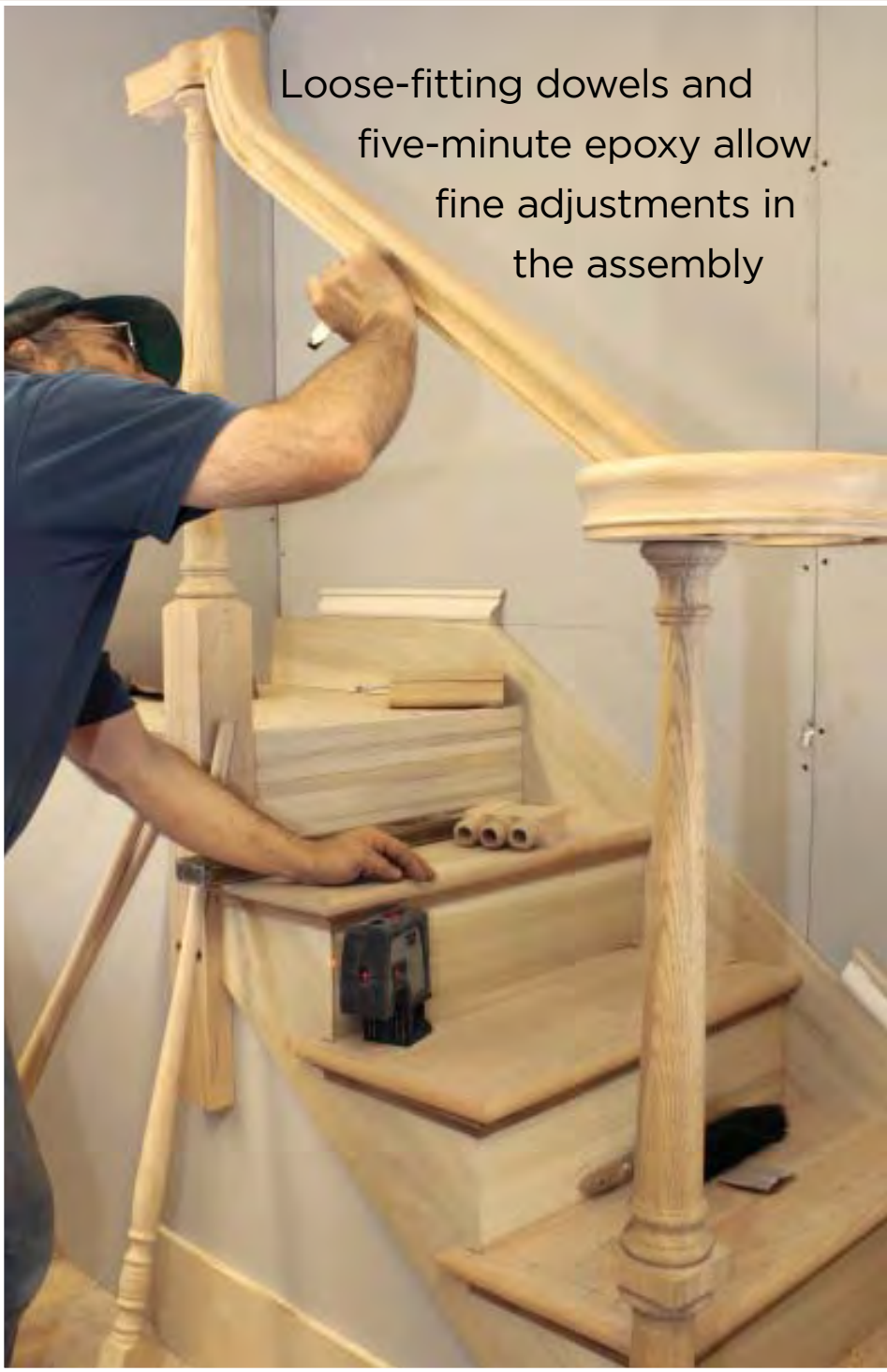
PART TWO

Installing an Over-the-Post Handrail



Loose-fitting dowels and five-minute epoxy allow fine adjustments in the assembly

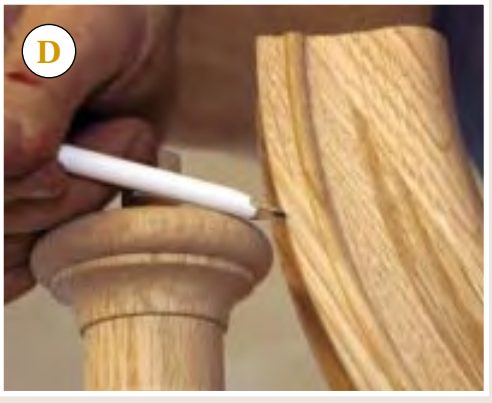
by Jed Dixon

Last month, in Part One, the author explained how he installs the landing newel and assembles the rake rail and starting volute at its permanent, working height by using temporary rail stands. This month, in Part Two, he shows how he makes a customized gooseneck for the landing newel, anchors the volute newel in the bullnose tread and riser, and installs the balusters.

