A Custom Newel Post Retrofit

Tapered sleeves update the original square posts

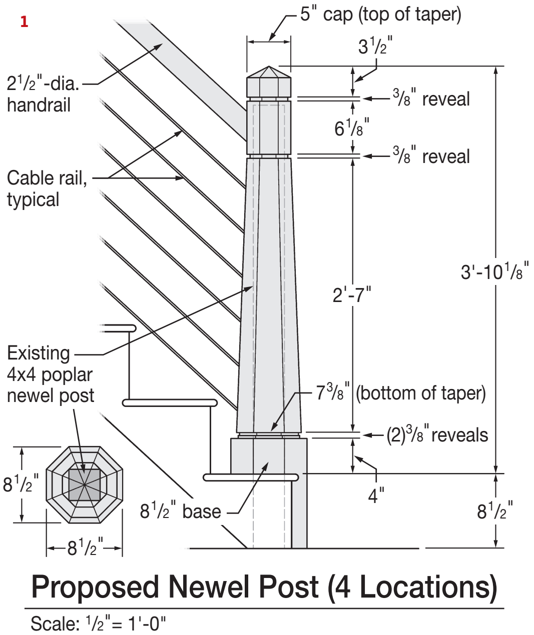
BY DAVE HOLBROOK

Late last year, a friend texted me a drawing of a custom newel post for a remodeling project he'd taken on, wondering if I'd be interested in making four of them. I was. The drawing **(1)** showed a tapered octagonal column between base and cap elements, resembling a lighthouse in form. Construction details were up to me. We determined that, since the existing 4x4 newels **(2)** were decently plumb and seemed secure, it made sense to leave them in place and sleeve the new newels over them. Further, the newels would be paint-grade, so I chose to work with poplar.

The base was to be fitted over the starting tread, so I decided it would be kindest to the installer if I made it as a separate element, to simplify scribing, fitting, and installation. That was one of my better decisions, because I ended up being that installer.

Solving the octagon. Having basically zero experience with the octagonal realm, I looked up how to find the dimension of the facets of an octagon of a given diameter. As I feared, the answer involved some fascinating math that went right over my head. Given the diameters at the top and bottom of the taper and at the base (5, 7 3/8, and 8 1/2 inches in diameter, respectfully), I figured that I could simply rip scrap lengths of 1/4-inch plywood at half of each diameter, then cut individual isosceles triangle segments at 22 1/2 degrees on a miter saw, flipping the board edge-for-edge to produce each piece **(3)**. For example, with the 5-inch cap, I took a 2 1/2-inch-wide board and cut across that at 22 1/2 degrees (360 degrees divided by 8 is

Photos by Dave Holbrook and Eve Aspinwall



The designer's plan provided the basic elements without construction details **(1)**.

Existing newels were basic 4x4 painted poplar, left in place as the new posts' structural core **(2)**.

To determine octagonal facet, or "stave," dimensions, the author made segmented patterns from 1/4-inch plywood **(3)**. A calibrated digital angle gauge ensures precise beveling **(4)**.

45 degrees, half of which is 22 1/2 degrees). I then flipped the board, edge-for-edge, and started my next 22 1/2-degree cut at the peak of the angle that I just cut, leaving a nice isosceles pie wedge of the octagon—a simple, "no-math" solution.

With eight triangles accurately cut, I glued them together into a regular octagonal pattern. I made three patterns, at 5 , 7 3/8, and 8 1/2 inches in diameter, to create a proof-of-concept mock-up for reference, helping me to cut everything to accurate width and to lay out the taper. Now, to determine the respective facets of the workpieces—I'll call them staves—all I had to do was measure the base of the appropriate triangle. With the blade tilted to 22 1/2 degrees, the base and cap pieces only called for straight rips on a table saw **(4)**.

Before proceeding further, I processed all my poplar stock, first to rough width, then to length using a stop on the miter saw for repeat accuracy. Each newel consists of three separate components (cap, tapered column, and base), each with eight sides. So, for four retrofit posts (two per floor), I needed to make 96 staves.

Tapered rips. For cutting all the tapered column sides, I made a simple tapering jig **(5, 6)**. With those 32 staves ripped on one edge, I marked them for reference to avoid accidentally recutting the same edge **(7)**. Adding a tapered waste piece to the jig **(8)**, essentially restoring parallel sides, let me cut the opposite edge to the mirror profile. With the previously cut and marked edge toward the saw fence, I completed the tapering operation.

