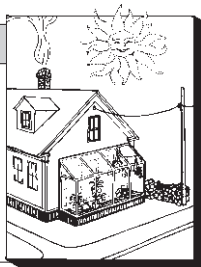


Panelized Construction: The Energy Factor

by Alex Wilson



We are rapidly moving from a component-oriented building industry, to a systems-oriented one. On many construction sites, the building shell arrives, not as truckloads of lumber, insulation and sheathing, but as completed wall and roof sections or interlocking stressed-skin panels.

For the builder this is truly a revolution, speeding erection time and providing quality control. But what effect will it have on the homeowner's fuel bills? How do panelized houses compare with conventional stud construction in terms of energy efficiency?

Bob Barr, General Manager of Amos Winter Homes of Brattleboro, Vt., described the difference this way: To get an accurate sense of energy efficiency, whether panelized or stick-built, you have to look at the whole system, not simply the R-value of the components. Our stressed-skin panel system offers a consistently high R-value throughout, while minimizing air infiltration, a leading cause of heat loss," he said. The Amos Winter Homes package, according to Barr, enables the builder to achieve superinsulated levels of construction quickly and easily. Achieving that same level of energy performance with conventional construction, he said, requires labor-intensive and costly detailing.

Amos Winter Homes, and their parent company Winter Panel Corporation, are among dozens of companies around the country which have recognized that the goals of rapid construction, efficient material use, and energy efficiency can and should go hand in hand. Structural stressed-

skin panel home manufacturers use either a urethane foam or expanded polystyrene (EPS) foam in their panels. While the debate goes on as to which is superior, both urethane and EPS panels generally provide higher levels of energy efficiency than conventional stick-built construction, largely because of their tightness (assuming they are properly erected)

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and uniformity of insulation levels (there are far fewer by-pass leaks). Because structural stressed-skin panel homes are so tight, most manufacturers recommend air-to-air heat exchangers to ensure adequate ventilation.

Some thirty-four EPS panel manufacturers produce an R-Control structural stressed-skin panel, under strict guidelines established by the Associated Foam Manufacturers, Inc. (AFM). AFM specifies energy detailing, such as dual waferboard splines in joining panels (see illustration), caulking and the use of air-to-air heat exchangers. The manufacturers can supply panels of

varying thicknesses to meet the builder's or homeowner's particular energy-efficiency needs.

Some other EPS panel manufacturers operate independently of AFM, but most probably end up with similar performance standards. One of these, Concept 2000 Homes, in St. Charles, Mo., lists estimated heating costs for its various home models. With electric resistance heat, annual heating costs range from about \$200 for a 1,250-square-foot home to \$325 for a 2,500-square-foot home. The large number of variables affecting heating costs, however, make this sort of claim somewhat arbitrary—an energy-efficiency rating factoring in climate and independent of fuel costs (such as Btus per square foot per degree-day) would be much better. Unlike the R-Control panel manufacturers, Concept 2000 panels have studs of rafters embedded into the foam panels—which will increase the strength, but decrease the energy performance slightly.

Along with Amos Winter Homes, there are three or four other urethane-core panel manufacturers. The largest is Cheney Building Systems (manufacturers of Chase Thermo-Panels) of New Berlin, Wis. Cheney has been around for about twenty years, producing walk-in coolers and freezers before moving into the home building industry. Pond Hill Homes of Blairsville, Pa., and Advanced Building Systems, of Clifton Park, N.Y. also produce a limited number of urethane-core structural stressed-skin homes.

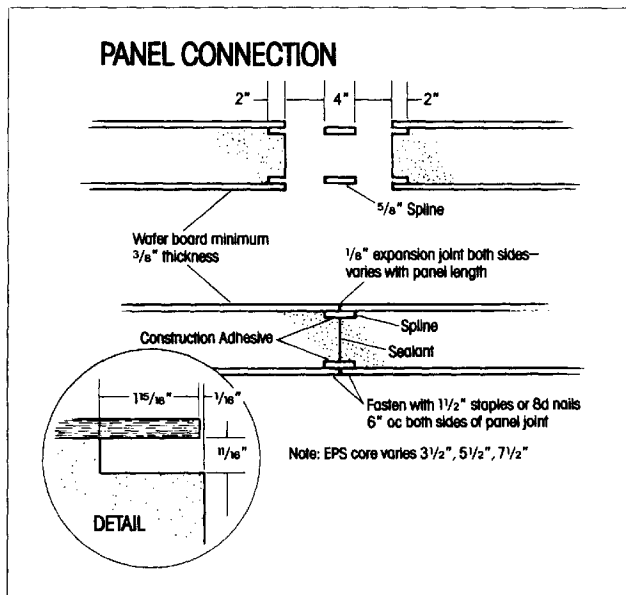
Along with these structural stressed-skin panel home manufacturers, there are a great many panelized home manufacturers who employ more conventional framing and insulation systems, but do so in the factory. Included in this category are Acorn Structures, one of the pioneers in energy-efficient panelized construction, and Scandinavian homes which have received so much recent exposure in this country (see the April '88 issue of *New England Builder*).

While the foam-core structural stressed-skin panels owe their high energy efficiency to the foam and tight interlocking panel joints, the frame construction panelized systems owe their energy efficiency to precise tolerances, quality materials, and high levels of quality control in the factory. The same performance can be achieved in standard construction, but it is very labor intensive and requires close supervision.

Acorn Structures produces homes with about the lowest energy consumption found. Their "Independence Series" homes have a predicted heating cost of just 1.0 Btu per square foot per degree-day, which for a 3,000-square-foot house in Baltimore (4,500 degree-days), translates into a fuel bill of \$190 per year with oil at \$1.25 per gallon.

If energy efficiency were the only benefit of panelized construction, we probably wouldn't see that much of it—and we certainly wouldn't be seeing the dramatic increase in interest in it at this time. But energy efficiency is an attractive bonus to the other benefits—speed of construction, quality control, etc.—and one that has contributed to the rapid growth of panelized construction. ■

Alex Wilson is a technical writer based in Brattleboro, Vt., who specializes in energy and building issues.



In R-Control panels, energy details such as dual waferboard splines in panel connections are specified by the Associated Foam Manufacturers Inc. (Excelsior, Minn.), which owns the trademark and governs the manufacture of the panels.

Associated Foam Manufacturers, Inc.