Residential codes now call for the rake rail to be 34 inches above a line projected vertically from the tread nose, and for the landing rail to be at least 36 inches above the finish floor. If you project these two heights to their point of intersection, it will occur somewhere behind the landing newel.

In post-to-post rail systems, an elongated top square on the newel catches both rails at their different heights, but with an over-the-post system a gooseneck fitting must be used to make the transition. The pitch of a manufactured gooseneck can be adjusted to tangent, but every stair is different in regard to the height of the rail, the location of the newel, and the pitch of the rake rail.

These factors all affect the rise of the gooseneck, and consequently no stock-standard gooseneck can be used in all cases.



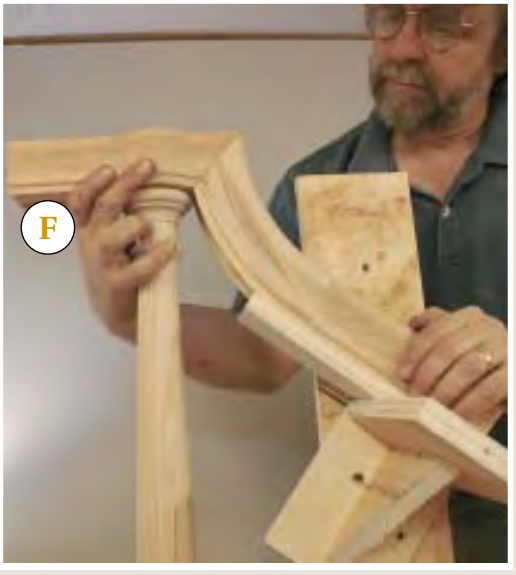


Figure 1. This standard, one-rise gooseneck (A) can't be shortened enough to make the transition. To make a custom fitting, the author first drills a mortise in a flat newel cap (B). With a stock up-easing temporarily bolted to a short length of straight rail, he aligns the tops of the flat cap and the easing (C) to mark the miter angle (D) on the easing. After cutting the easing angle, he transfers it to the cap. Since the cap is straight — unlike the easing — its cutting angle will be slightly different (E). He then checks the miter in place (F) before gluing the fitting.

Custom gooseneck. In the case of our demonstration stair, the straight, vertical stem of the gooseneck cannot be cut short enough to fit the mandatory 34-inch rake-rail height (Figure 1, page 2). What I do in this situation is site-build a "custom" gooseneck using an up-easing and a level newel cap.

First, I place the cap on the landing newel. I then temporarily attach the up-easing to a short piece of straight rail and place it on the rail stand, off to one side so that I can slide it up past the cap to find the common mitered angle. Because we have a straight rail intersecting a curved easing, the miters won't necessarily be 45 degrees, or even the same angle piece for piece. I clamp the easing tight to the stand and carefully mark the long and short points of the miter cuts on both fittings. I make the cuts on the miter saw and check the fit.

Epoxy dowel. To assemble the two pieces, I use what I call an "epoxy dowel." I drill matching 1/2-inch-diameter holes in both ends, then flood the holes and coat the joint with two-part five-minute epoxy — the kind that comes in a double syringe — and insert a 3/8-inch-diameter dowel. The undersize dowel allows some fine adjustment, and the epoxy fills the spaces to make a very strong joint. I use a spring clamp to hold the pieces firmly together until the epoxy sets (Figure 2).

With my newly crafted fitting set on the newel post, I mark its endpoint on the handrail platform. Now I can align the volute assembly back on the stand and transfer the gooseneck mark to the straight rail for cutting. Then I bolt all the parts together, but still don't glue anything until I've checked the final fit from newel to newel. I'll install the volute newel next.

The Volute Newel

Although we used a good-quality manufactured bullnose tread and riser on this staircase, the hollow, rounded riser end needed some remedial reinforcement before installation (Figure 3, page 4). Codes require that guardrails be able to withstand a sideways force of at least 200 pounds, and the newel takes up most of this load. Therefore, the point of attachment must be extremely solid.