Edge bevels. I'd thought I could then simply bevel all the edges for the tapered pieces on a router table, using a 22 1/2-degree bit, with the fence and top bearing limiting the cut. However, I immediately had trouble regulating the feed, with the bit eating beyond the desired edge. Instead of resolving the issue, I decided I could move faster on a table saw. I clamped a waste piece of smooth plywood to cover the right side of the table saw fence. With the blade tilted to 22 1/2 degrees, I raised it spinning into the face of the plywood, burying the teeth at the height of the 3/4-inch stock thickness **(9)**. This way, I beveled all the edges on the table saw, error-free.

To cut the tapered column facets, the author uses a disposable jig on a table saw **(5)**. Self-adhering sandpaper pads add friction **(6)**. The first edge of all 32 pieces is cut, and the pieces stacked and marked to avoid accidental recutting **(7)**. A tapered waste piece is added to the jig, establishing the second ripped edge **(8)**.

To bevel the tapered edges, the author raises the table-saw blade at $22\frac{1}{2}$ degrees into a sacrificial fence face, at the thickness of the stock **(9)**. Decorative grooves are cut using a router table for tapered stock **(10)** and a dado blade in the table saw for parallel pieces **(11)**.

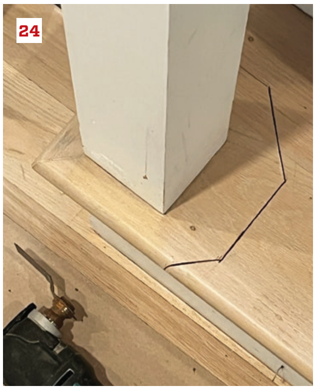
Grooving. The posts featured two $\frac{3}{8}$-inch-wide decorative grooves running around the cap and a double-height groove atop the base. On the router table, I rabbeted the top and bottom ends of the tapered mid-section pieces **(10)** to create the groove effect. I used a miter gauge to compensate for the taper and cut squarely across the ends. I cut the cap and base grooves using a dado blade in the table saw **(11)**.

Slick clamping trick. I wasn't particularly nervous at the prospect of clamping the pieces together, despite the faceted configuration. I knew I could use the same technique a friend (the one who asked me to do this job) demonstrated a few years earlier, simply taping multisided pieces together at their mitered edges, adding glue, and folding them up **(12–16)**. I've always used plain blue masking tape; this time, for added strength, I used duct tape. I'd seen prior perfect results with four-corner pieces, so eight-sided pieces could only be twice as successful—happily, this proved to be more or less the case. Once I'd rolled up a column, cap, or base, I taped it closed then wrapped it with ratcheting tie-down

Tapered staves are aligned face down and edge-to-edge, taped together with duct tape **(12)**, then flipped **(13)**. Wood glue is applied to the open joints **(14)**, and then the assembly is rolled up and band-clamped **(15)**.

Before the glue sets, misalignments are tapped out with a rubber mallet **(16)**. For the column caps, back-beveled post segments create a dished surface to cradle and control cap pieces during glue-up **(17)**. After the glue sets **(18)**, caps are pressed and bonded into place in a bed of two-part epoxy filler, then sanded true. To make the newel caps, the author rips slope and bed angles in a rough length of laminated poplar, then cuts segmented elements at 22 1/2 degrees on a miter saw **(19)**.

To align sleeve components around the existing 4x4 post, U-shaped plywood is glued together to form a 4x4 cutout **(20)**, the corners chamfered and fine-tuned on a sander **(21)** to fit inside post and base ends **(22)**.

The base section, fitted over the old post, is plumbed **(23)** and traced onto the existing starter tread **(24)**, to be let in. The outline is cut from the tread **(25)**, and the riser lines traced onto the base (viewed looking up under the starter tread) **(26)**.



The base is cut out to drop onto the floor **(27)**. After the author scribe-tunes the fit, he glues the base in place with heavy-duty construction adhesive **(28)**. Squeeze-out is cut away after curing. To fit the post inside the tapered sleeves, the author power-planes the old post corners until the sleeves drop into place without resistance **(29)**.

straps and cranked all the joints tightly together at once. To true the ends, I tapped out slight misalignments with a rubber mallet. Regular Titebond glue leaves enough open time to work at a relaxed pace, provided you have all your ducks in a row at the outset.

