

Technology Profile



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Market Challenges for the Acceptance of Prefabricated Wall Systems

Despite reduced construction cycle times and improved framing quality offered by prefabricated buildings, the majority of houses built in North America are still being framed on-site using the conventional 'stick-built' method. Past studies suggest that home builders may have the most impact on the decision to use (or not to use) prefabricated components. While large consolidated builders typically use wall components since they allow them to reap the benefits of production efficiencies, small and medium-sized builders, representing the largest market share (60%), have a tendency to refrain from using them.

Given the trends supporting the increased use of prefabricated housing systems, Forintek Canada Corp. (Lavoie and Gibson, 2006) probed the home building industry in order to identify barriers to a wider acceptance of prefabricated wall components. Through this effort, five major barriers were identified as limiting the use of prefabricated wall panels in residential construction.

Barrier #1 – Lack of Familiarity with the Product

Home builders' lack of familiarity with prefabricated wall panel products was a top barrier to the increased adoption and utilization of prefabricated wall systems. This lack of familiarity included an array of issues ranging from a lack of knowledge to negative perceptions held both by home builders and home buyers. As a result, home builders appeared to have preconceived notions about costs, uses, technical requirements and benefits.



With respect to the lack of knowledge, many home builders admitted to not knowing enough about prefabricated wall panels to feel comfortable using them and selling them to prospective home buyers. Additionally, home builders overall felt that the term 'prefabricated' carried negative overtones. For most, the term prefabricated was equivalent to mobile (or HUD code) homes.

- Successful transformation of a prefabricated wall market will ultimately require familiarity with the product. Extension and marketing strategies should be developed by prefabricated wall panel stakeholders to educate and promote the use of wall panels in an effort to positively distinguish the product from walls built on-site.



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- It is possible that prefabricated wall panels may need to undergo a change in terminology in order to better reflect product advantages and distinguish them from walls built on-site.

Barrier #2 – Industry Conservatism

The construction industry generally has a conservative attitude that hinders the adoption of new products and technology, including prefabricated housing systems. Resistance to change, as found through focus group discussions, appeared to be compounded by a number of excuses. Some builders did not want to deviate from the traditional methods they have been practicing for years, while others did not want to disrupt their planning and coordination efforts, arguing that the process of advance planning for wall panels was not conducive to construction time frames.

- Extension activities will be required to provide home builders with information and solutions that reduce their risk (i.e., installation packages, product support, and product education) and increase their comfort zone with using wall panels.

Barrier #3 - Cost

A third barrier identified by home builders was cost. Prefabricated wall panels were generally perceived to cost more (10 to 15%) than conventional stick framed walls. Without knowing the potential of the apparent quantitative savings that could be realized from using prefabricated wall panels, many home builders were only focused on the issue of higher upfront costs. Additional installation costs attached to the price of prefabricated wall panels were also mentioned, most notably crane costs and their availability. Other (opportunity) costs such as potential time delays associated with ordering panels and refitting/remanufacturing wrong panel configurations/dimensions were noted.

- While prefabricated components may indeed cost more than walls built on-site, case studies offering quantitative cost and benefit comparisons between stick-frame and prefabricated wall panel construction methods should be developed. A costing tool giving specifiers the ability to determine bottom line figures/profitability of prefabricated walls on a given project (or over a certain period of time) could also be designed to provide builders with accurate information on the financial benefits of these products.



Building houses on-site creates considerable waste

- Additionally, panel manufacturers offering installation packages that include warranties and (if necessary) crane equipment could also potentially eliminate the perceived supplementary costs associated with planning and coordinating installation needs for builders.

Barrier #4 – Technical Issues

Technical issues associated with the installation of wall panels, largely fitting and flexibility, were noted as a fourth barrier by home builders. Overall, small custom home builders felt that prefabricated wall panels did not meet their needs. Prefabricated wall panels were thought to be ideally suited to those buildings conducive to repetition (i.e., multi-family dwellings).

- Customized homes continue to benefit from the image that 'built by hand' by 'craftsmen' is better. Yet, homes built from prefabricated components can be customized prior to construction, and modified (like any other wall) after construction. Because panelized construction is simply a different way to deliver a similar product, albeit more controlled, continued education, promotion and extension efforts need to be targeted to home builders.
- Home builders also noted that perfectly square wall panels fitting with 'out-of-square' concrete foundations was a barrier to future prefabricated house component use. Yet, past Forintek studies have shown that a majority of home builders today are demanding straight and square lumber. It is paradoxical that these attributes demanded by home builders and provided by prefabricated wall panels, pose potential problems on the job site. As such, one may wonder why home builders would be more satisfied with an 'out-of-square' foundation than a perfectly square wall panel. Greater quality control measures on the job site will have to be undertaken by home builders to ensure concrete foundations are in compliance with building drawings. Another possible avenue to address off-square foundations is the collaboration between industry associations to develop complementary products (i.e., insulated concrete forms and pre-cast basements with wall panels) and possibly a 'best practices' guide that could be used as a reference by home builders and home buyers.

