BY TIM UHLER

Photos: Tim Uhler

Framing a Curved Staircase

For me, framing a curved staircase has always been something that separates those who can frame from those who are simply framers. Ever since I saw a diagram in Will Holladay's book *A Roof Cutter's Secrets to Framing the Custom Home* showing how to frame a circular stair, I'd been itching to frame one. It turns out that it isn't particularly difficult. With guidance from Holladay's book and a framer named John Kirkpatrick online who routinely does this, I was able to frame a free-standing curved stair in less than eight hours.

CODES

When building a curved stair, the first step is to know the codes. The free online code explanations from the Stairway Manufacturers Association (stairways.org) are handy for this.

Before starting to frame my first curved staircase, I spent a lot of time making sure I understood how to lay out the stair according to code and checking that the designer had drawn the stair correctly on the plans.

It was time well spent, since it turned out that the plans for the stair weren't right—the radius was too tight, so the winder treads didn't meet the minimum depth at the walk line. And, since it's my job as the framer to build it right, I had to adjust the layout.

LAYOUT

Using black chalk—so it's permanent and won't wash away in the rain—I snapped the stair layout at the same time as the rest of the wall layout. This allows some flexibility if we need to move things around a bit for a better fit and also helps shift my brain into gear.

To accurately lay out the stair, the "walk line" must be correctly located. According to the 2009 IRC (Sec. R311.7.3),


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the walk line should be 12 inches in from the inside edge of the stair, and the treads at their narrowest part on the inside curve must be at least 6 inches deep (R311.7.4.2). As long as you have a minimum tread depth of 10 inches at the walk line and no part of the stair tread is less than 6 inches, the code allows for a difference in tread depth between the straight section of the stairs and the winders. (Note: Under the 2012 IRC, the minimum tread depth has been increased to 11 inches.) If I needed to make things fit in a tight space, I could adjust the tread depth, but in this case I had a large, open area in the entry and didn't need to make adjustments.

I began layout by snapping the line of the top riser, which was also the edge of the top landing. Next, I found the radius as defined on the plans, and made a trammel from a piece of strapping **(1)**. I put four marks on the trammel—the outside distance from the center; the inside curve (both sides of the 2x4 wall); and the walk line 12 inches from the inside end of the tread **(2)**—then used it to draw the edges of the curved section of the stairs. With a square along the top riser line at the walk line, I marked 10 inches in front of the top riser and snapped a line through this mark for the next riser. I repeated this, sliding the square until the 10-inch mark touched the walk line, snapping a new line for each riser **(3)**.

FRAMING

Before framing the stair, it's best to wait until the upper floor is framed so you can take exact floor-to-floor measurements. You also need to know the thickness of the finish floor material at the top and bottom of the stair. For this stair, both floors and the treads were getting hardwood, so every riser was the same height.

To idiot-proof the riser heights, I began by making a story pole. I entered the subfloor-to-subfloor height—119 ⅜ inches for this house—into my Construction Master calculator and divided that by 16 (the number of risers on the plans) to arrive at a 7 7/16-inch riser height. (The 2009 IRC maximum riser height is 7 ¾ inches. In the 2012 IRC, it drops to 7 inches.) I then hit "M+" to store this number. Next, I entered "+ RCL M+ =" and got 14 15/16 inches. For each stair, I just hit "=" to get the next riser height; the calculator does the rounding so that every riser will be exactly the same (7 7/16, 14 15/16, 22 ⅜, 29 ⅞, 37 5/16, etc.).

For the story pole, I used a 2x4 that's a few inches longer than the total floor-to-floor height. I hooked the bottom end of the 2x4 with my tape, marking each number my calculator gave me along its length, then squared across. Each line represents the bottom of a tread. In this case, I had ¾-inch hardwood on both floors and on each tread, so I didn't have to do anything except cut the story pole to the total subfloor-to-subfloor height. If I'd had different floor or tread thicknesses, I would have drawn these on the story pole to keep track of everything so that each riser would be the same height. (See the online version of this story for more about this.)

The next step was to physically scribe each tread directly over the marks on the


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floor **(4 & 5)** and then set the cut treads on their marks **(6)**. I marked each tread with a number and put that number on the floor so I'd know what goes where, making sure that the treads are cut perfectly to ensure that each step lines up correctly and follows the layout. I also cut 2x12s for the risers (using good-quality Doug fir or LSL) and the 2x4s that will serve as the cleats each tread will be fastened to, and set these in place on the snapped-out layout as well.

Next, I cut the pair of 2x4 "legs" for each stair. I set the story pole over the pair of 2x4s, marked the length (height) for each riser, and cut the pair using the Big Foot saw so that they're an exact set **(7)**. I marked each pair to match the corresponding tread label marked on the subfloor.

With everything cut and ready to go, I began gluing (with PL Premium) and nailing a 2x4 cleat to each 2x12 riser, then gluing and nailing this assembly flush to the top of a pair of 2x4 legs. It's easy to nail the 2x12 to the 2x4 legs **(8)**, then stand the assembly up and toe-nail the legs directly to their corresponding marks on the floor **(9)**.

Before moving onto the next set of legs, I glued and nailed the tread to the previous riser cleat, locking each step in place (see lead photo, page 17). At each step, I'd double check for plumb to make sure I was staying over the layout on the floor. By starting at the top and working down the run of stairs, I always had something solid to nail into and I didn't need to brace the stair at all. (Depending on the stair width, some additional 2x4s may be needed along the outside wall supporting the stairs so that the drywall J-channel has enough support to make a smooth curve **(10)**.)

