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A CALL FOR TARGETED TECHNOLOGY TRANSFER

Today's energy-efficient wood-frame houses are the most expensive, the most comfortable, and very likely the least durable residential structures ever built in the United States. The rapid evolution of building materials and construction practices in the 20th century—particularly since the energy crisis of the 1970s—occasioned the creation of houses whose walls became progressively tighter and tighter. Tight walls markedly improve energy efficiency and occupant comfort. Those that get wet, however, tend to stay wet longer, and in some cases, accumulate enough moisture to cause problems. Homeowners complain increasingly of window condensation and mildew indoors; of mildew, extractive staining, and peeling of exterior coatings; and of rot in windows, doors, siding, trim, sheathing, and framing, all within a few years of construction.

The switch from leaky, warm walls forgiving of getting wet, to tight, cold, less forgiving walls is one of the reasons cited for the prevalence of moisture-caused problems in today's wood-frame houses. Dubious designs, poor construction practices, and new building products that have not performed as promised have also been fingered. While these things have indeed caused specific problems in individual houses, they did not cause the durability crisis that plagues new wood-frame houses in general. The real culprit is declining technology transfer. Despite the truism that says otherwise, what you do not know will hurt you.

The durability of a wood-frame house arises from the proficiency of its design, the quality of its construction, and the ability of the materials from which it is assembled to resist wear and tear over time. Although the principles and practices for designing and constructing durable wood-frame houses are well established and thoroughly documented, this information is not reaching many practitioners. The decline in technology transfer traces to retrenchment of the traditional routes by which this knowledge has been communicated. Because of the emphasis placed on concrete and steel, students in architecture, engineering, and construction programs in vocational schools, colleges, and universities receive little or no instruction on the proper use of wood in residential construction. Curtailment of outreach services provided by state cooperative extension agencies and wood industry trade associations in the 1990s has made the acquisition of information more difficult. The demise of the apprenticeship system in the United States has largely denied novice builders the opportunity to learn from experienced masters. The confluence of these events has left many architects and builders unaware of the new considerations surrounding the proper use of wood in today's tight-walled houses.

Dubious designs that undermine the durability of wood-frame houses flow directly from the decline in technology transfer. The architect who is unaware of the importance of designing a wood-frame house to shed water cannot knowingly incorporate the proper details into his or her plans. Hence, the recent prevalence of questionable architectural trends such as the narrowing of eaves and a reluctance to use gutters. Designs that sandwich wood between materials of low permeability can trap water and encourage mildew and rot. This inherently risky approach was used—

Wood and Fiber Science, 33(1), 2001, pp. 1–2

with disastrous results—in some houses in the 1990s when exterior insulation and finish systems (EIFS) were introduced into residential construction. All wood-framed walls will eventually get wet during their lifetime; they must be designed to dry either to the inside or the outside. Had the proponents of EIFS known this basic tenet of wood-frame construction, what might have emerged from their drawing boards would likely have been different from what actually did.

Good house designs can be defeated by poor construction practices that allow excessive moisture to build up inside or permit water to intrude from outside. Most poor construction practices stem from declining technology transfer. The builder who is not told of the importance of back- and end-priming wood siding prior to installation is unlikely to realize intuitively the benefit of doing so. Much of the workforce building houses today is transient and lacking in some of the training, skills, knowledge, and experience necessary to construct durable houses. Some builders continue to commit such basic errors as venting clothes dryers and bath fans into attics, basements, and crawl spaces, and omitting flashing around doors and windows.

Even the best design and construction practices can fall victim to building products that are not inherently durable. The widespread failure in the 1980s of OSB lap siding and fire–retardant-treated plywood and lumber under normal conditions of use is now legendary. It is difficult to imagine that either debacle would have happened had the developers of these products diligently done their homework.

The most important consideration in ensuring the durability of energy-efficient wood-frame houses is to utilize design features and construction practices that keep wood as dry as possible and promote the drying of wood that does get wet. While this principle has been championed in peer-reviewed journals and espoused at academic conferences for decades, these technology transfer efforts amount to not much more than preaching to the converted. Because architects and builders typically do not read scientific publications or attend ivory-tower meetings, the message does not transmit beyond the inner circle. The durability of houses will not improve until the wood products industry develops a technology transfer campaign to impart this sorely needed information directly to those who need it the most: the architects and builders who design and construct the one million-plus energy-efficient wood-frame houses built annually in the United States.

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