



Add Muscle to Your Miters

Shopmade L-shaped tenons
create a powerful joint

BY
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For those who like their joinery subtle and seamless, the miter is indispensable. It allows long grain to flow around a door frame, over the edge of a case piece, or from leg to rail in a chair, unbroken by end grain. And it lets you join sheet goods without exposing the inner layers.

But the miter's glue surface—especially in solid wood—is mediocre, and the space for reinforcement, whether with biscuits, slip tenons, or splines, is limited and also compromised in terms of glue surface. For some years now, we've been seeing a clever solution used by a number of craftsmen: L-tenons, shopmade right-angle slip tenons that allow you to sink a long leg with plenty of face-grain glue surface into each member of a miter joint. L-tenons can be used with almost any sort of miter and on any scale.

We've brought together three fine makers who use the joint frequently, each taking a different approach but all ending up with what one calls "an indestructible miter joint."



Three versions of the L-tenon

Reinforcing miter joints with L-shaped tenons makes a beautiful joint suddenly much stronger. The tenons' 90° turn produces a joint with much more available glue surface, all of it face-grain. It also can make for simpler assembly.



FINGER-JOINTED
IN SOLID WOOD



LAMINATED WOOD
AND ALUMINUM



PLYWOOD

Finger-jointed L-tenons



Solid-wood cases with mitered corners are at the heart of my furniture making. Most of my pieces involve carving, and in pursuit of good surfaces to carve, I build wall cabinets, freestanding case pieces, and small boxes, most of them

mitered. And on all of those miters I use L-tenons made by finger-jointing two pieces of solid wood. Yes, I spend a fair amount of time making the tenons, but the resulting strength of the joint is well worth it. Using this technique, I've made L-tenons in sizes ranging from 3 in. across for large case pieces to barely $\frac{3}{4}$ in. for small boxes. The L-tenon miter joint allows for



Duncan Gowdy
Holden, Mass.

more straightforward assembly than typical splined miter joints, which must be assembled on the diagonal, often causing a bit of juggling in the glue-up.



Flowing frame. With the powerful tenons hidden, Gowdy's mitered case works as a clean, elegant border for his carved doors.

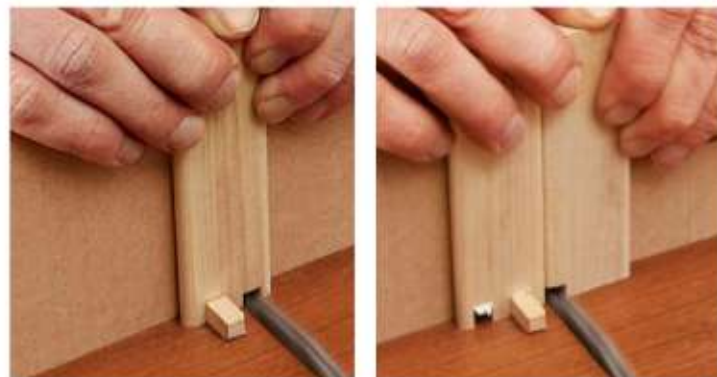
MAKE THE TENONS



Cut the joint. Gowdy cuts the mortises first with a horizontal mortiser, then uses a sled to cut the miters on a tablesaw.



Fit the strip. After making long blanks and rounding their edges with a bullnose bit on the router table, Gowdy fits them to the mortise.



Finger-joint jig. Gowdy uses a dado blade and a dedicated tablesaw jig to cut the fingers. He cuts fingers on the first leg of a pair (left), then uses it as a spacer to make the first pass on the second leg (right).



Perfect 90. During glue-up, a drafting triangle held against the inside of the legs creates a reliable right angle. Once the glue has dried, Gowdy trims the proud fingers flush on the router table.

FINE-TUNE THEM

Glue slot. One careful pass over a tablesaw blade raised $\frac{3}{16}$ in. produces an escape route for glue.

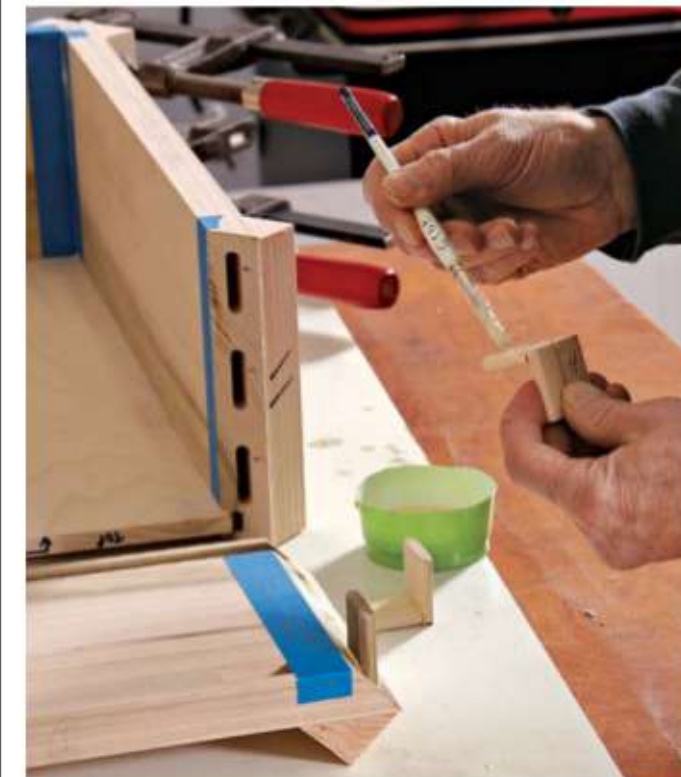


Off with the excess. A low fence at the bandsaw simplifies trimming the legs of the tenons to final length.



