Despite its odd name, “loose-tenon” joinery is one of woodworking’s tightest methods of joining parts. It’s also one of the most versatile. Structurally, a loose-tenon joint resembles a traditional mortise-and-tenon joint, and it’s every bit as strong. Both joints gain their strength from a thick, solid-wood tenon. The difference is that, in a loose-tenon joint, the tenon fits into mating mortises in the pieces, whereas in the traditional version of the joint, the tenon is integral to one of the pieces.

There’s a big efficiency to cutting both parts of the joint in the same manner, as opposed to having to perform a completely different set-up for one half of the joint. Another advantage to a loose-tenon joint is that connecting work at odd angles is much easier because there are no angled tenon shoulders to cut. Also, it’s a great way to join long boards that are difficult to maneuver on your tablesaw.

One example of loose-tenon joinery can be seen in the Patio Table and Chairs article on page 44, where a Festool Domino machine is used to cut the mortises. However, making loose-tenon joints has long been done with a plunge router and shop-made jig, as I’ll show you here.

Common applications:
- Frame corners
- Table apron-to-leg joints
- Polygon frames
- Miters
- Stretcher-to-rail connections

Go to woodcraftmagazine.com for a short video showing how to use a mortising T-jig. You’ll also find plans for the mortising fixture shown on page 69.
Sizing a loose-tenon joint

The structure of a loose-tenon joint affords great mechanical strength in shear, and the large mating face-grain surfaces provide great adhesion for glue. When sizing the joint, the goal is to keep the tenon beefy without creating a mortise so large that it weakens its host piece. These notes are general guidelines; size components to suit your particular project.

Tools for the job

First and foremost, you’ll need a plunge router outfitted with an upcut-spiral bit of a diameter that matches your desired mortise width. To guide the router, you’ll need either a template guide (for use with a T-jig), or an edge guide (typically used with a mortising fixture.)

Jigs allow speedy joint layout

Because loose-tenon mortises are typically cut with a jig, joint layout is minimal. Usually, a simple center mark is all that it takes in order to provide alignment for mounting a jig to the work, as shown on page 68. When using a mortising fixture, you often need to fully lay out only one end mortise and one edge mortise to set up the router edge guide and fixture stops. After that, clamping the work to the fixture automatically registers everything for the cut.

Gang layout.
When using a mortising jig, all you generally need is a mortise centerline to set up the cut. For efficiency, gang pieces for marking, such as the stiles and rails shown here.
A simple T-jig does the trick

This simple T-shaped mortising jig provides a platform for a plunge router outfitted with a template guide. The jig's slot captures the template guide to control the length and width of the cut. A jig like this is typically dedicated to making centered mortises in stock of a particular thickness. Although it's also often made for a mortise of a particular length, I find that making the slot long, and then filling it in with spacers to shorten it makes the jig more versatile.

It's crucial that the slot width exactly matches the outside diameter of the template guide, so take your time to get that right: Before gluing up the platform pieces, dry-clamp them together to make sure that the template guide travels freely end-to-end without any slop across the width of the slot.

### Mortising T-Jig

This jig, which is designed to work with clamps with a 3” reach, allows cutting mortises up to 4” long.

**PLATFORM**

\[
\frac{1}{2} \times 4\frac{1}{2} \times 8\frac{1}{2}
\]

(Use dense hardwood to resist deflection.)

**Template guide slot**

\[
\frac{5}{8} \times 4\frac{3}{8}
\]

**Notch**

(for clamp access)

\[
1 \times 2\frac{1}{4}
\]

**CLAMPING BOARD**

\[
\frac{3}{4} \times 3\frac{1}{2} \times 8\frac{3}{4}
\]

**Offset platform to center slot across stock thickness.**

**End mortising.**

Align the mortise and jig centerlines, clamp the jig to the stock, and rout. For cleanest cuts, first plunge to full depth at both ends of a mortise, and then clean out the waste between with a series of subsequently deeper cuts.

**Edge mortising.** When edge mortising, you can either cantilever the workpiece out from a vise as shown, or forgo the clamps, and secure both workpiece and jig in the vise jaws. Again, fully plunge at the mortise ends, then clean out the center.

Friction-fit softwood spacers

\[
\frac{1}{4} \times \frac{3}{4} \times \text{desired length}
\]

#6 × 2” coarse-thread drywall screw

Offset platform to center slot across stock thickness.
A mortising fixture: The ticket for fast, accurate loose-tenon joinery

This type of mortising jig is really more of a fixture, in that workpieces are clamped to it instead of the other way around. Plans for this particular model are available as a woodcraftmagazine.com onlineEXTRA, but there is also a wide variety of other designs available online. (Type “mortising jig” into your web browser) Fixtures of this sort allow mortising stock of various thicknesses, and usually incorporate adjustable router travel stops for accuracy and efficiency. The jig shown here uses a custom router subbase to guide the tool, but most jig designs incorporate a standard router edge guide instead.

Making tenons

Individual tenons are crosscut to length from strips of tenon stock you mill to thickness and width. It’s important for joint strength that the tenons are a friction fit in their mortises, requiring just a bit of hand pressure for insertion. If your mortise locations are spot-on in every case, you can make the tenon width match the mortise length for instant alignment and maximum mechanical strength. (Make sure to groove your tenons for air escapement.) However, I find it’s usually best to leave ¼” play for joint adjustment.

Saw to length. To efficiently saw tenons to identical lengths, clamp a standoff block to your rip fence to serve as a stop. This creates a safe “fall-off” area for the freed pieces, preventing kickback that would otherwise occur using just the fence as a stop.

Edge mortising. This mortising jig and adjustable router subbase allow making centered mortises in stock of various thicknesses. Adjustable stops limit router travel, and thus mortise length. (Note that the full-length panel groove in this workpiece was not made using the jig.)

End mortising. A vertical fence and clamping block are bolted to the jig base to enable securing narrow pieces for routing end mortises. With the stock set against the vertical fence, and clamped in place with its end flush with the top of the fence, set the stops and you’re ready to rout.

Round to fit. Bullnose the edges of your tenon stock on the router table using a round-over bit with a radius that’s half the thickness of the stock.
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