spline—for example, a 2x6 for a nominal 6-inch panel—is the most common treatment at a joint. A full spline nailed through from both faces, and sometimes glued, provides good structural continuity. But the joint is a weak link thermally. This will often result in "melt lines" or "frost lines" showing on the roof. Full splines can also lead to cracked drywall joints on the interior if the wood spline swells during the first winter.

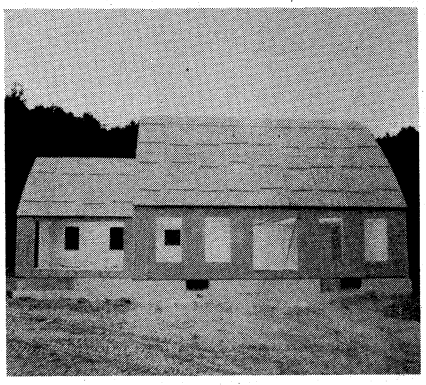
To beef up the joint thermally, many have switched to a double spline system. This improvement is still vulnerable to thermal, air, and moisture leaks. To bridge the gap thermally, Benson intentionally leaves a 3/8-inch gap in the foam between the splines. The gap is foamed through ¼-inch holes drilled about every 10 inches from the outside. Northern Energy Homes uses a 1½x2-inch foam spline to get thermal continuity. Its panels are slightly beveled, leaving a gap on the outside to be foamed for an airseal.

Stress-skin roofs face another nuisance. Sometimes shingles refuse to lie flat over joints. The cause is attributed to expansion of the waferboard, which buckles the shingles. This problem has also been reported on conventional roofs with waferboard sheathing. One solution, reports Winter, is to seal the waferboard edges with roofing cement and then wet down the roof to "condition" it to its normal moisture content. Some waferboard manufacturers are said to be responding to the problem by preconditioning their panels. Tedd Benson says that his solid foam-to-foam joint seems to prevent the problem, which he blames in part on moisture that escapes and condenses under the shingles.

Market tactics

Stress-skin panels can't beat the cost of conventional building systems. But they are carving out a niche in the market for low-energy houses. Stress skin should become more competitive since the costs of labor and materials for conventional building are increasing faster. Most would agree that panels are used to their best advantage in manufactured and pre-cut panelized housing, where the increased material costs are offset by labor savings and quicker scheduling.

Enercept pre-cuts homes to the customer's plans. The company supplies a complete system through a dealer/contractor network. Enercept's system is frameless with patented wood and metal connectors for wall and roof panels. Vertical loads are picked up by thermally broken studs placed in the panels 4 feet on center. Once the foundation is in, an average house shell can be completed in two or three days, says Enercept's Ken Norberg.



Bowed-roof cape *is typical of the structural panel houses from Winter Panel Corp. The company offers complete design services throughout New England.*

The W.H. Porter Company markets some panels with a tubular-steel octagonal frame. It's aimed at the recreational and vacation-home market. Most of Porter's panels are sold for roofs of conventional houses, and some for site-built panelized houses. Porter sees great promise for OSB-faced roof panels that can span up to 24 feet. "There's no better product," he says, "for cathedral ceiling applications."

Northern Energy Homes supplies completely pre-cut house packages—using styrene panels and a simplified timber frame. "Each piece is pre-engineered and pre-cut for each house," says Northern Energy's Richard Clancy "This way," he says, "we don't leave our technology up to the contractor." The standard package includes such energy amenities as Heat-Mirror windows, integrated night insulation, and groundwater heat pumps.

Other companies target specialty markets. Several pre-fab sunspaces use foam-core panels for end-walls and roof sections. Energy Saving Products, a company that specializes in indoor swimming pool equipment, is beginning to market stress-skin panels for pool enclosures. The company's Rita Welebob says urethane panels are viewed as a one-step solution to problems caused by rusty nail heads and soggy insulation.

While no figures are available, manufacturers report rapid growth over the past two years. Enercept's Ken Norberg forecasts growth from 50 to 100 percent this year over last.

No one speaks as if stress-skin panels are panaceas. But arguments and rivalry aside, everyone predicts a bright future for the foam-core panel system that can provide structural integrity, exceptional energy performance, and freedom from moisture concerns. □