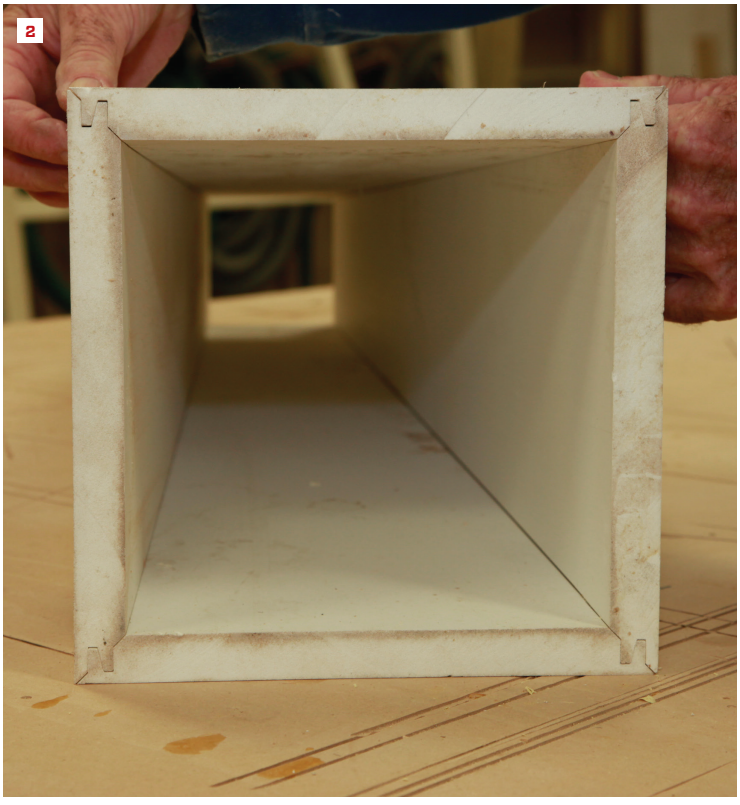
BY GARY KATZ



Tapered Columns With Lock Miters

Most of the really cool carpentry tricks that I know how to do I've learned from other carpenters, like my brother and the guys at Roadshows and JLC Live events, and I've learned a bunch from Jed Dixon. One thing Jed taught me is how to cut lock-miter joints. He uses lock miters on all of his newel posts and columns—whether they're installed indoors or out and whether they're tapered or not. He believes the lock-miter joint is simply the strongest corner joint possible.

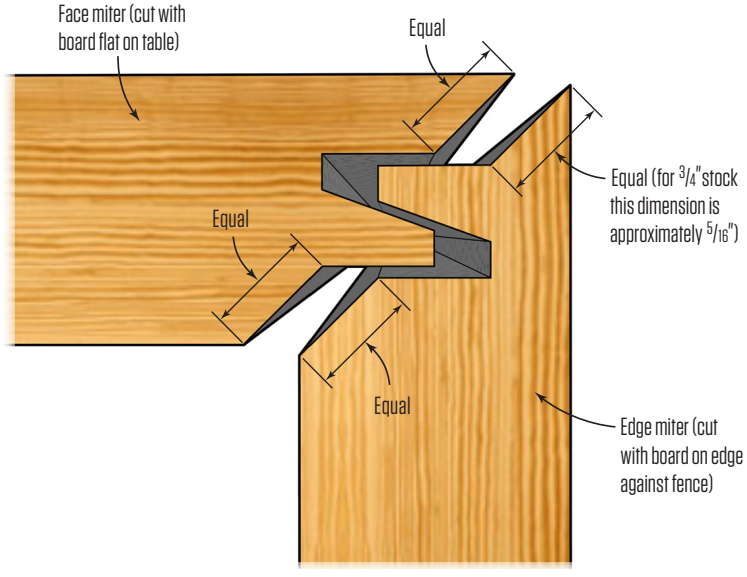
Lock miters can be cut quickly—they can cut assembly time in half—and all the pieces are easy to keep track of, so it's tough to make a mistake. Jed cuts his lock miters with a shaper, using a power feeder so all the pieces are cut precisely the same way **(1)**. All four sides of every column are cut the same width—there's no wide side or narrow side, as with butt joints or rabbet joints, to confuse you. Cutting different widths can really complicate matters when you're making tapered columns.

LOCK-MITER JOINTS ON TAPERED COLUMNS?