I fill the internal void in the bullnose end with solid blocking, using screws and lots of construction adhesive. I'm mindful to place the screws where I won't drill into them later when setting balusters. The bullnose riser must be securely fastened to the floor, and the tread well-fastened to the riser, using lots of adhesive. Since the height of the volute varies with different fittings and rail heights and with stair rise and run, always use an adjustable volute newel. (In my work, I typically use a custom newel.) Most adjustable newels have a long, 1 1/2-inch-diameter removable dowel inserted into a deep hole centered in the base (Figure 4, page 5).

The dowel is removed to cut the newel to length, then glued back into the bottom of the newel with wood glue or epoxy.

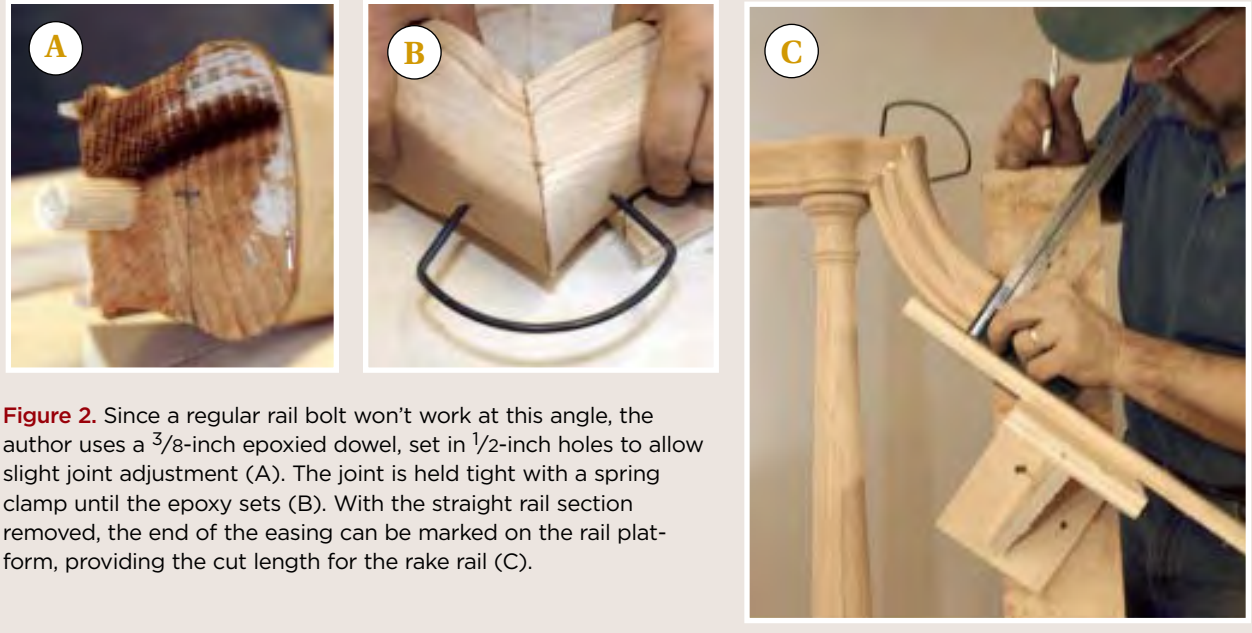


Figure 2. Since a regular rail bolt won't work at this angle, the author uses a 3/8-inch epoxied dowel, set in 1/2-inch holes to allow slight joint adjustment (A). The joint is held tight with a spring clamp until the epoxy sets (B). With the straight rail section removed, the end of the easing can be marked on the rail platform, providing the cut length for the rake rail (C).

Figure 3. The bullnose riser assembly (A) should be solidly filled to provide maximum holding power for the newel post. The author cuts filler blocks to eliminate all recesses, sliding them into place on a heavy bed of construction adhesive (B).

Adjustability. It's almost impossible to bore a perfectly plumb mounting hole into the bullnose tread without a drill press, so I prefer to drill an oversize, 1 5/8-inch hole, to allow some adjustability. I drill the hole as deep as my spade-bit allows, then saw the dowel off about 1/8 inch shorter than hole depth. I drill a 1/4-inch-diameter hole in the bottom center of the hole, and another in the center of the dowel. I drive a 3/8-inch-by-3-inch dowel screw halfway into the dowel. (The easiest way to do this is to chuck the screw in your drill using a driver kit, an accessory typically offered by stair-parts manufacturers.)

Then, with a generous application of five-minute epoxy, I screw the newel down onto the tread. The dowel screw pulls the shoulder of the newel down square onto the tread, and the epoxy fills the gap between the dowel and the oversize hole. When the epoxy sets, the structure is monolithic and very strong.

