Table-Sawn Splines

Add strength to miter joints by the slice.

By Paul Anthony

M iters are among the most common joints in woodworking because they provide an attractive way to join two pieces at almost any angle. The only problem is that a basic miter is nothing more than a butt joint. It’s an inherently weak joint because you’re gluing end grain to end grain.

Adding a spline—a wooden strip fit into matching slots cut in both faces of the mitered parts—turns a weak joint into one you can trust. In addition to providing mechanical strength, a spline offers mating face-grain-to-face-grain contact, which gives glue something to hold onto. In some cases, splines can also help align workpieces for easier assembly. And when used to reinforce both case miters and frame miters, they can serve as decorative elements, especially when made from a contrasting wood.

One of the quickest and easiest ways to make spline slots is on the table saw. The slots and splines require only a few seconds to cut, but taking a few extra minutes to understand the process will guarantee splinter-free slots that register reliably on both sides of the joint, and splines that work like they should. Here are some tips and jigs for creating four strong, attractive miter joints that will stand up to the ages.
**Tongued-spline case miter**

A tongued spline spans the full length of two mating miter faces. It’s perfect for reinforcing a case miter when joining wide pieces to create box or cabinet sides made from sheet goods or solid wood. The spline also aligns the miter joint during assembly, allowing easier glue-ups.

**Sawing case miters**

Dress your pieces to thickness, width, and length, and then crosscut each miter using a premium 40- or 50-tooth combination or “all purpose” blade. (An 80-tooth blade is even better.) Make a test cut in dressed scrap and check the angle with an accurate miter square or with a try square held against two adjacent miters.

Feed the workpiece over the tilted blade using a miter gauge precisely set to 90°. Use a stopblock or face your miter-gauge fence with 220-grit sandpaper to prevent the workpiece from shifting in mid-cut. To feed larger panels, I use a simple single-runner sled, as shown in Photo A. Carefully align the cutline and blade, and then saw the joint to create a sharp knife edge without shortening the workpiece.

**Lay out a spline slot**

Lay out one \(\frac{3}{8}\)-\(\frac{1}{2}\) deep spline slot for saw setup, locating it \(\frac{1}{8}\) or so from the inside mitered corner, or heel. I typically make the slots \(\frac{1}{8}\)-wide (the kerf-width of a standard blade), fitting them later with solid wood splines. (See “Making Wood Splines,” page 24). For large case pieces, I cut \(\frac{1}{4}\)-wide slots to accept plywood splines, which are easier to make in long strips. You can either face the case edges afterward to hide the exposed plies or insert short solid wood splines into the ends of the slots for display.

**Sawing the slots**

Place the marked-out workpiece against a miter gauge with backer board and align the slot location with the blade. Then butt the rip fence against the end of the stock and make the cut as shown in Photo B, pushing the work at a moderate, consistent speed. Slot all of the miters using this same setup. To cut slots wider than \(\frac{3}{8}\), it’s best to use a dado set. Alternatively, you can adjust your fence to make a second series of cuts with a standard blade. Note that you’ll also have to adjust the blade height for these secondary cuts in order to maintain a flat-bottomed slot.

**TIP ALERT**

For clean, accurate case miters, always orient the workpiece so that the offcut is under the tilted blade, not above it.

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To avoid slots with V-shaped bottoms, use an ATBR combination blade. The intermittent raker teeth will cut a nearly square-bottomed slot.
A tongued-spline frame miter is a great option for cabinet doors that carry heavy panels or glass panes. The spline slots are easy to cut using a simple jig that holds the stock at 45° to the table. A standard commercial tenoning jig will work, but I prefer a dedicated shop-made jig (shown in Figure 1) that does a quicker, cleaner job.

**Making the tongued-splined slotting jig**

Build the jig from hardwood plywood or MDF. Size the end panels to straddle your rip fence without allowing side-to-side play in the jig. Attach two hardwood fences at 45° and parallel to each other on the face panels. Screw a sacrificial backer to the right-hand fence to prevent exit tear-out. Now make a 7/4×4× 8” hold-down block. This block also prevents exit tear-out when using the left-hand fence.

**Cut the spline slots**

Mark the “show” face of every workpiece, then lay out one spline slot. Mount the workpiece on the right-hand fence, show-face out, and shift the rip fence to align the slot location with the blade. Clamp a hold-down block to the jig on top of the workpiece and saw the slot, holding the piece firmly against the saw table as shown in Photo C. Cut the similarly oriented miter on each piece using this setup.

To cut the miter on the opposite end of each piece, reverse the jig on the fence and fix the hold-down to cover the top end of the slot location to prevent tear-out. Feed the work show-face out, holding the stock firmly against the table and the jig as shown in Photo D.

**Making Wood Splines**

For strong joints, the grain on a spline must run perpendicular to the joint line. Use a tenoning jig to slice splines from the ends of stock that has been dressed flat and square. By rotating the stock and flipping it end for end, you can quickly cut four splines to thickness as shown in Photo E. Crosscut them to length afterward using a miter gauge.

**Slice splines from the outer faces of dressed stock held against a tenoning jig.**
Keyed miters

A key spline intersects the outside corner of a miter joint. Keys provide good reinforcement for boxes and other small casework and for frames that don’t carry heavy weight. What a key spline might lack in strength, it makes up for in production speed and convenience. In this instance, the slots are cut into the frame or case after it has been assembled. The only trick is carrying the assembly at a 45º angle over the blade.

For slotting keyed case miters, build a plywood cradle to run in your saw’s table slots, as shown in Figure 2. For safety, I incorporate a wooden blade guard and set up a stop on the saw table to prevent forward travel once the top of the blade intersects the trailing cradle wall.

To set up the cut, raise the blade enough to saw a deep spline slot that won’t slice through to the box or frame interior. Clamp a stop stick to the cradle wall to register the first series of consistently spaced slots. Also set up a travel stop of some sort on the table. Position your box against the cradle wall stop to make each of the initial four slots as shown in Photo F. Relocate the stop as necessary to make each subsequent series of slots. When using the jig in the future, cover the trailing cradle wall with a thin sacrificial panel to prevent exit tear-out.

For slotting frames, you’ll need to hold the workpiece on edge. I use a simple saddle-style jig outfitted with twin fences set at 90° to each other and at 45° to the table. (For simplicity, I mounted them on the opposite face of my shop-made tenon jig as shown in Photo G.)

For accurate slotting, remove the workpiece after the cut. Don’t pull it back over the blade on the jig’s return stroke.

Making key splines

Rip a strip of stock a bit wider than the depth of your spline slots then plane it to thickness for a snug fit in the slots. To plane thin stock like this, first lay a ¾”-thick MDF riser panel across your planer bed and tables, attaching a cleat to the underside of the trailing end to prevent the feed rollers from pulling it through. Then take light cuts.

You can crosscut individual splines, glue them in place, and trim away all the excess, but it’s more efficient to saw them into slightly oversized triangles first. Just register the strip against a setup block on the rip fence, holding the thin material down with a stick. After making the cut, flip the strip over and repeat.

A properly fitting spline should seat snugly in its slot with just a bit of pressure. It shouldn’t need clamping after glue-up.

About Our Author

Paul Anthony is a woodworking writer, photographer, and teacher living in Riegelsville, Pennsylvania. His latest book is Taunton’s Complete Illustrated Guide to Tablesaws (Taunton Press).
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