Quick chamfer. Break the edges with a few strokes of a sanding block.

ASSEMBLE THE JOINT



Glue and drive. With the opposite end of the case dry-fitted and clamped, Gowdy glues the tenons (above) and hammers the joint home (below). He achieves final tightness with quick-release clamps on the angled glue blocks.



Photo, opposite page (bottom left): Dean Powell

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Wood-and-aluminum L-tenons



Miters reinforced with L-tenons are very useful in casework and furniture, and I've experimented with several methods to create the tenons. I tried using solid wood, either finger-jointed or dovetailed, and I tried plywood. Then I discovered that by gluing strips of wood to aluminum angle stock I could make strong L-tenons quickly.



Timothy Coleman
Shelburne, Mass.

I buy the aluminum angle at the hardware store in 3-ft.-long pieces that measure 1 in. on each side and 3/8 in. thick. It is accurately machined and extremely strong. By laminating strips of wood to the inside of the angle with polyurethane glue, I produce the blanks from which I cut individual tenons. The wood

strip allows me to trim the thickness to match the mortise or slot in the miter. I use either the chopsaw or tablesaw to cut the tenons to width. For final assembly of the joint I typically use Titebond. I figure that the tenon will have wood-to-wood glue surfaces on one side, and the faces of the miter offer plenty of additional glue surface. For extra insurance, you could do the final glue-up with epoxy or polyurethane glue.



Strong and seamless. Coleman's veneered sideboard has mitered corners stocked with L-tenons.

MAKE THE TENONS



Cut the joint. Coleman cuts his miters first, then cuts the mortises with a horizontal mortiser. A router or Domino would work as well.



Clamp the sandwich. With the aluminum angle resting in a cradle and the wood strips glued, Coleman uses a square-section caul to distribute clamping pressure. The caul and the cradle are both waxed to resist glue.



Chop chop. A regular woodworking blade in the chopsaw (or tablesaw) makes quick work of cutting the long blank into dozens of tenons.

FINE-TUNE THEM



Tenon trimming. Coleman trims the tenon to exact thickness by shaving the wood face on the bandsaw.



Chamfer if you must. A few strokes with a file ease the edges of the tenons. To avoid having to round over the side edges of the tenon, Coleman makes the mortises extra wide.

ASSEMBLE THE JOINT



Two-step glue-up. Coleman glues his tenons into one side of the case and lets them dry, then glues them into the second side. This means that to close the joint he needs clamping pressure in only one direction.



Plywood L-tenons



I learned the L-shaped plywood tenon from David Upfill-Brown when he was teaching at the Center for Furniture Craftmanship in Maine. He referred to it as “the indestructible miter joint.” I haven’t taken a sledgehammer to one of these joints, but since the technique utilizes deep



Reed Hansuld
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tenons with face-grain glue surfaces combined with the stability and strength of plywood, David may well be right. I find these joints great for mitered casework both in solid wood and sheet goods, as well as for mitered frames and furniture. They can also be used where parts meet at angles other than 90°, and even for compound angles.

I make the tenons from Baltic-birch plywood, which is free of voids, and I cut the mortises with a Domino or a router. I produce the tenons by gluing up a long blank of plywood blocks and then slicing it up like a loaf of bread, which makes it easy to produce lots of identical tenons.



Frame job. Hansuld’s coffee table has 19 mitered frames, each one reinforced with plywood L-tenons.

MAKE THE TENONS



Miters after mortises. After using a Domino to cut the mortises on his frame members, Hansuld cuts the miters with a chopsaw.



Glue up a stacked blank. When gluing up the stack of Baltic-birch squares, be sure the grain direction on the face alternates in adjacent blocks. Hansuld marks each block to show grain direction. He uses cauls along all four sides of the stack to maintain alignment during the glue-up.



Rip to make a notch. First saw all four edges to create a clean, square blank. Then make two ripcuts with the blade at about half height to yield the L-shaped blank.



Slice off the tenons. Hansuld uses the miter gauge, with a stop block clamped to the fence to control thickness.

FINE-TUNE THEM

Notch the elbow. A side-to-side scrape at the bandsaw cuts a shallow notch that prevents the tenon from catching on the edge of the mortise during assembly.



Rout a radius on the edges. Working carefully and using a push block, Hansuld rounds over the edges of the tenon on the router table.



Final fit. To tweak the final fit, Hansuld rubs the tenons on 100-grit sandpaper adhered to plywood.



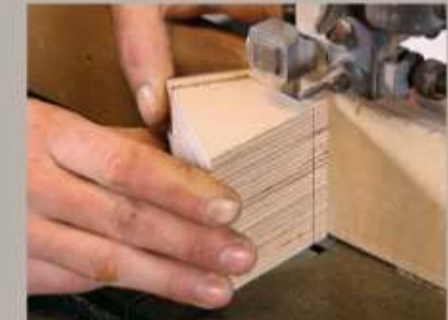
ASSEMBLE THE FRAME



Four-way glue-up. Hansuld glues all four joints at once, then applies pressure with quick-release clamps along the length and across the width of the frame.

When the miters aren’t square

Hansuld’s bar stool is made with a series of mitered frames, none of them meeting at 90°. He made plywood tenons to reinforce all of them.



Bandsaw the notch. After gluing up a long blank and then cutting it to shape on the tablesaw, Hansuld creates the notch at the bandsaw.



Steady slicer. Using the notch cutoff as a push block, Hansuld slices the block into wide-angled tenons.



Screwy glue-up. With no easy purchase for clamps, Hansuld glues on angled clamping blocks. For compound angled joints, you can use wider mortises to allow some adjustment.

