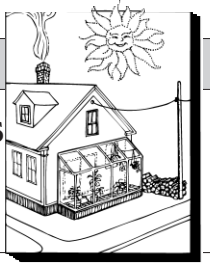
# The Energy Advantages Of Wood I-Beams



by Bruce Sullivan

Ask any builder about the quality of dimensional lumber these days and you're likely to get an ear full. Then mention current lumber prices and you'll likely unleash real excitement, plus a raft of questions about alternative materials. Suddenly those engineered members look pretty attractive. Wood I-beams, in particular, have a number of advantages over dimensional lumber, not the least of which are the energy advantages.

### Ventilation

Wood I-beams intended for residential use commonly come in four sizes — 9 1/2, 11 7/8, 14, and 16 inches. These depths offer ample room for insulation and ventilation in floor and roof assemblies.

Getting enough ventilation in a cathedral ceiling, for instance, has always been a challenge with conventional lumber rafters, but is much easier with wood I-beams. For example, the 11 7/8-inch beams can hold a high-density R-38 fiberglass batt (10 to 10 1/2 inches thick) with plenty of room to spare for ventilation. In cold climates, builders often upsize to 14- and 16-inch I-beam rafters. These allow for conventional R-38 batts (12 inches thick) plus even more ventilation to ensure a cold roof that prevents ice dams (see Figure 1).

Wood I-beams have 1 1/2-inch knockouts at 12 inches on-center near the top flange for running pipes and wires. But you can also use the knockouts to quickly open up cross ventilation near skylights and hip rafters, where ventilation is otherwise very difficult (see Figure 2).

### Insulation

One of the great advantages of wood I-beams is that you can fit nearly continuous insulation across a roof or floor assembly. The plywood or OSB web is only 1/2 inch wide, so there is less wood to conduct heat through the framing, especially if you frame 24 inches on-center. Be sure to order batts that are a full 16 or 24 inches wide. Batts intended for wall framing are cut slightly narrower to account for the thickness of conventional framing lumber. These narrow batts leave gaps around the thin webbed I-beams, allowing air to circulate and reducing the effective R-value.

In roofs, the deep I-beam rafters allow more room over the wall plates, so continuous insulation can be maintained over the exterior walls. The insulation isn't pinched at the edges as it is with typical stick framing and common trusses.

Fiberglass insulation is notorious for allowing air to circulate through it, however. So make sure you install baffles above the wall plates, as shown in Figure 3. This prevents air from blowing through the batt and creating a "thermal short circuit" that can cause condensation, and sometimes mildew, on the ceiling near exterior walls.

### Cost

Suppliers charge more for engineered lumber than for solid-sawn lumber. However, rising lumber prices are quickly closing the gap. Also, installed cost and material cost are not the same. While it's difficult to accurately nail down an installed cost for wood I-beams, here are some things to consider.

Most builders agree that wood I-beams are easier to handle than solid-sawn members. Wood I-beams are lighter to carry, and you don't have to crown them or spend time straightening warped material. But they also require web stiffeners at bearing points to transfer loads at ridge and rim connections. Labor costs are probably a wash, unless you are dealing with very long spans. In this case, wood I-beams will probably save labor. You save time when you don't have to break joists and rafters over bearing walls or beams. And long solid-sawn members are a bear to handle, to say the least.

In addition, there is substantially less waste with wood I-beams. I-beams are often cut to the nearest foot and every piece can be used; with solid-sawn lumber you are paying for knots, bows, and shrinkage.

However, there is one disadvantage with I-beams that's seldom mentioned. With material that's light, straight, and dry, the framers won't have much to complain about. ■

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*If you have an energy-related question, please send it to* JLC, *RR#2, Box 146, Richmond, VT 05477.*