Now I check the fit of the rail assembly — it should drop down onto the pin tops of both newels. After testing the fit, I loosen the rail bolts, apply wood glue to the joints with a Popsicle stick, and snug the bolts up tight again with the railing in place. When the glue has grabbed, I remove the rail stands and install the balusters.

Fitting Balusters

In most cases, to meet code spacing requirements you'll need to install three balusters per tread. And because the height between railing and tread grows from front to back, you also need three different baluster lengths per tread, each typically about 2 1/2 inches longer than the last. This is a fairly standard differential that suits most code-compliant stair pitches.

Since we've already located the front baluster center, locating the other two centers is as simple as stepping off in thirds back to the riser. A quick way to do this is to use the 12ths scale on your framing square and a compass to divide and transfer the distance in equal fractional segments (Figure 5, page6).

The balusters I'm using on this demo stair, provided by Coffman Stairs (276/783-7251, www.coffmanstairs.com), have adjustable blocks on top, designed to make it easier to match the angle of the rail. At the bottom, the balusters have standard 3/4-inch dowel pins. Dowel screws provide a much stronger connection than glued dowels for securing the balusters and I generally prefer to use them, but in this case I drill 3/4-inch

Figure 4. The volute newel comes with a loose-fitting dowel, which gets glued in place after the newel is cut to length (A). To allow for adjustment, the author drills a slightly oversized hole into the bullnose tread and blocking to receive the dowel (B), then sets it in a bed of five-minute epoxy, using the 3/8-inch-diameter dowel screw to pull the newel tight against the tread (C). After the newel is properly aligned and the epoxy has set, the author dry-fits the rail assembly to check its alignment over the post pins (D).

Figure 5. Using a compass is the easiest way to space the balusters (A). Balusters may be attached by dowel screws, best driven chucked in a drill (B), or by integral dowels set in cup holes drilled in the treads (C). Wood glue is used at both ends of each baluster to prevent movement (D). The tops of the adjustable balusters are brad-nailed — first the pins (E), then the blocks (F). They will later be locked into place with fillet molding. The last baluster under the gooseneck easing (G) is cut with a jigsaw to fit the railing.

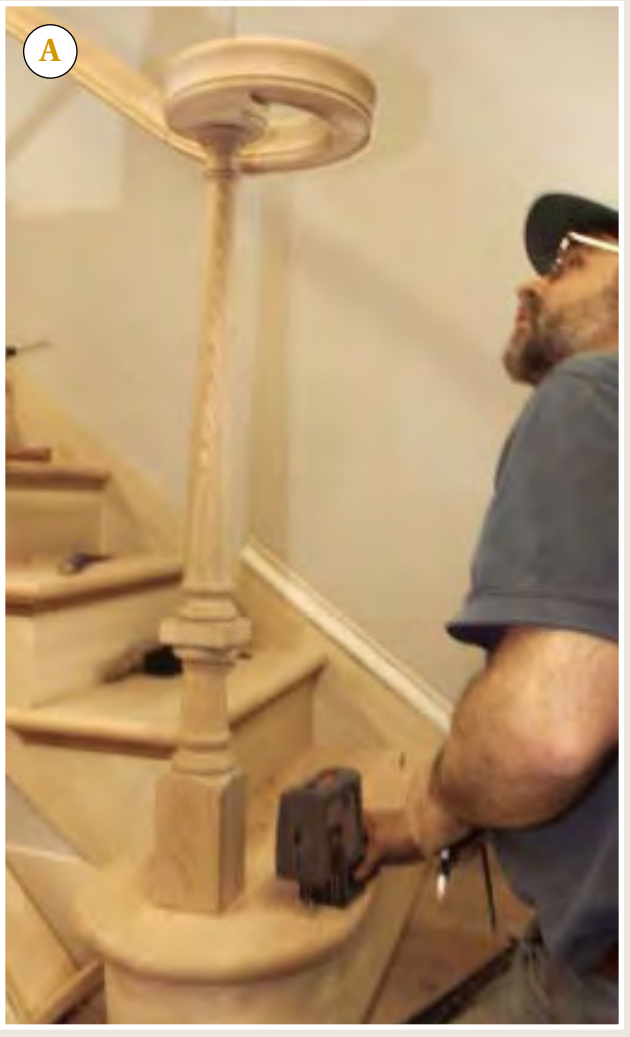


Figure 6. The volute balusters are spaced with the same compass setting as the common treads. Center points are found, one at a time, by locating the volute center over progressively scribed arcs (A) using the laser plumb (B).

