

Connecting Posts to Shallow Joists

Q Because of limited clearance, I'm building a rooftop deck with 4x4 or doubled 2x4 joists. What is the best way to fasten 4x4 posts to the deck framing in order to meet California codes, which have typical IRC post-deflection limits and call for a 42-inch railing height above the deck surface? The entire rooftop deck is floated on foam.

A Paul Bennett, P.E., a managing engineer with Exponent Failure Analysis Associates, in Boulder, Colo., responds: In general, I would advise against trying to anchor a 4x4 deck post to a 2x4 or 4x4 joist. Testing has shown that anchoring a post to a joist smaller than 2x8 is likely to result in premature failure due to the joist cracking. But the question—and your proposed solutions (see illustrations A, B, and C, right)—is worth addressing here because of the issues it raises. The first is the misuse of structural hardware.

In the first option (A), for example, the L-straps being used to create a connection to resist rotation will instead result in what we geeks refer to as “cross-grain bending” on the post. In plain English, this means that when a significant lateral load is placed on the top of the post, the post base may split about the bolt holes. While the hardware shown can resist some post rotation, it is really intended to resist axial load; that is, the load created by pulling straight up on the post.

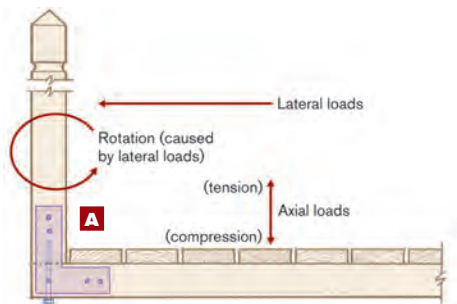
Option B shows girder tiedowns used in an unintended configuration. Similar to the L-straps, these tiedowns are intended to resist axial load, not rotation. Once the post is loaded, the tiedown on the outside may buckle in compression, and the tiedown on the inside may fail if the nails withdraw due to the rotation of the post. Also, note that the lag screws shown in options A and B offer limited help, as they are screwed into the end grain, where they are relatively weak in pull-out, as would occur when the post is rotated.

In option C, the problem is the close distance between the bolts and the end of the 2x4 joist and constraints created by the 3½-inch joist height. Design codes require carriage bolts to be placed a certain distance from the edge and ends of the member, and in this case, there is not enough room to get sufficient distance between the bolts to resist rotation while maintaining proper edge distances in order to prevent splitting.

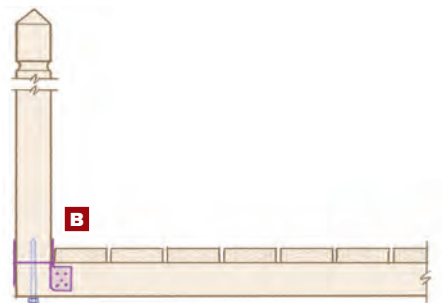
It might be possible to reinforce the connection with steel plates, but the cost of engineering and building such a design makes it an unattractive option, as the complete load path back to the other end of the joists would have to be analyzed. My advice would be to look for a way to attach the posts directly to the wall or roof structure, rather than to the deck framing.

There are two lessons here. One is that unless you are using a piece of hardware in an obvious application for which it was designed, you should always call the manufacturer and ask to speak with an engineer about your particular situation. Hardware manufacturers have on-call engineers, and contractors should take advantage of this free service.

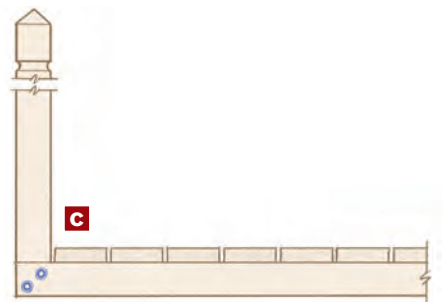
The other lesson is that wood is a complex building material that is affected by factors such as moisture content, species, knots, splits, end grain, side grain, and warpage. To avoid a potential failure, always pay attention to the species and grain configuration assumed by the structural engineer or the hardware manufacturer.



