

# Quick and Sturdy Stair Attachment

**Nailed-on steel straps make a bomb-proof connection**

by Mark Hansen

**M**y dad was a deck builder, and I remember going with him to job sites as a kid. I dug holes, screwed down decking, and stained decks while he spent his time on the layout and the stairs. To fasten stairs to a deck, he would screw blocking between the stair jacks (or stringers), then nail the blocking to the deck framing with 16d nails — no hardware at all. Of course, for there to be any meat left to the stringers, the top tread was actually an extension of the decking.

I never really liked the way I was taught to build stairs. When I got older and started building on my own, I came up with a way to attach stairs using metal strapping that's fast and sturdy and doesn't require the top tread to be at the same level as the deck. I still use blocking between the jacks but lower down, where it's needed to stabilize newels.

## Attach Jacks With Hardware

There's nothing fancy about my jack layout until you get to the top. There, I cut the jacks to extend below the deck joists (**Figure 1**). Then I nail a CS16Z 16-gauge steel strap (Simpson Strong-Tie; [strongtie.com](http://strongtie.com)) to the underside of each jack and to the face of a joist (**Figure 2, page 2**). With all the nail holes filled, this strap is rated by the manufacturer for about 1,700 pounds.

In cases where the joists run parallel to the jacks, I install blocking between the joists and use the same strapping detail (**Figure 3, page 2**). Often, though, the outer jack falls directly on a joist; in that case, I nail the strapping to the bottom of the joist, using 16d common nails. That configuration provides a stout connection, but it loads the nails in withdrawal, which means their load-bearing ability isn't as great or as reliable as it would be were they loaded in shear (that is, across the shaft of



**Figure 1.** The stair jack, or stringer (foreground, upside down), is cut to extend below the joists. Galvanized-steel strapping is nailed to the jack's bottom with 10d commons.



**Figure 2.** With the jack placed, the strapping is bent upward and nailed to the side of the joist. Use full diameter 10d x 1½-inch nails for the joist connections.

the nail as opposed to parallel to it). Withdrawal is a friction-based connection that can weaken over time, particularly in locations subject to severe weathering.

Only one jack, however, out of three or more is connected that way, and the entire system is more than capable of handling the load. On a typical 3-foot-wide three-jack stair at residential loads of 50 pounds per square foot, the upper connection shown here could support as many as 9 treads — even applying a 250 percent safety factor and entirely discounting the contribution of the third jack because of the withdrawal loading. And that's not taking into account that half the weight of the stair is borne by the lower landing. In theory, the stair could support 18 treads, though in practice, the code wouldn't allow it. (The maximum span for cut stringers without an intermediate landing is only about 7 feet, depending on the lumber species.)

There are several caveats. First, any time you make a connection using



**Figure 3.** When joists are parallel to the jacks, install blocking between the joists to receive the strapping. The strapping is nailed to the bottom of the outer joist with 16d commons; the combined strength of the inner connections compensates for this somewhat sketchy one.

hardware, you must follow the manufacturer's instructions. And it's critical that full-diameter nails that are rated for use in treated lumber be used. Both shear and withdrawal values drop significantly with smaller nails. Another factor is the species of wood the nails are going into. Douglas fir and southern pine hold nails well, but the allowable loads decrease with most other wood species and when the wood is wet. Manufacturers such as Simpson and USP Structural Products (800/328-5934, [uspconnectors.com](http://uspconnectors.com)) provide a great

deal of design information on their Web sites.

If the alignment of the joists and the jack allowed, I could use a Simpson TS twist strap that gets nailed to the side of the joist, loading the nails in shear. Unfortunately, Simpson doesn't make that strap with its Z-Max galvanized coating, and a connector that might corrode isn't any better than one that loads the nails in withdrawal. ♦

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