I've had folks at my demonstrations argue that lock-miter joints cannot be used on a tapered column. One attendee wouldn't believe me even after I cut and assembled the joints right in front of him. OK, the joint isn't perfect—the outside edge stays slightly open—but it's close **(2)**. For a column with a taper angle of 2 to 3 degrees, the angle on a lock-miter bit works just fine. But be aware that if the taper angle of a column is much more than 7 degrees, the mating surfaces of the lock miter misalign to the point that the joints don't come together. Here's why: Once a column starts to taper, its sides no longer meet at a 90-degree angle. And the greater the taper angle, the further away from 90 degrees

Photos by Gary Katz

Lock-Miter Intersection



A lock miter is a good example of something that looks complicated but is pretty simple once you understand how it works. One thing that makes it simple is that the same setup is used for cutting all the corner joints, but you cut two of the boards lying flat on the router table (face miters), and you cut the other two boards standing on edge against the fence (edge miters). Once the bit height and the fence location are set, you don't need to touch the router table except to push material through.

Let's start by setting the height of the router bit for cutting the face miters. In the simplest terms, the lock-miter profile consists of two short miters with a tongue-and-groove section in between. For the joint to fit perfectly, the cutter must be centered vertically in the workpiece and the two miters must be exactly the same length (see Lock-Miter Intersection, left). If you're starting from scratch—that is, without a precut test block—you can lay out the length of the miters with a sharp pencil or pen and get pretty close on the first few tries **(3)**. I like to make a few quick adjustments to get the setup close, and then micro-adjust the final height with a router lift. A sensitive lift mechanism on your router makes this part much easier to do.

The next step is positioning the fence. This time, the miters of the bit profile have to be perfectly centered on the workpiece when it's run through on edge (vertically). Again, I get it close and then dial the fence to the precise location using test blocks. At this point, the machine should be ready for both the edge cuts and the face cuts.

the corner gets. Roof cutters call this the "dihedral" angle.

Most tapered columns angle at just a few degrees, so lock miters are absolutely the best joint for the job because the angle across the joint is so close to 90 degrees. With a 2-degree pitch, that angle is 90.07 degrees (for readers who only trust math). That's pretty darn close to a perfect 90-degree corner.

LOCK-MITER SETUP

The biggest drawback to lock miters is the time it takes—especially the first time around—to set up your router or shaper. The bit and the fence must be set up precisely. However, there are a few things you can do to work more efficiently. First cut a bunch of set-up blocks and save them. You'll probably need between six and eight pieces of 1x6 about 8 inches long. These blocks are for making test cuts as you slowly adjust the height of the bit and the location of the fence. Once you've set up the bit and the fence perfectly, label the final test blocks and keep them in a safe place. In the future, using those test blocks to dial in the settings will be a lot easier than starting from scratch.

SAFE CUTTING

When making cuts like these on a router table, I always use hold-down clamps and feather boards to apply consistent pressure against the fence and the table. For cutting the face miters—when the board is lying flat on the table as it's cut—the hold-down device on my CMS stand works perfectly **(4)**. The CMS hold-down applies plenty of pressure to secure the material, and it's also easy to flip up out of the way if you have to make minor adjustments. But I still use push blocks to move the work while holding it tight against the fence.

Illustration: Todd Murdock

When you cut the edge miters, the board must be standing on edge against the fence, so that the miters are cut into the bottom edge of the board. The CMS hold-down device won't work in this situation, so I use a custom feather board. I first make a mounting board from ¾-inch plywood for my CMS router table, and secure the board to the router table with a couple of Fast Clamps. A dado in the mounting board allows me to adjust the feather board **(5)**. I've even used two feather boards in the same mounting board. Trust me, when you're cutting lock-miter joints, you don't want anything to move once you start up the router.

When I run a board on edge through the router, I hold on to the top of the board. Moving my hands as they get near the bit, I apply consistent pressure down toward the table top, while the feather boards apply pressure against the fence. Although I didn't use work gloves in these photos, I recommend wearing a thin pair, such as FastCap Skins, to protect your hands from getting cut up by the sharp miters.

Cutting lock miters generates a lot of saw dust, so good dust collection is very important, both to keep the cutter sharp and to let you run boards through the machine more quickly without dust being trapped between the fence or table and the boards. The CMS router table has a great dust extraction port, but it doesn't work once you lift the hold-down to cut edge miters. So I made a small baffle out of ¾-inch stock that lets the port work even when the hold-down is lifted out of the way **(6)**.