Misusing L-straps in this configuration may cause the base of the post to split under lateral loads.



Under a lateral load, the tiedowns used here may buckle under compression or fail when the nails withdraw.



This bolted connection is too close to the ends and edges of the joists, and will cause the 2x4 joists to split.

Composite Decking Maintenance

Q My clients' 5-year-old composite decking is starting to fade, and they're starting to panic. What can I do to bring the decking back to life?

A Jim Grant, the proprietor of Jim The Deck Guy, in San Diego, Calif., responds: Scorching sun, weeks of rain or snow, mold and mildew, and food stains can impact the appearance of any type of deck—composite decking included. Fortunately, most composite decking can be restored to look like new with a simple

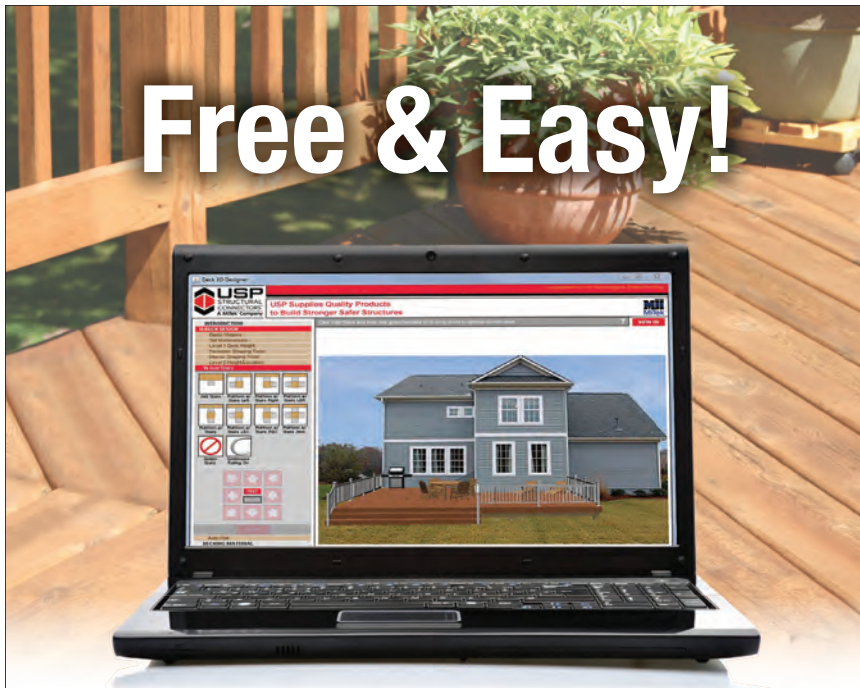
maintenance regimen, as long as the problem is on the surface and not in the substrate.

To clean a dirty composite deck, we mix up a batch of Duckback's Composite Deck Cleaner (superdeck.com) in a 5-gallon bucket. One 2.5-pound container costs around \$30 and makes 5 gallons of cleaner, enough to clean about 125 square feet of decking. We use warm water and mix thoroughly; the cleaner is designed to work at a specific concentration, so we never add more water than the manufacturer recommends.

Depending on the size of the deck, we apply the solution with a garden sprayer or just a soft bristle brush dipped in the bucket. After the cleaner foams up, we scrub the decking with a medium-stiff bristle deck brush. To prevent the cleaner from drying out on the deck, we work on one small area at a time, keeping a garden hose close and misting the cleaning area frequently. Then we rinse the cleaned area with either a low-volume pressure washer or a strong stream from a garden hose. Most decks will require two applications of the cleaner.

In recent years, we've also been applying Duckback's clear acrylic sealer to decks after we clean them. The sealer prevents heavy dirt and stains from bonding to the decking, making it measurably easier to clean the next time. Any cleaner or protective sealer should always be tested on a small area first.

To prevent a severe build-up of dirt, which can be difficult to erase, I recommend cleaning composite decking every two years. In addition, I advise my clients to hose down their decks every month or so to keep the surface clean. ❖



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