FREESTANDING STAIRS

We build freestanding stairs the same way, but add a load-bearing laminated stringer from many layers of ¼-inch plywood, then cut away the supporting 2x4s.

To make the laminations, we cut 16-inch rips, then generously apply Titebond II with a paint roller. We glue and staple the first layer onto the studs **(11)**, then use the paint roller to completely coat each subsequent layer of plywood with glue before stapling on a new layer. We rout out the tread and riser profile in each layer as we go **(12)**. For the stairs shown here, we installed a total of 14 layers, nailing through the last layer with a framing nailer to make 3 ½-inch-wide structural stringers **(13)**.

We let the glue dry for a week before cutting the 2x4 legs flush with the underside of the laminated stringer **(14)**. To test stiffness, we had our heaviest guys bounce around on the outside of the stair. It deflected about ¼ inch along the walk line with almost no vibration at all.

The sides of the stringers and the undercarriage were finished-out in drywall **(15)** before the hardwood treads and handrail were installed by the finish crew.

Tim Uhler is lead framer for Pioneer Builders, in Port Orchard, Wash.

Drying Rack for Staining Shingles

BY EMANUEL SILVA

At the start of last winter, I landed a project to re-shingle an older home in New England. Because red cedar would match the existing shingles and last a long time, that's what the clients wanted. They also wanted a specific color. I looked into buying pre-stained shingles, but the only ones available were white cedars, which don't have the longevity of red cedars. So it would be up to me to stain the shingles.

I've tried different methods for staining shingles: stacking them on sticks, laying them against walls, hanging them from clotheslines, even using a heat gun. But I always thought there must be a better way. One evening my son, Carter, and I sketched out some ideas and came up with a lightweight rack that would be easy to build from mostly readily available scrap material.

With cold and snowy weather on the way, I needed a warm place to pre-stain and dry the shingles before I could install them. A local lumberyard graciously offered me space in a corner of one of its buildings, so I built the rack to fit that area.

I started by ripping 1-foot-wide pieces out of ¾-inch plywood for the side panels, which I cut down to 90 inches to fit under the ceiling. I decided on 4 feet for the rack's width so it could easily be moved around, and cut horizontal spreaders out of 1x4 accordingly. At the top and bottom corners, I joined two lengths on edge to make an L-shape for strength, then put single lengths of 1x4 at 30 inches and 60 inches for the intermediate spreaders. Finally, I ripped narrow widths of 1-by stock for the vertical center pieces, which gave the rack more stability and helped support the fishing line on which the stained shingles would rest. I used .0185-inch-diameter/20-pound test fishing line because it's thin, strong, and inexpensive.

Before assembling the rack, I laid out the spacing for the line at 1-inch intervals along both edges of one side panel, and transferred the layout to the second panel, as well as to the center support strips. At each layout location, I cut a ¼-inch-deep kerf with my Japanese hand saw to hold the line **(1)**. When all the parts were ready, I screwed the rack together using deck screws. I held the

Photos: Emanuel Silva


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spreaders about ½ inch in from the edges of the side panels so they wouldn't interfere with the fishing line. The center support strips screwed to the spreaders, which lined up the kerfs in the strips with the kerfs in the side panels to support the fishing line in the middle of the rack.

Running the fishing line around the rack was easy but slow going. I anchored the line to a screw driven into the side near the bottom, and fed it outside the edges of the side panels and inside the center support strips. After slotting the line into the kerfs on four corners to create one "shelf," I led the line up diagonally to the next level and went around again. The challenge was feeding the line and making it tight enough to support the shingles without sagging, but not so tight that it pulled the sides in. When the first spool of line ran out, I drove a screw into the side panel at that level and tied off the loose end to it, and used it to attach the new line **(2)**. The screw also gave me a place where I could adjust the tension in the line. After I'd strung the entire rack, though, I found the line needed to be tighter, so a friend helped me slide a 1x4 board behind the line along one of the sides, which gave me the extra tension I needed **(3)**.

Once the rack was assembled, I was ready to stain the shingles. I set up my work table next to the rack **(4)**. Using a roller—the fastest way to apply the stain—I coated all the sides and edges of each shingle. I loaded the rack from the bottom up so I could see the fishing line as I slipped the shingles in. The rack held three boxes of shingles or about one square, which I could stain in a couple of hours **(5)**.

When the rack was full, I decided that it would be best and cleanest to store and transport the shingles in their original boxes. I came up with a quick, easy way to put them back. First I measured the width of the shingle box and marked that measurement on my table, subtracting ½ inch for clearance **(6)**. I then sorted the stained shingles into three sizes. Using the marks on the table, I stacked rows of shingles, taking the appropriate sizes from the sorted piles and alternating the butts on each row to keep the stack straight and square **(7)**. Once a stack was tall enough to fill a box, I slid the pile into one and taped it closed **(8)**.

Overall, building the rack and pre-staining the shingles was time and money well spent. Pre-stained red cedars would have been an expensive custom order, and even then I probably couldn't have gotten the exact color my client wanted. Staining them on site in the winter would have been miserable and messy. Instead I invested about $85 in materials and a couple of hours to build the rack. Then I was able to apply the stain in a warm place, which meant that the stain could dry properly and that I could concentrate on the business of installing the shingles when I got to the jobsite.

Emanuel Silva is a frequent contributor to JLC *and owns Silva Lightning Builders, in North Andover, Mass.*