9703 Development of Cost-Effective, Energy-Efficient Steel Framing

Benefits

- Increased acceptance and use of steel-framed construction.
- Heating savings of 10% over current levels is feasible in milder climates.
- Increased production of steel, providing more manufacturing jobs.
- More cost-effective choices of framing materials for builders and homeowners.

Applications

Applications for practical steel-framed construction are in residential and light commercial construction markets.

Thermal performance of the steel-framed system will be designed to meet code requirements throughout the United States.

Program to design cost-effective, energy-efficient steel-framed buildings to meet code requirements

The National Association of Home Builders (NAHB) Research Center is working with the steel and construction industries in a three-year research program to increase the energy efficiency of steel-framed construction for the residential and light commercial markets. The program will consider thermal performance and installed cost to determine designs for steel-framed residential and light commercial construction that are energy-efficient and meet applicable building codes.

The construction industry has used steel framing in residential construction for several years. However, designs for minimal energy code compliance have not always been cost-effective or practical. For example, more than two inches of exterior foam are often required on the wall in colder climates, which significantly increases material and labor costs.

The NAHB program will work toward overcoming the major performance and cost barriers that prevent many builders from using steel framing, thereby expanding the role of steel in residential and light commercial construction.

Steel-framed construction is expanding the role of steel in residential and light commercial construction.

Project Description

Goals: To determine designs for energy-efficient, cost-effective steel framing systems for residential and light commercial construction that meet energy code requirements throughout the United States.

The project will focus on optimizing the performance of steel-framed walls. Different wall configurations will be examined with a view to improving cost-effectiveness while either increasing or maintaining the equivalent effective R-value of assemblies in the *AISI Thermal Design Guide for Walls*. Subsequently, up to ten wall designs will be constructed and hot box tested.

During the second year, various designs of steel studs were tested both for heat transfer and structural capabilities resulting in a new revolutionary stud design. The remaining project effort has focused on optimizing and testing wall sections utilizing the proprietary stud.

Progress and Milestones

- The project was initiated on July 28, 1998.
- Work is in progress with manufacturers and researchers to select steel-framed wall designs for further analysis and testing. After the information is obtained, builders and trade contractors will be contacted regarding the feasibility of the approaches. Up to ten designs will be selected for further evaluation. Thermal testing began in September 1999.
- The application of the improved technology is expected to yield energy savings estimated at 2.5% of current consumption (0.03 quads), based on 25% of new homes employing energy-efficient designs developed from this work. Because the program addresses the largest barriers to use of steel-framed construction, the steel industry estimates an increase in demand of 2 to 2 1/2 million tons per year (given 1.4 million home starts per year and 6 to 7 tons of steel per home).

Total Project Cost/Duration

$419,000/four years.

Research Organization

National Association of Home Builders (NAHB) Research Center
Upper Marlboro, MD

Industry Participants

North American Steel Framing Alliance
Washington, DC

Bethlehem Steel Corporation
Bethlehem, PA

USS - POSCO

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