

Evaluating the Potential for Automation in the Modular Home Industry

In a recent assessment of the U.S. modular home industry, we observed that automation and advanced technology were largely absent from factories. Although taking place in a controlled factory environment, much of the construction process resembled that of traditional on-site “stick built” house construction. The controlled environment provides factory-built home manufacturers a number of benefits over conventional on-site construction:

- Controlled factory environment prevents weather damage to materials.
- Subcomponents can be built concurrently.
- Inventoried materials can be better controlled and managed.
- Less-skilled labor can be utilized.
- Manufacturing quality control can be implemented.

Total labor cost is a major concern for modular home manufacturers. Although cost of materials fluctuates, workforce utilization has a more significant impact on the bottom line. Modular home manufacturers closely monitor labor content, and improved manufacturing efficiencies generally focus on reducing labor content.



Wall sections progress down the assembly line in a German home manufacturing factory.

Background

Our modular home manufacturing technology assessment offered the following insights:

- The major process stations in a modular home factory that use wood-based materials are floor framing, floor decking, wall framing, wall sheathing, wall set, roof framing, roof assembly, roof decking, and roof setting.

- The typical U.S. modular housing factory has very little advanced technology. Examples of base technologies found to be in use include manual pneumatic nail guns, manual cut-off saws, cranes, and roller track systems. Opportunities to implement advanced technology potentially abound.

- Factories that manufacture roof trusses or wall panels have generally implemented a higher level of technology. Many modular home manufacturers purchase roof trusses, but we did not find that same trend for wall panels.

Objectives

The goal of this study is to examine barriers to incorporating advanced technologies in the modular home industry. Automated wall panel systems will be used

for benchmarking because (1) they offer an appropriate fit into the modular home factory, (2) they offer a range of capacity and technology level, and (3) the modular home industry will likely consider such systems in the next 3 to 5 years as pressure increases toward more effective workforce utilization.

Approach

1. Develop two surveys—one for wall panel equipment manufacturers and one for wall panel manufacturers.
2. Identify vendors and manufacturers of wall panel manufacturing equipment, and survey them about capabilities and application of equipment they supply. Ask them to identify purchasers or users of their equipment and those that use the equipment effectively.
3. Survey wall panel manufacturers regarding their use of wall panel systems equipment.
4. Work with nearby wall panel manufacturers using automated or semi-automated equipment to better understand and confirm capabilities and limitations of manufacturing systems (for example, conduct time studies).
5. Prepare final report compiling descriptive information from surveys and studies, and attempt to classify wall panel equipment systems according to technology level.

Expected Outcomes

Information reported from this study will be of interest to the wall panel manufacturing industry (wall panel equipment assessments) and the modular home industry (incorporation of advanced technologies). Reports will be summarized and published in trade journals and presented at an annual Forest Products Society meeting.

Timeline

Factory tours will begin in fall 2005. This initial study will conclude in December 2006.

Cooperators

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In a German modular home factory, drywall, wiring, doors, and windows are installed before wall sections are shipped to the construction site for assembly.