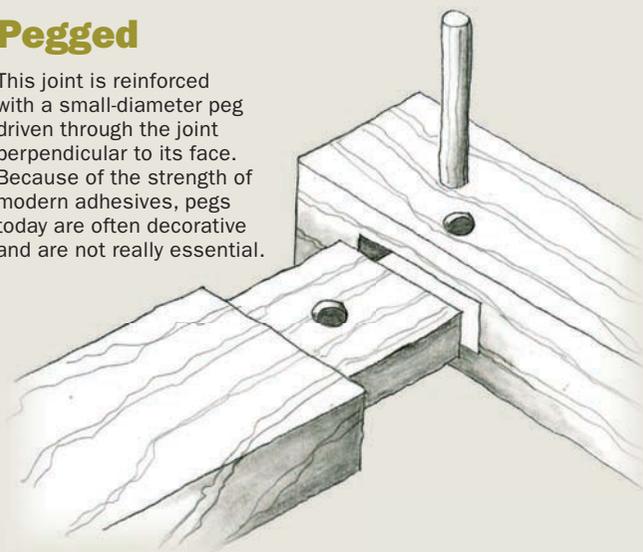


Bridle joint

With this joint, both halves are open, with one sliding into the other. Once joined, the connection is solid, and can render the joint rackproof.

Pegged

This joint is reinforced with a small-diameter peg driven through the joint perpendicular to its face. Because of the strength of modern adhesives, pegs today are often decorative and are not really essential.



Wedged through-tenon

Wedging the end of a tenon reinforces the joint, closing small gaps and providing a tight fit. With through-tenons, this is also done for decorative purposes.

Tusk

An extended tenon comes through the mortise, and at the point where the tenon clears the mortise, it is pinned in place by a peg or a wedge. You find this joint on assemblies that can be dismantled and put back together.

