

# Anchoring Wood

## Forget about packing the web; fasten wood to the top, and hang the floor framing with top-mount joist hangers

BY JOHN SPIER

Modern floor plans are trending toward wide-open spaces. Despite advances in engineered-wood beams, there are times when something stronger is needed. Many carpenters shy away from steel because fastening lumber to steel can be tricky. Cutting a steel beam on site is even trickier. Sometimes, though, a steel I-beam is the best choice. Structural steel costs less than comparable LVLs, is strong, and is available from local suppliers. If you order it to the right size with fastener holes punched, your only challenge will be attaching the lumber.

### Steel has a few limitations

Although a piece of steel carries a larger load over a longer span with less depth than any other building material, steel has some disadvantages. First, it's very heavy. You need to make sure you can get it to where it needs to go, either with humans or with a machine. Second, you won't find steel span charts in a codebook; steel usually needs to be sized by an engineer. Steel should be protected from moisture to prevent rust and deterioration. Also, a

steel beam will fail much more quickly and catastrophically than an equivalent wood beam in a fire.

### Top-mount joist hangers are the most practical

In the simplest usage, an I-beam rests in pockets cast in foundation walls, with floor joists on top of it. More often, though, wood is bolted to the web; then joists or rafters are attached to the wood with standard joist hangers. The drilling and bolting required by this method are so impractical that it's worth changing before construction. Another attachment method is to weld top-mount hangers to the I-beam. However, this option is rare, not because it doesn't work but because most framing crews don't have a welder on site.

I think the best method is to bolt 2x lumber to the top flange of the I-beam, then nail top-mount joist hangers to the lumber. I use ¼-in. by 1½-in. lag bolts through the bottom of the top flange. Because top-mount joist hangers won't resist twisting as well as face-mount hangers, I use strapping below or blocking between the joists. If uplift resistance is needed, I tack the lumber in place with a powder-actuated nailing tool, then through-bolt after the plywood subfloor is down, recessing the bolt heads into the plywood.

The steel I-beams most often seen on job sites are called W- (wide) and S- (standard) shapes, depending on the width of the flange. Steel beams are designated by shape, depth, and weight. For example, a W8x35 beam is a W-shape about 8 in. deep and weighing 35 lb. per lin. ft.

Because steel is hard to cut and drill on site, your supplier needs the exact length along with sketches showing all hole locations and sizes. If you have to cut a beam, an acetylene torch is the easiest method, but metal-cutting blades in circular saws and reciprocating saws work, too.

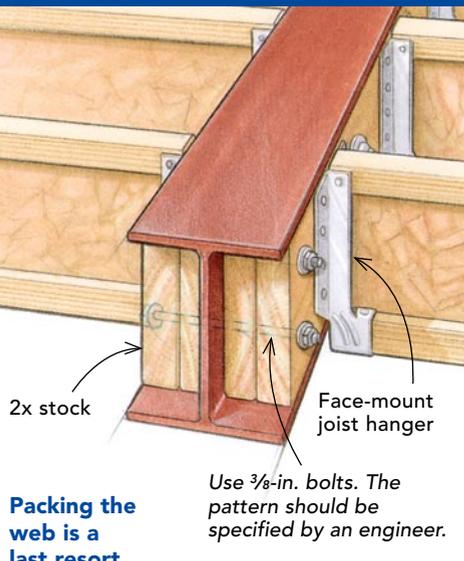
### Steel needs protection from the weather

To prevent corrosion, most suppliers spray steel with a primer. It's worthwhile to make sure primer is applied because it keeps the steel clean and rust-free while you're working with it. Occasionally, galvanizing is specified for steel components. If it is, make sure all the cutting and drilling are done first, and remember that the holes need to be oversize by ⅛ in., or the bolts won't fit through after galvanizing is done.

Really big beams are best set in place with a crane, but lesser beams often can be placed with a lumber-delivery boom truck. A backhoe or excavator works if it can get close enough. I've found that beams as heavy as 600 lb. or so can be set safely with human power (four to six people), as long as they're not too high up. Use levers, rollers, winches, platforms, and plenty of caution. Finally, remember that wood shrinks and swells, but steel won't budge. □

John Spier is a builder on Block Island, R.I. His new book, *Building with Engineered Lumber*, is now available from The Taunton Press.

### A WASTE OF TIME



### Packing the web is a last resort

Unless there are compelling reasons (such as headroom issues) to attach wood this way, I avoid it. This is a very strong method, but it's too time-consuming to make it practical for everyday use.

# to a Steel I-Beam

## THE FASTEST WAY TO MARRY WOOD TO STEEL

Bolt a 2x6 or 2x8 to the top flange of a steel I-beam, and use top-mount joist hangers to support the floor framing. Fastening 1½-in. lag bolts through the bottom of the top flange is far faster than countersinking the heads of through-bolts from above.

Have holes punched by steel fabricator.

Web

Steel I-beam

Flange

Top-mount joist hanger

2x stock ripped to width of flange

¼-in. by 1½-in. lag bolt spaced every 12 in. on alternating sides

Floor joist

W-shape

S-shape

### I-BEAM OPTIONS

Most I-beams on job sites are W-shapes, or wide flange. Another common beam is S-shape, or standard, which has narrower flanges and a thicker web. S-shapes are generally taller than comparable W-shape beams. Narrower S-shape beams are better suited for recessing into wall framing, whereas W-shape beams are great where headroom is an issue.