Barrier #5 – Labour

Trade labour issues extending from shortages of skilled workers to attitudes toward adapting new products/systems was another important barrier identified by home builders. Home builders noted the difficulty of training framing crews on how to use new products such as prefabricated wall panels. Given that many tradesmen are not trained in working with prefabricated wall panels, the fear among home builders was that if they lost trained prefabricated wall framers, they would have great difficulty finding replacement framers of equivalent training or framers who would be willing to install prefabricated panels. Additionally, the demographic profile of the construction industry indicates that many framers are close to retirement. As such, many are not interested in learning how to work with new products such as prefabricated wall panels.



Trade shortages will increasingly push builders to adopt prefabricated building components

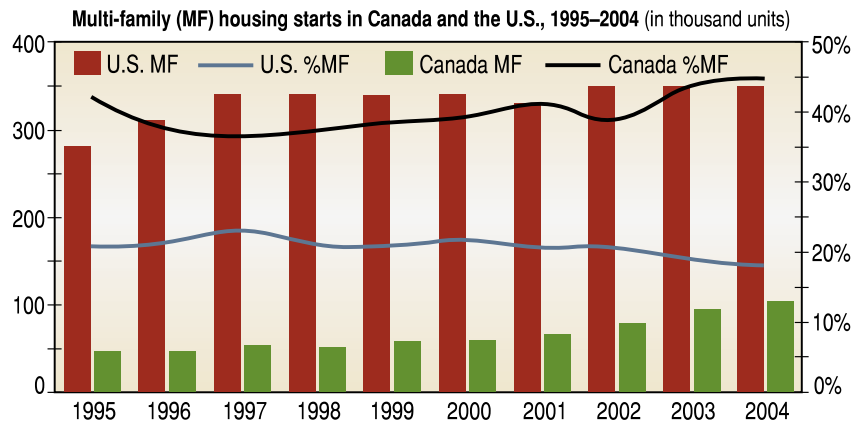
- The introduction of a prefabricated wall panel product to the home building industry will require availability of product support. Product support in the form of installation packages provided by a prefabricated wall panel manufacturer could potentially ease current framing problems faced by home builders. Packages could include installation (complete with crane services). A reasonably priced framing crew could also be made available to smaller home builders.

Summary

Future steps needed to increase the market penetration of prefabricated wall panel components will require both technology transfer and research and development.

- **Technology Transfer** – to overcome the negative perceptions of prefabrication, and provide the home building industry with relevant information that will impact their acceptance and adoption of prefabricated wall panel products.
- **Research and Development** – to improve the performance and use of prefabricated panels by adding value through technical advancements in design and ease of use.

While the current use of prefabricated wall panels by home builders is very limited, the adoption of this technology, particularly in light of the industry's conservative attitudes towards new technologies and products, will take time. Given what has been learned from Forintek's research efforts, short-term development opportunities for prefabricated walls do exist.



The proportion of multi-family housing starts is much higher in Canada than in the U.S. Component manufacturers should be able to capitalize on this market segment since home builders already see advantages linked to the use of prefabricated components in this type of housing

- **Spec homes:** Many of the spec homes constructed are completely framed (and sometimes completely finished) before the builder has secured a buyer. As such, any customized changes to the framing package are eliminated. Given the potential volumes and the fact that customization opportunities (in all probability) are removed from the framing phase of construction, prefabricated wall panels would be an ideal fit for spec/production home builders.
- **Multi-family homes:** Based upon the concerns expressed by home builders surrounding the inflexibility of wall panels to meet the needs of custom homes, it was often suggested that prefabricated wall panels be sold to multi-family home builders. Unlike U.S. markets, multi-family housing starts in Canada are of a significant volume when compared to single-family starts. The use of prefab in multi-family construction may gradually increase builder familiarity with panelized construction and result in their eventual use in custom home building.
- **Non-residential buildings:** 'Prefab-friendly' structures such as hotels are similar to multi-family dwellings as these units are repeated multiple times throughout the entire building. While hotels may not be a practical endeavour for some home builders, they may however offer an opportunity for others. Additionally, they may create a window of opportunity for framers to experience using prefabricated building components. This knowledge and experience could eventually filter through to other construction projects, including new residential homes.

- **Partnerships between component manufacturers/home builders and big box retailers:** The increased importance of big box stores within the construction and repair and remodeling sectors has been significant. It may be only a matter of time before these retailers become fully integrated within the home building sector, and possibly supply prefabricated housing components or prefabricated buildings to consumers.

By tapping into certain segments of the construction sector, the acceptance and adoption of prefabricated wall panels may move to a state where prefabricated wall panels are viewed as the product of choice within the construction industry. Combining technical support with research and development efforts could eventually contribute to making prefabricated wall panels a premium product fully capable of filling the current and future needs of both the residential and non-residential segments of the construction industry.

Reference

Lavoie, P., Gibson, R. 2006. Market Challenges for the Acceptance of Prefabricated Building Systems. Quebec City. Forintek Canada Corp.

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