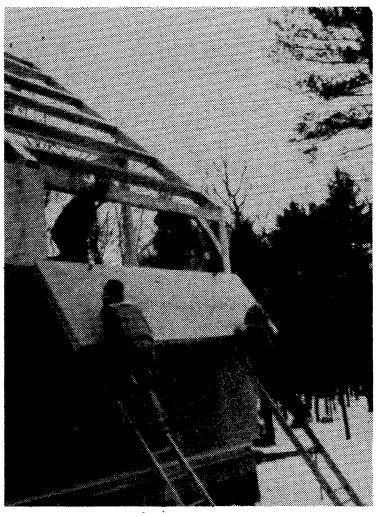
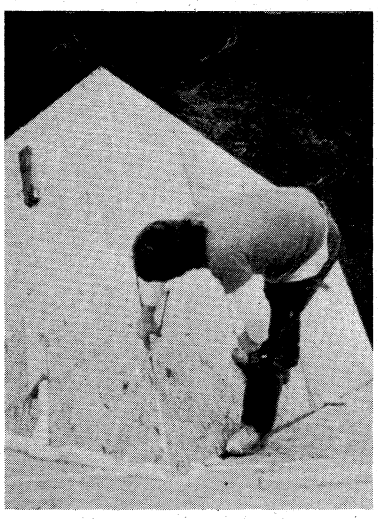
Wrapping the house: *Tedd Benson normally orders stress-skin panels with drywall on the interior and oriented strand board on the exterior. If heavy siding is used, or if the exterior is shingled, the OSB has to be strapped.*



To beef up *the thermal performance between joints, voids are filled with one-part urethane foam. The foam glues the panels together and forms an airseal. Excess is shaved off after the foam sets.*

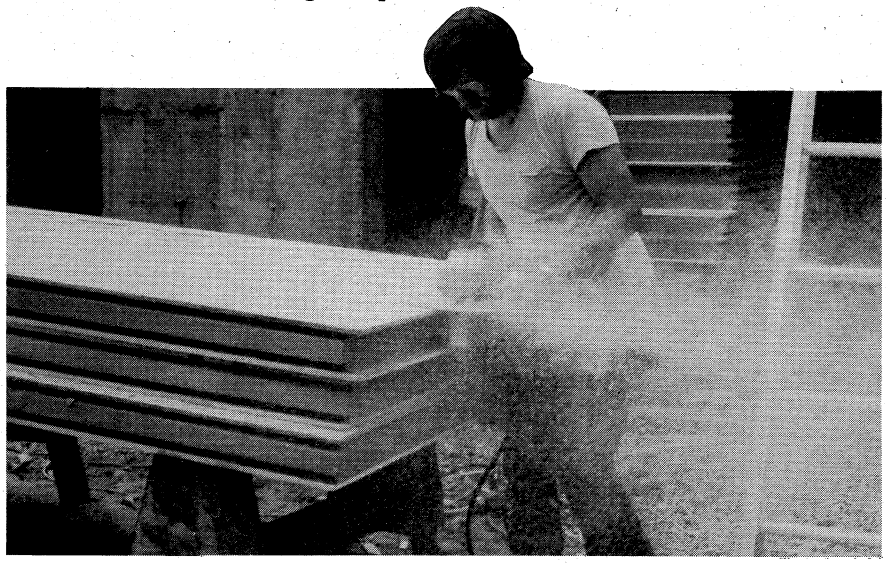


that beadboard panels will fail structurally when the foam starts to melt at around 200°F, whether the panels burn or not." He says the melted styrene (it flows at around 250°F) will feed a fire like molten wax from a candle. Urethane burns more like wood, he says. It stays intact until it burns through. Winter believes that a styrene system is more acceptable if it has fire-stops throughout and full structural supports—for example, a system with full 2-by splines at all panel joints and edges.

Either type of panel can be made to comply with the 15 minute thermal-barrier requirement. But the codes were not written "for a system that melts," says Winter.

William Porter, who makes both beadboard and urethane panels, points out that both will burn at high temperatures. He feels that the code requirement for ½-inch drywall on walls and ½-inch wood on ceiling panels is adequate. Using just drywall on a ceiling panel is unwise, anyway, says Porter, because the panel could sag if the drywall ever got wet.

Styrene supporters counter by arguing that melting temperatures don't occur in walls or roofs under normal conditions or even during small fires. One manufacturer, Enercept in Watertown, S.D., says its panel with drywall and waferboard on the interior passed the UL "corner test" intact. In the test, a 35-pound wood pile is ignited in a full-scale mock-up building corner. This type of test is challenged by Winter. He says it isn't representative of conditions in a real fire because the space is not enclosed.



Atlas Industries *of Ayer, Mass., has been making stress-skin panels for the past decade. The company has begun to market a line of low- to medium-price houses designed around its urethane foam panels wrapping laminated trusses and beams. At the building site, a workman prepares panels for splining with a router designed specifically for the job.*

Longevity

Discussions about long-term performance are equally contentious. Under moist conditions, says Porter, urethane expands slightly as it ages and beadboard contracts. "Too much of either is not desirable," he says.

In an batch of urethane panels produced early on, the foam shrunk and warped the panels, said Winter, who removed and replaced them. The problem was solved, he says, by improving the chemistry. The message is clear: Urethane foam "needs a good cook" to insure good performance.

More important to durability is the longevity of the foam itself and its bond to the facing materials. Many distrust the life expectancy of 1-pound-density beadboard, which has a soft, breakable consistency. To get a good bond, the adhesive must penetrate into the beadboard, says Winter. He prefers urethane adhesive with beadboard cores. Urethane, on the other hand, is difficult to bond to because the cells on the surface are cut open "like cracked egg shells."

Facings and bonding

There are as many ways to fashion panels as there are manufacturers. With some panels, the urethane is best foamed in place between the sheets, providing its own integral bond. More commonly, the plastic core is laminated to the sheets with a contact adhesive or a pressure-set adhesive.

"Laminating is tricky", says Porter. "If you haven't made a mistake, you haven't been in the business long." At one point, he says, his company used an adhesive with a plasticizer that dried up over time and eroded the bond to the facings. Most glues are sensitive to air temperature and moisture content. They require industrial-type clamping to