

Mastering Balusters

A stair pro shares his process for installing the three common types of stock balusters

BY JAMES SHULL



PIN-TOP balusters taper to a uniform diameter near the top, which fits into a hole drilled in the rail. Pins on the baluster bottoms glue into holes drilled in the treads. You'll need to trim them to length, but I buy 34-in. balusters for the front, 39-inchers for the back, and, if there are three per tread, 36-inchers for the middle.



SQUARE-TOP balusters also come in various heights, and their doweled bottoms glue into the treads. The tops are cut on site to the angle of the stair, and are nailed into a rabbet plowed into the bottom of the rail. Fillet strips reinforce the connection, ensure consistent spacing, and fill the rabbet for aesthetics.



METAL balusters have gained popularity in the last decade. While they can have a variety of decorative elements, the basic stock is usually $\frac{1}{2}$ in. square, with a short, round section that fits into a hole drilled in the underside of the rail. Similarly, the square bottom section fits into a hole in the tread, and is then braced with a collar.

As a custom stair builder, I've installed miles of railing and balusters. Designs vary, but the style of balusters breaks down to three main types: pin top, square top, and metal. No matter what kind of baluster you're installing, the starting point is the same. You need to install the newels so they're plumb and centered where you want the balusters to fall on the stairs. To be code compliant, the rail has to be between 34 in. and 38 in. above the line of the tread nosings. Because a stair rail rises while the treads stay level, balusters are sold in several heights, with taller ones used at the back of the treads. In order to cut the balusters at consistent heights, the rail also needs to be parallel to the slope of the tread

nosings. The space between balusters on stairs can't be more than $4\frac{3}{8}$ in., and on level rails this is reduced to 4 in. For stairs with runs up to 10 in., the $4\frac{3}{8}$ -in. spacing requires two balusters per tread. Deeper treads will call for more balusters.

Here, I focus on installing balusters on stairs, but the process doesn't differ much when working with level rails on balconies—and you're sure to find those installations easier in comparison. □

James Shull's company, James Shull Custom Stairs, LLC, in New Fairfield, Conn., does all kinds of stair work, but specializes in high-end, one-off installations. Photos by Andy Engel.

LAYOUT AND DRILLING ARE UNIVERSAL

Accurate baluster placement starts with a good layout on the treads and continues with the transfer of that layout to the bottom of the rail. You need to get this part right, because once drilling starts, you're committed. Most stair builders still rely on corded drills for this work; drilling a lot of relatively large holes in hardwood gives even the best cordless tools

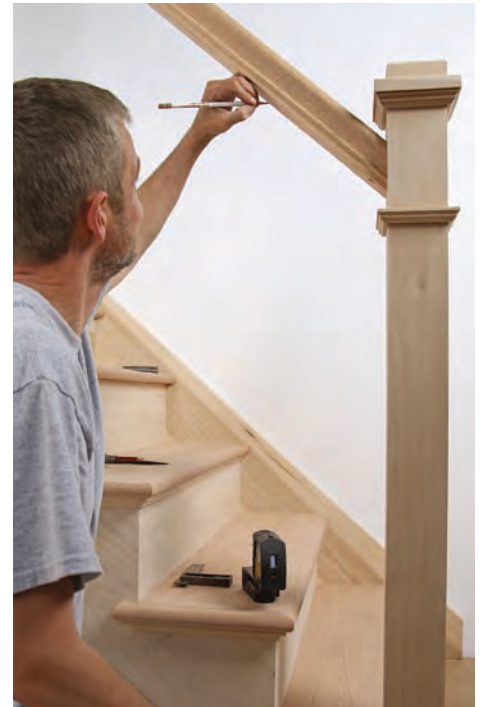
a workout. Always use new spade bits for each job—they're cheap, and hardwood dulls them quickly. Be sure to have spare $\frac{3}{4}$ -in. bits on hand because you'll almost always dull at least one on tread-return nails. When finished drilling, take a random orbital sander to the bottom of the rail before moving on to baluster installation.



Set the spacing. Locate the first baluster so that its face aligns vertically with the face of the riser below it. Set the second baluster half the distance of the stair run behind the first.



Center the placement. The vertical centers of the balusters should be aligned with the vertical centers of the newels, and are easy to locate consistently using a combination square referenced off the tread returns.



Plumb up. The fastest way to transfer the baluster locations to the rail is with a laser plumb bob, but you can also use a level and a combination square.

Drill the treads first. Most balusters call for a $\frac{3}{4}$ -in.-dia. hole in the tread. Once you're finished drilling, use the air from the drill motor's fan to blow the chips out of the holes.



Accurate angled drilling. When drilling plumb holes in an angled rail, start with the bit square to the rail, then, once its point bites, swing the drill so the bit eyeballs plumb. Drill in about 2 in. (usually to the shoulder of the bit) to avoid drilling through the top of the rail.

