

Technology Assessment of Automation Trends in the Modular Home Industry

Most new home construction in the United States is known as “stick built,” meaning home components are assembled on site at the permanent location of the house. In modular home construction, box-like sections of the house, known as modules, are produced in a factory and transported to the building site. At the site, the modules are situated on and fastened to the foundation. Modules can be stacked for multi-story construction.

Modules are typically 80% to 95% complete when they leave the factory.

Modular home construction now represents approximately 5% of new single-family home construction in the United States. In 2001, about 200 modular home manufacturers were in operation in the United States. The modular home industry has become a force in the homebuilding industry and appears poised to grow. Some estimates project that 90% of new home construction will be modular within 20 years.

Background

Modular home construction offers several potential advantages over stick-built construction:

- Less skilled labor is required in producing the home (the U.S. labor pool of skilled construction workers is currently shrinking).



Two modules near completion as they progress along the manufacturing line in a modular home factory.

- Controlled environment of the factory prevents weather damage to materials and avoids delays in home construction.
- Factory setting allows more efficient use of raw materials.
- Use of specialized equipment is possible in the factory, resulting in higher quality construction.
- Factory environment allows quality control program and better

inventory control and management of materials.

The purpose of this study is to assess the technology currently used in the production of modular homes. Investigating the technologies used in the manufacture of modular homes will help to identify processes, equipment, and software that will allow homes to be built more efficiently by decreasing waste, improving quality, increasing productivity, and reducing overall cost.

Objectives

The objective of this study is to develop a research and outreach program that will investigate applicable technologies and develop new methods and approaches to factory home production. Future research areas related to industrial home manufacturing include applications of automation and optimization equipment, new wood-based materials specifically

developed for factory-built homes, and technologies that will facilitate mass customization. The first step is to conduct a technology assessment of the processes and equipment currently used in the construction of modular homes, with two specific objectives:

- Identify major modular home components fabricated as stand-alone constructs
- Identify and evaluate the technology (equipment, processes, software) currently and potentially used in construction of modular home components

Approach

The modular home industry will initially be researched through associations, trade journals, and websites. Researchers will then visit modular home factories in the United States and Europe to observe manufacturing processes and identify processes and technologies employed. Manufacturers of process equipment used in the modular home industry or component industry will also be visited and interviewed.

Expected Outcomes

This research will result in a report describing the characteristics of modular home manufacturing and technology, classifying and assessing employed and developing technologies. The study will serve as a technology transfer tool that will be useful to existing and potential modular home manufacturers, wood products manufacturers, equipment manufacturers and vendors, researchers, and homeowners.

Timeline

Factory tours will begin by September 2004. A trip is planned to Germany and Sweden in May 2005 to investigate European technologies for factory-produced housing. This initial study will conclude in September 2005.

Cooperators

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