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NAHB Research Center

Path Roadmapping Group Seeks to Improve Houses with Next Generation Panalized Systems

Advanced panelized systems hold the promise of improving efficiency, adding value and lowering the cost of new home construction. But these systems continue to have a hard time gaining ground in many segments of the marketplace. What will it take to get advanced panelized-type construction systems accepted in the home building market? This is what a PATH Technology Roadmapping Group of builders and producers has set out to determine.

Panelized construction, which includes pre-manufactured components, elements, or systems that are site assembled into the finished home, can bring the benefits of mass production into the highly customized residential market through the pre-production of components and systems.

The wide use of roof trusses shows how dramatic an impact panelization can have in this industry. However, the narrow use of wall panels in today's home building shows how far the proponents of panelized systems must go to gain market acceptance. In 1999, trusses represented 63.4 percent of total roof area in residential construction, compared to residential wall panels which accounted for 5.2 percent of the lineal feet of walls in houseS.

The impact of panelization in 1999 was significant, but not comparable to what is envisioned for coming years by the PATH Technology Roadmapping Group. It is estimated that 790,000 homes constructed in 1999 had some form of panelized construction, most commonly, roof trusses.

The top 42 panel manufacturers had gross sales of roughly $450 million in 1999. While this appears to be a significant number, it is minor in comparison to the estimated $250 billion spent on new residential construction in 1999. Panelized systems represent approximately 0.2 percent of total expenditures for new residential housing.

While individual components have had the largest market acceptance, to meet the goals set by PATH will require a broad-based, system-wide approach, formulated with a technology roadmap for panelized systems. Panelized systems offer the greatest impact through a coordinated approach. There are several benefits that are driving the push toward wider use of panelization:

- Panels can leverage the known benefits of mass production to provide easily transportable components to the builder economically and on schedule.
- Panelized construction generates less scrap and waste-both on the jobsite and in fabrication-which leads to minimized environmental impacts.

- On site, the panels can be quickly and easily assembled into homes, thereby reducing cycle time, with minimal worker risk and overall safer construction.
- The quality and uniformity of mass-produced panels and well designed connection techniques will translate into increased disaster resistance and durability of homes.
- Panel implementation leads to reduced labor time and skill requirements.
- Panelization helps to decrease assembly costs and reduce the opportunity for theft and vandalism on the construction site.

The issues preventing the wider use of panelized construction are both technical and market driven. Acceptance in today's market is often driven by installed cost to the builder, not life cycle costs, which could justify value-added features from panelization.

On the technical side, the industry faces issues such as transportation economics, change order flexibility, and labor training (rough carpenters often are not familiar with panel assembly). In addition, most panels are shipped as "open" panels so inspectors can view the installation of plumbing and mechanical systems. The need for this visibility may limit innovation in the way of "closed" panels that have fully integrated wall and floor systems.

To change the situation with panelization, a group of builders, manufacturers, researchers and government officials have begun a process to define specific research and development activities required to implement changes in existing panel technologies and to develop new technologies. The first step in the process was a technology brainstorming session in December. That session, which was announced by President Clinton in May 1998, was organized by the NAHB Research Center in conjunction with PATH and administered by the U.S. Department of Housing and Urban Development.

The roadmapping session focused on the integration of walls, floors, and roofs in addition to specific roof and wall applications. Although the emphasis was on factory production, the need was also recognized to develop on-site or near-site production methods to add flexibility and address transportation issues. Several proposals called for integrated exterior and interior finishes as well as adding functionality or enhancing performance with integral insulation or distribution of utilities. Some proposals focused on the adaptation of systems used in commercial applications or in other countries, while others would require significantly more original work for development.

After the initial discussion and planning meeting in December at the NAHB Research Center, subgroups have continued to define specific, time-phased research and development activities to implement these technologies. The roadmap for the advanced panelized-type system is scheduled for completion by mid-2001. The PATH roadmaps are intended to help coordinate and leverage private as well as public sector research and development. The completed roadmaps will:

- Provide a common, shared vision among the public and private sectors of how the technology, if effectively implemented, will benefit the industry.
- Serve as a guide for public and private sector investment in research and development.
- Provide direction to public sector, private sector, and academia on needed research and development.

- Facilitate joint private/public sector activities to reduce or eliminate barriers to achieving the vision (e.g. development of connection and panel standards to speed construction).

Roadmapping work began in March 2000 with a two-day “brainstorming” session in which a cross-section of industry experts identified and evaluated 40 “Technology Options” as candidates for roadmap development. Six specific options addressed as panelized or panelized type systems were consolidated into an Advanced Panelized-Type Systems “Portfolio” that was designated as high priority for roadmap development. This high priority reflected the potential contribution of panelized technology in helping the industry achieve the PATH goals to (1) reduce the monthly cost of new housing by 20 percent or more, (2) cut the environmental impact and energy use of new housing by 50 percent or more and reduce energy use in at least 15 million existing homes by 30 percent or more, and (3) improve durability and reduce maintenance costs by 50 percent while reducing the risk of loss of life, injury, and property destruction from natural hazards by at least 10 percent and decrease residential construction work illnesses and injuries by at least 20 percent.

The NAHB Research Center is the not-for-profit research arm of the National Association of Home Builders, and is located in Upper Marlboro, MD. Through testing and certification services, the NAHB Research Center seal is recognized throughout the world as a mark of product quality and an assurance of product performance.

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