PIN-TOP BALUSTERS

Most pin-top balusters call for a $\frac{5}{8}$ -in.-dia. hole in the rail, but sometimes an $1\frac{1}{16}$ -in.-dia. hole is needed if you've trimmed the tops of the balusters down to the tapered section. Yellow glue can be used for this connection, but it drips a lot, and if a baluster fits tightly the glue may flash-set before it's in its final position. PL Premium construction adhesive is a much more manageable product that also fills voids.

Mark the length.

Find the length of the balusters by placing their dowels in the treads and holding them against the rail. Allow for about 1 in. to penetrate into the rail.



Glue the hole.

A shot of construction adhesive in the rail and in the tread secures the baluster. Use mineral spirits to clean off any adhesive squeeze-out before it sets.



Push up, pull down.

With a twisting motion, push the baluster into the rail. When the dowel clears the tread, swing it into place and seat the baluster. Dowels aren't always centered, so check that each baluster aligns with the others, and twist it to a different face if needed.



Pin the pin top. To fix the baluster in place until the adhesive sets, shoot a $1\frac{1}{4}$ -in. 18-ga. nail through the pin top and into the rail.



SQUARE-TOP BALUSTERS

With square-top balusters, it's particularly important for the rail to be parallel to the slope of the stair nosings, as the relatively short upper blocks of square-top balusters can make even small height differences noticeable. You can buy a rail that's already plowed or plow your own. When I do it myself, I plow the rail to $\frac{3}{8}$ in., and cut $\frac{1}{4}$ -in.-thick fillets in order to leave a $\frac{1}{8}$ -in. reveal.

Check for parallel. To make sure the rail is parallel to the stair, hold a framing square across the tread nosings and check the rail height at several spots.



Plumb the first baluster. Tape a 24-in. level to a board to bridge between the square parts of the baluster and mark its top edge on the rail.



Mark the baluster. With the baluster plumb, mark the spot where it meets the railing. Repeat this process on the longer, rear baluster(s).



Mark the actual cut. Add the depth of the plow to the mark on the baluster. Repeat this process for each baluster on the tread, and you'll have length templates for all the balusters on the stair.



Nail 'em. After gluing the tread holes and the baluster ends, fasten them to the rail with $\frac{1}{2}$ -in. finish nails. Start at the bottom of the stair so there's room for the nailer, and keep an eye on spacing so the balusters don't wedge up the railing. Finish by pinning a fillet strip between each baluster.

METAL BALUSTERS

The length of metal balusters must be precise because they bottom out both in the railing and the tread. Because of this—and as with square-top balusters—it's critical to get the railing parallel to the slope of the tread nosings. Unlike the other baluster types, when working with metal balusters, the rail is attached temporarily for layout and drilling, removed while the balusters are placed in the treads, and then reinstalled over the balusters.

Measure carefully. Metal balusters must be cut to exact lengths so they bottom out in the tread holes and their shoulder contacts the rail at the lower end of the hole. A folding rule is an excellent choice for getting the overall measurement right.

Drill the treads precisely. Use masking tape on your bit when drilling the treads to measure the depth of the holes, and make sure they're right with a depth gauge.

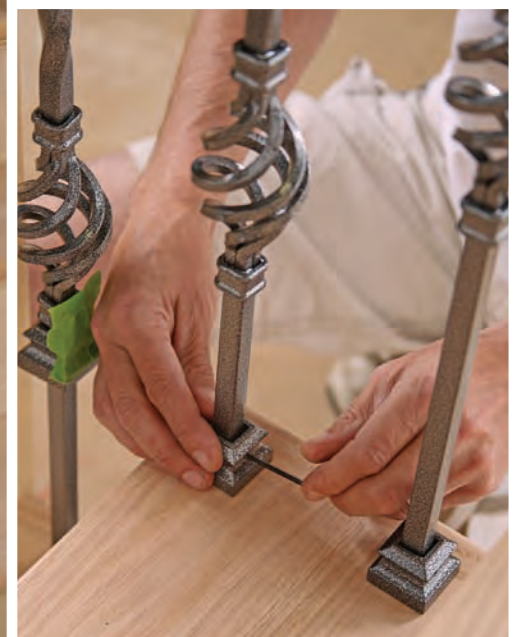
Drill smaller. With the rail installed temporarily, drill $\frac{1}{2}$ -in. holes for the balusters, located the same way as with pin-top balusters. You only need to go about 1 in. deep for most metal balusters. The railing will come off later to allow for baluster installation.

An excuse to buy a tool. Use a cutoff saw to cut metal balusters to length. If you don't do much stair work, a cheap version from a discount tool house will last through a few jobs.





Assemble. With a shot of construction adhesive in each tread and rail hole, the collars on the balusters (taped in place to keep them out of the way), and the balusters in the treads, place the rail over the balusters and screw it to the newels.



Tighten. Slide the collars down to the treads and tighten the set screws. The collars can be loosened and moved by the floor finisher when sanding and coating the treads.