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Wood & Steel Hybridization: Innovating Tomorrow's Housing by Mark Nowak & Lisa Gibson, NAHB Research Center

WHAT IS PATH?

The Partnership for Advancing Technology in Housing (PATH) was established in 1998 as a public-private sector partnership. PATH was formed to speed the creation and widespread use of advanced technologies in order to improve the affordability and value of our nation's housing through improvements in quality, durability, energy efficiency, environmental performance and safety.

PATH participants conduct cooperative research and development on breakthrough technologies, evaluate new technologies and deliver information on new products, processes and services for the building industry to put into place. In addition, by developing new administrative systems, practices, products and events, PATH acts as catalyst, facilitator and/or remover of barriers.

Since May 1998, the NAHB Research Center has provided technical support to the PATH Program. The Research Center has initiated a process for scanning new technologies in housing, and provides technical assistance and outreach to builders and remodelers who are evaluating the performance and cost of emerging technologies. The Research Center also works under cooperative agreements with product manufacturers to develop innovative housing technologies. The PATH technology roadmapping process, facilitated by the Research Center, has outlined the technology development requirements that will help the industry to achieve PATH's goals.

THE WOOD STEEL CONNECTION

For years, if not decades, the steel industry has approached the use of cold-form, or light-gauge steel framing in homes as an all-or-nothing proposition. As late as the mid-1990s, the industry embraced the concept of building the entire frame of the home exclusively out of steel members. Consequently, many

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A WORKER ATTACHES
STEEL FLOOR JOISTS



STEEL FLOOR JOISTS REST ON TOP OF
WOOD FRAMED WALLS

uneconomical applications of steel were used, creating the impression that steel would always be too expensive for homebuilders to consider. With the creation of the North American Steel Framing Alliance (NASFA) in the late 1990s, the industry has taken a fresh look at how steel should be used in homes.

NASFA's approach, with feedback from customer groups like [STCA](#) and [WTCA](#), has been built around using steel in the most economical way possible—in other words, using steel only where it makes sense in the home. More specifically, they have recognized the need to integrate steel and wood in the framing process. This concept of “hybrid” steel/wood framing acknowledges the different cost impacts in how steel is used, where it is used in the home (e.g., roofing, walls, floors, etc.), and how best to use steel in a given climate or within given market preferences. An early example of this cooperation and feedback was shown at the 1997 NAHB Builder's show demonstration home where WTCA provided wood trusses for the steel framed demonstration home.



SINCE THESE JOISTS WERE SPACED 32" APART, IT WAS NECESSARY TO ADD HAT CHANNEL FOR HANGING DRYWALL

This article outlines some of the activities where the hybrid concept is in use as part of the PATH and other related activities. Hybrid steel/wood framing has been evaluated in the field at two separate PATH field evaluation sites. The technology is featured at the K. Hovnanian Idea House in Freehold, NJ and at Hughes Construction in Lexington, NC.

The 3,500 square foot Idea House was constructed in 2000 to identify the methods for adding consumer value and increasing productivity. The site has provided an evaluation of how a steel flooring system can be used in a production wood-framed home with existing jobsite framing crews. Connection details and installation issues were of primary interest. There were both pros and cons to the system. On the positive side, the installation did not require much in-depth training, setting the joists was relatively quick, the attachment to rim joists was smooth, and the steel floor members were lightweight and easy for the carpenters to handle. On the other hand, the Research Center recommended improvements to the system, which include that the floor layout information from the manufacturer delineate which side of the house to start the layout, that a chop saw be on-site to facilitate the cutting of the floor and rim joists, and that the industry develop new tools and fasteners to help framers and other contractors in the transition from wood to hybrid steel/wood flooring.

At Hughes Construction in Lexington, NC, a four-duplex site will be completed in 2001 to identify products and practices that conserve energy, increase durability and promote affordability. One of the duplexes features insulated steel wall panels, steel floor joists, nonstructural steel partition walls and a wood truss roof. In another duplex, Hughes has used engineered wood floor joists, wood roof trusses and steel stud interior wall framing. In all, Hughes has used four different exterior wall systems at this site. The Research Center is monitoring the homes for energy performance.

These homes show that the technologies can be used in a variety of applications. However, the new materials require the acquisition of additional tools and skills. For example, variable-speed

screw guns are extensively used in steel-to-steel connections and steel-to-wood connections. Furthermore, since most steel connections require numerous screws, quick installation is dependent upon using the best screw gun available (e.g. automatic fastener delivery guns). These, like their wood construction counterparts, can be used with precollated fasteners, reducing the amount of manual labor required.

Carpenters at the Hughes site reported that steel joists and studs are easier to handle than wood because of their lighter weight. The joists and studs came precut to length from the distributor, thereby reducing material waste and cutting labor costs. In addition, the steel sections of these floor and wall assemblies were less expensive than wood.

PATH activities and other research has found that the lack of hybrid building connection details has hindered homebuilders' efforts to transition from conventional framing materials to a hybrid use of wood and steel. The Research Center, in conjunction with NASFA, AISI, WTCA, STCA, APA, HUD and private industry, is compiling and developing connection details that will illustrate the recommended method of joining cold-formed steel framing to wood and concrete. This research includes the testing of new detail assemblies. A final report is expected in the Spring of 2002.

The Research Center is also finalizing a guide entitled Prescriptive Details for Hybrid Cold-Formed Steel/Wood Framing, which will focus on single- and multi-family residential construction. The guide will be written in layman's terms for use by design professionals, as well as builders and code officials.

Will hybrid steel-wood framing be a major part of the home building industry in the future? It is probably too early to answer this question. However, there has been a slight upswing in the use of steel in residential construction. For example, in 1996 the Research Center's Builders' Survey found that residential external steel wall materials had a market share of 0.4 percent. In 2000, the market share increased to 1.6 percent. Only time will tell if the new move toward hybridization will dramatically change the way steel is used in homes.

FOR MORE INFORMATION

If you are interested in participating in PATH or receiving more information on PATH activities and/or publications, visit www.toolbase.org, www.nahbrc.org, www.pathnet.org, or contact Bob Fuller, PATH Program Manager, at 301/430-6216, or bfuller@nahbrc.org.

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