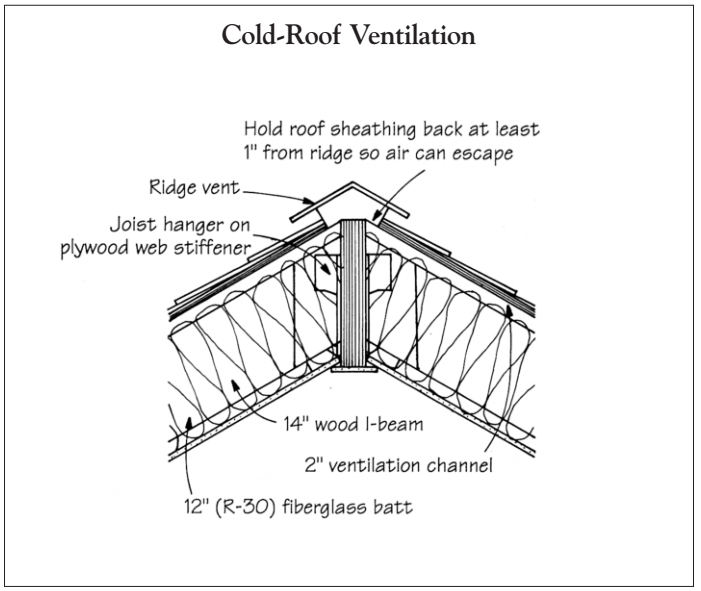


**Figure 1.** *Wood I-beams are generally deeper than conventional solid-sawn rafters, so you can get good insulation and still leave ample room for ventilation. Use full-width batts so the insulation will fit tight next to the narrow webs.*

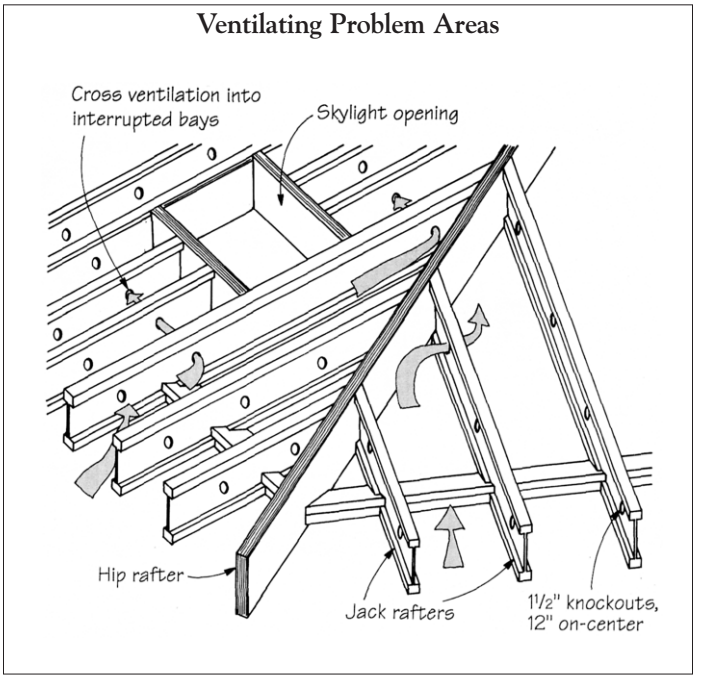


**Figure 2.** *The 1 1/2-inch knockouts in wood I-beams allow air to circulate around jacks feeding into a hip rafter and through bays interrupted by skylights.*

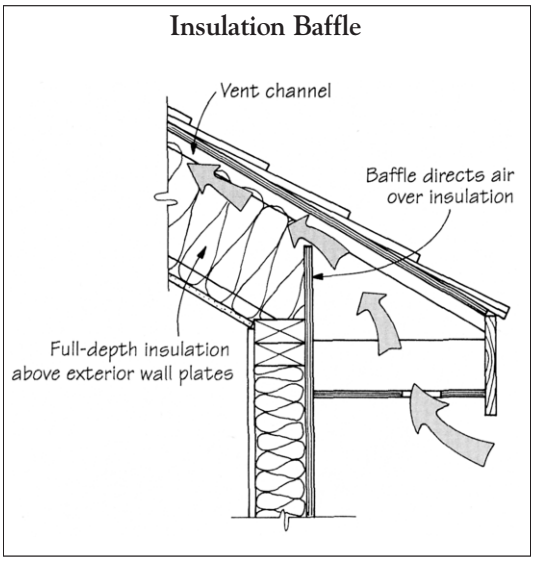


**Figure 3.** *Install a baffle at the exterior wall plates to prevent air from blowing through the end of the batt.*