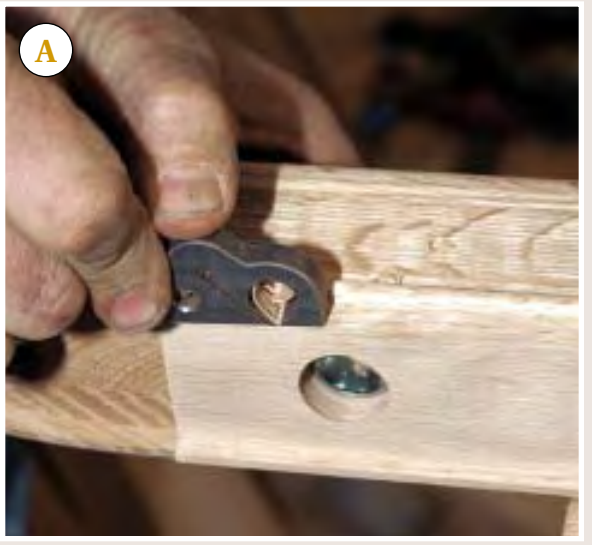
cup holes in the treads at the marked centers.

With the railing clamped overhead, I use the laser plumb bob to accurately locate the top of each baluster against the railing. Holding the baluster in position, I scribe the angle against the railing, then cut it about 1/4 inch long so that it will fit up inside the plough. After adding a small amount of glue (to avoid drips), I fix its position with a pneumatic brad: first the pin, then the block.

Fillet — a thin strip of matching wood made to fill the plough between balusters — ensures that the baluster won't move off the brad and gives the underside of the railing a nice, finished appearance. It's a time-consuming task to cut fillets, but simply butting a square-top baluster against a flush-bottom railing practically guarantees that you'll have visible gaps at the top, and a much weaker assembly that relies only on the brads for holding power.

The last baluster before the landing newel happens to coincide with the curving up-sweep of the gooseneck. Therefore, I have to scribe and cut the baluster top using a saber saw. A curved fillet piece is typically sold with the gooseneck fitting to finish the underside.

Baluster spacing under the volute's spiral is no different than the standard tread spacing. I use my compass and laser plumb bob to set the centers one at a time, at the same intervals as the common baluster spacing (Figure 6). Baluster layout starts against the second riser up and works out from there around the



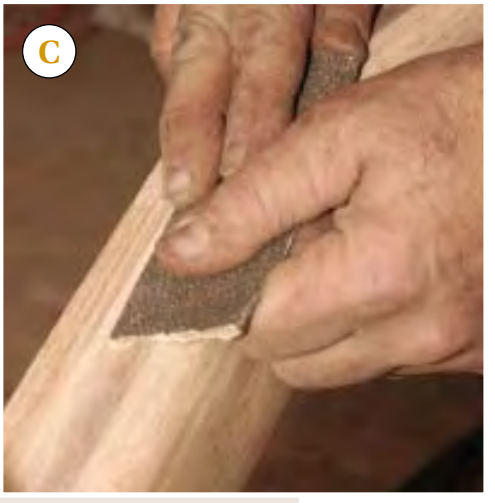


Figure 7. The author cleans up the joints in the handrail with a small plane (A), a spokeshave (B), and sandpaper (C).

spiral. I eyeball the volute's radius, swing an arc with the compass, and find the rail's precise centerline by placing the plumb bob over the arc.

I install the level landing balusters and those wrapping the volute newel first because these are all square-cut to common lengths. After screwing them down on their dowel bolts, I set the assembled railing over them.

At this point I can cut and fit the rake rail balusters. If I'm using balusters with wood tenons, I'll go ahead and glue the railing to the newel pins. Then I can rock the rake balusters into place, dropping them into the cup holes in the treads and lining them up with layout marks on the underside of the railing, which I make using the laser. I work from the bottom of the stair up; this makes it easier to brad-nail the balusters to the railing. I'm careful not to overdrive the brads and jack the railing up.

If I'm using dowel screws, which I prefer, I'll wait to glue down the handrail until I've marked and cut the balusters, and threaded them into place.

Fitting the fillet pieces completes the baluster installation. I clean up the railing assembly, beginning with a small plane, a spokeshave, and 36-grit paper to fair the joints (Figure 7), then step down through 80-, 120-, and finally 180-grit papers to finish.

Jed Dixon *is a master stair carpenter in Foster, R.I., and a regular presenter at* JLC *Live.* *Thanks to Crown Heritage for providing all the railing parts for this demonstration staircase.*