ASSEMBLY

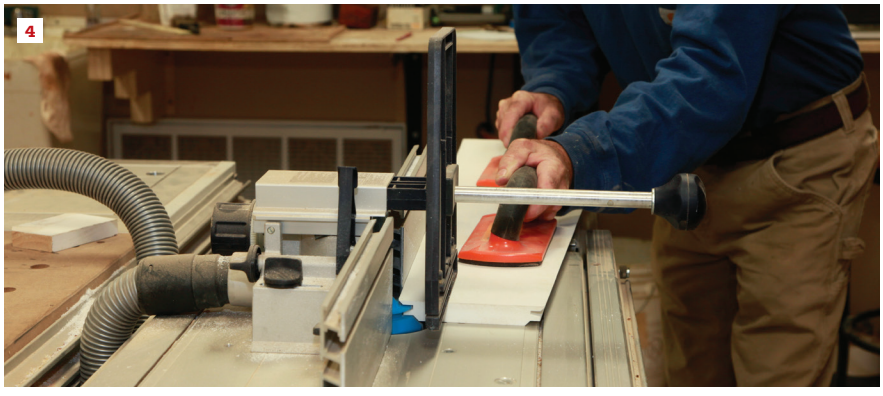
Over the years, I've tried just about every technique for joining the corners of newel posts. And lock miters are not only the strongest, but they are the easiest to assemble as well. (Dominos, Festool's version of a mortise and tenon, also work extremely well).

I start by laying one of the face boards on my workbench, and then I run a bead of glue in the lock miter. It isn't necessary to apply glue to both boards. Glue applied to one side spreads easily onto the mating piece, and I get less squeeze-out with glue on just one side. (With PVC, it's especially important to glue only one side for the strongest and longest-lasting glue joint.)

Next I set the two edge-mitered boards into the face board, letting their miters interlock. Then I run beads of glue in the lock miters of the last face board, flip the board over, and drop it onto the edge boards **(7)**.

Lock-miter joints seem to close up nicely no matter what direction you clamp from, but for the best results, I apply clamping pressure to the face boards—the boards that are milled flat in the shaper or router table—rather than to the edge boards. However, I've found that the joints close even if I clamp on the edge boards instead. Most often, I secure the edges with 23-gauge or 21-gauge pins **(8)**.

Gary Katz is a frequent contributor to JLC *and a presenter at JLC Live. He produces the Katz Roadshow and publishes THISisCarpentry.com.*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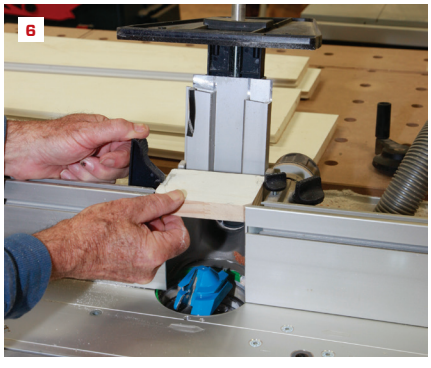
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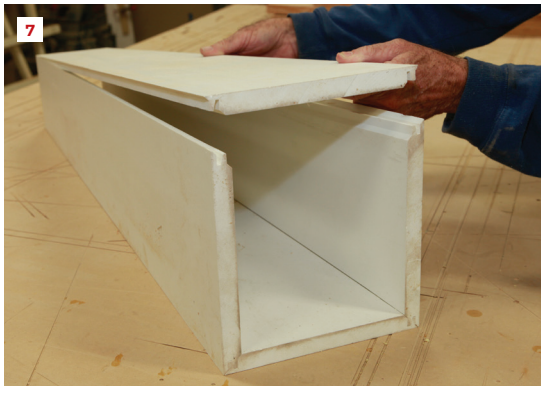
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New Columns for an Old Porch

BY EMANUEL SILVA

Living in the Boston area, I work on many houses with traditional exterior wood millwork, which at the time these homes were built was typically milled from eastern white pine. The pine looks great, but I'm often asked to repair or replace damaged trim with a material that won't rot and that requires less maintenance. That was the case recently for a pair of porch columns on a 1930s home. With plans to sell their house within a few years, the homeowners had hired me previously to repair or replace a number of other exterior details, and the front porch was the next item on their to-do list **(1)**.