Column caps. The newel design included a peaked octagonal top, with a 1-inch edge-to-center rise. I couldn't come up with a simple way to clamp these elements together; paint-grade wood, however, has the saving grace of not requiring "invisible" joints. I decided that I could "dish" the top end of the post by back-beveling the ends before assembly **(17, 18)** and use a reciprocal, fitted bevel on the underside of the top segments **(19)**, nesting the individual pieces together in place with a generous dollop of glue and hand pressure. The nesting angle was arbitrary, so I stuck with 22 1/2 degrees. Coincidentally, the same 22 1/2-degree angle suited the cap's required slope.

I ripped 1-by poplar to 2 1/2 inches (half the width of the cap's 5-inch octagon) and laminated three lengths to obtain the necessary thickness. I beveled opposing faces at 22 1/2 degrees. Then, using the same approach as for the octagonal patterns, I used a miter saw to cut the eight identical little wedges needed for each post cap, swiveling the saw back and forth to cut the 22 1/2-degree left and right angle cuts. Nesting worked even better than I expected, with the pieces self-aligning along the facets. Once the glue dried, I hand-pressed the preassembled tops into place in a bed of two-part Minwax epoxy wood filler, sanding away the squeeze-out after it hardened.

Three-piece assembly. To mate and align the base and taper sections on the original posts, I inserted internal guide plates, at the bottom of the tapered segment and the top of base, that would fit around the 4x4 posts **(20–22)** with enough room to tweak the alignment as needed. (The top of the tapered column was close enough to the existing 4x4 post that it fit snugly after I later planed it to the eight-sided shape, as shown in photo 29). I cut U-shaped pieces from 3/4-inch plywood, glued them together, and trimmed the corners at 45 degrees. Then I fine-tuned them to a press-fit using an oscillating belt sander and glued them in with Titebond.

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Six inches of old post projects above the main sleeve, enough to glue on the cap piece **(30, 31)**, which is pinned plumb and stable using trim-head screws before the glue sets.

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The oversized handrail had to be let in to the post. The author made a router jig and used a bearing-over straight router bit to make the recess **(32)**. A slightly oversized recess accommodated the angled insertion, later filled with two-part epoxy wood filler and sanded to a seamless fit **(33)**. The retrofit glued-in bases provide a stiff newel–rail assembly **(34)**.

Installation. At the jobsite, I began by sliding a base section over the old post, plumbing it, and tracing its profile onto the tread surface **(23–27)**. I then cut away the tread material within the outline and dropped the base into the recess, transferred the riser line, and cut away the waste material. With a little additional scribing and shaving, I achieved a plumb and level fit. I used "heavy-duty" construction adhesive to bond the base to all contact surfaces and let everything harden overnight **(28)**.

Due to the tapered interior of my newel sleeves, they weren't going to slide right down onto the bases. First, I had to taper the old posts, which was easily done using a power plane and about 20 passes per corner **(29)**. I slathered the post with adhesive and dropped the sleeve into place on the base. This left about 6 inches of old post projecting, enough to capture the cap pieces with more adhesive **(30, 31)**. I used trim-head screws to hold everything plumb while the glue cured.

Railing attachment. In what was perhaps a design oversight, the top railing, a 2 1/2-inch-diameter, full-round custom oak profile, was about 1/2 inch wider than its corresponding facet on the cap, making for an awkward union. We decided to let the railing into the post, requiring a 1/4-inch-deep recess. I made a simple router template **(32)**, tracing the end of a railing sample cut at the proper angle. I clamped it to the post and used a top-bearing straight bit in a trim router to make the recess. As planned, it was a little oversized to allow for adjustment. I eliminated the voids with Minwax epoxy wood filler **(33)**. I fastened the rail with TimberLok screws, installed from the front of the post, and then bunged the holes.

With the original handrail removed, the old posts had some movement, but the new glued-in bases did a remarkable job of stiffening the entire assembly **(34)**. The final railing system includes cable rail, to follow painting—still a couple of months out as of this writing. I charged $625 per newel, plus installation.

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