WOOD AND MASONRY DON'T MIX

The existing turned columns seemed to be in good shape—until I took a closer look. The bottoms of the columns were crushed, and the wood bases that supported the columns were rotted beyond repair. Also, the porch was missing bricks, and some of the remaining ones were damaged. The first step was to temporarily support the porch roof and remove the columns. Then I called a mason to repair the brickwork.

After removing the columns, I discovered water damage in the porch structure above them as well. The crown molding used to finish the fascia on the eaves had doubled as a gutter. Though the top of the molding was capped with metal flashing where it wrapped around the porch, it looked like water had still managed to collect and leak into the short box beams that sat on top of the columns and supported the porch roof framing.

To fix the problem, I first removed the old beams—which had been framed like short knee walls and clad with board sheathing. I framed the new "knee wall" beams with PT lumber and clad them with PVC trim.

Photos by Emanuel Silva

Next, I assembled U-shaped PVC soffit-fascia assemblies and slipped them into place **(2)**.

STRUCTURAL COMPOSITE COLUMNS

The pair of 8-foot-tall PermaCast columns (hbgcolumns.com) that I used on this project are stocked by my local lumberyard. These are load-bearing columns cast from a proprietary composite material similar to fiberglass. To match the existing columns, I bought 10-inch-diameter Tuscan columns, which taper slightly to a diameter of 9 ¼ inches at the top (non-tapered columns are also available). Matching PermaCast bases and capitals, the flashing caps, and the installation kit brought my total cost to about $175 per column.

While the new columns are well-made and closely match the existing ones, they have one small flaw: an ornamental ring that seems too close to the top of the column. My solution was to lower the position of the ring by adding a PVC extension to the top of the column. This patch would then be covered by the capital.

I started by gluing together 1-foot-square sections of ¾-inch-thick PVC trim to make 1 ½-inch-thick stock. Then I used a jigsaw to cut out a pair of round plugs that matched the inside diameter of the top of the columns, and I screwed the plugs to the columns **(3)**.

Next, I cut a pair of slightly larger plugs to match the outside diameter of the columns and act as column extensions. Because these extensions needed to fit into the flashing cap (which prevents water and debris from getting into the column), I routed out a channel and center hole to match the flashing cap profile **(4)**. Then I screwed the extensions to the plugs with stainless steel screws.

INSTALLING THE POSTS

After shimming the porch roof assembly level, I located the column centers and used a Tajima plumb bob to transfer the centers down to the brick porch. Because the floor was fairly level, I measured the distances between the porch and the eaves at each column location and marked the lengths on the columns.

To mark cut lines that were parallel to the base of the columns, I wrapped a length of 4-inch-wide aluminum coil stock around the


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column as a guide. The company says that PermaCast columns can be cut with a carbide blade in a circular saw, but that seems to leave a pretty rough edge. Instead, I make the cuts with a 4½-inch angle grinder equipped with a diamond masonry blade, which results in a smoother and more controllable cut **(5)**.

The installation kits for the columns included a pair of galvanized metal installation clips, along with screws to connect the clips to the columns. But I was concerned about the screws eventually corroding or working loose, so I used stainless steel bolts and nuts. That allowed me to bolt rather than screw the clips to the bases of the columns **(6)**.

Before I fit the columns in place, I jacked up the porch roof assembly slightly so that they would slide easily into position. After screwing the flashing caps to the underside of the beams **(7)**, I slipped the columns into place, and removed the shims and temporary supports so that the roof was fully supported by the columns. In this installation, I wasn't concerned with wind uplift, so I didn't reinforce the connection to the roof framing with additional clips or long structural screws.

When I was satisfied that the columns were plumb, I drilled pilot holes into the brickwork, then fastened the brackets to the porch with 5/16-inch-diameter by 2⅜-inch-long Tapcon masonry screws **(8)**.

FINISHING UP

To block moisture and insects, I filled the gaps between the column bases and the uneven masonry with a generous bead of OSI Quad Max, an extremely flexible window and door sealant. Then I applied a glop of sealant at each corner and set the column bases in place, tweaking them slightly until they looked square and level. I glued the capitals to the flashing caps with the same sealant, using masking tape to hold the capitals in place until the sealant cured **(9)**.

The columns were pre-primed, so once they were installed, the only thing left to do was to apply a couple of coats of acrylic latex paint on the new millwork.

Emanuel Silva owns Silva Lightning Builders, a remodeling company in North Andover, Mass. This article originally appeared in Professional Deck Builder.


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