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Big Changes Afoot for UK Building Industry

by Mark Gorgolewski

The home building industry in the UK has been notoriously conservative in its attitude toward change. The industry builds about 180,000 new dwellings every year, and about 90% still use masonry cavity walls, which have changed very little over the past 75 years. They typically consist of a brick outer skin, a cavity (usually 50-75 mm wide), and a concrete block inner skin.

Developments over the past 30 years include: the use of lightweight concrete blocks, in which the cavity is filled with mineral wool or polystyrene insulation; the use of gypsum boards fixed to the concrete blocks as a replacement for wet gypsum; and the advent of double-glazed windows. Timber and steel framing forms constitute only about 7% of all dwellings in England, although the proportion is greater in Scotland.

The industry's hesitance to adopt new ideas is due to a variety of factors. These include the negative reaction toward innovative construction methods used in the 1950s and 1960s (e.g., poorly detailed panel systems), which are now seen as a failure, and the dominance of marketing that encourages traditional designs and technologies. The planning system, which grants permissions for new buildings, also tends to limit new designs and technologies. A further problem is that private home builders in the UK make more money from land transactions than they do from construction, so there's little incentive to improve the product. These factors, together with cost and land constraints, have resulted in typical homes in the UK being smaller than homes in North America — typically 75-150 m^2 (825-1,650 ft^2) for a house and 40-80 m^2 (440-880 ft^2) for an apartment.

The Push for Something Better

In recent years, there has been increasing customer demand for improved quality in housing. Furthermore, the government has become concerned about the poor economic performance of the industry and the high global warming emissions from energy use in housing (25% of all UK carbon dioxide emissions). This has prompted a series of programs designed to stimulate change within the industry, which have generated a lot of interest in alternative building technology. The industry is now looking around the world to evaluate and import technologies from other countries.

A government sponsored Urban Task Force (www.detr.gov.uk), chaired by the prominent architect Lord Richard Rogers, considered ways of regenerating urban areas and increasing housing densities. This led to targets being set in planning guidelines that require at least 60% of new dwellings to be located within existing urban areas and, where possible, on brownfield sites. In the future, permits for new housing located on greenfield sites at the edge of town will be more difficult to obtain, and densities will be increased significantly (in general to more than 20 dwellings per acre).

To stimulate change, a Construction Task Force (www.rethinkinghousebuilding.org) has established very challenging targets for improved productivity, efficiency, quality, and reduced costs. It also highlighted the benefits of long-term partnering between companies and the potential for prefabrication. A Housing Forum (www.thehousingforum.org.uk) was set up to disseminate information about improved performance and quality and to act as a catalyst for change.

A major review of several parts of the Building Regulations (codes), including acoustic and thermal standards, has been used to encourage higher standards. Until now, the energy-efficiency requirements have not been very stringent, with maximum wall RSI-values of 2.2 meters squared Kelvin per Watt (m^2K/W) (R-13) for walls and 4 m^2K/W (R-23) for roofs. Most construction has poor airtightness with typical air change rates for new construction of about 10 air changes per hour at 50 Pascals air pressure. The calculation of an energy rating (SAP — Standard Assessment Procedure) was introduced as mandatory for new housing in 1995, but no minimum SAP standard was set. The SAP takes into account the level of insulation, glazing, solar gains, and the efficiency of heating and hot water systems. Builders can get away with poor performance in one area by offsetting this against improved performance elsewhere in the dwelling.

New Insulation Standards Set

New energy-efficiency regulations will take effect in early 2002, requiring considerable improvements in overall insulation levels and details to avoid thermal bridging and air leakage. For the first time, a *Robust Details* publication will provide approved construction designs and details that automatically satisfy the new requirements. For other construction types, the builder will have to demonstrate that the insulation, detailing, and airtightness standards comply. The existing and new RSI-values are shown in Table 3 (see page 15).

New requirements include more demanding insulation targets for electric and low-efficiency gas heating systems and the use of efficient lighting systems that use compact fluorescents in principal rooms. An alternative way of satisfying the new requirements will be to use the SAP energy rating software to show that the predicted annual carbon emissions index for a house are below a maximum allowable level.

Other pressures on the industry include a shortage of skilled labor for traditional construction trades. Many tradesmen left the industry during the recession of the early 1990s, and now home builders are having to fly bricklayers to London from Scotland to satisfy demand.

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residential systems. Murray Grove, a high-profile development for social housing landlord The Peabody Trust, was constructed using prefabricated volumetric modules to create an urban apartment building. Similarly, Britspace has developed a volumetric system, using four modules to build a typical three-bedroom house. These are assembled and completed within a week (see Figure 13). The first examples are currently being constructed by Wimpey Homes, a major UK home builder, and by the Guinness Trust, a social housing provider.

A Shift Toward Timber Framing

Many home builders are considering a move to timber framing, some using considerable prefabrication, and a large expansion of this technology is predicted. Westbury Homes has set up a new 20,000 m² (220,000 ft²) factory to manufacture panels for up to 5,000 houses per year using timber frame technology. Phenolic foam is injected between cement particle board and gypsum board to create factory panels that can be assembled on site to form a house shell in one day. Wilcon Homes has purchased a timber frame company and plans to manufacture panels with insulation on the outside of the frame. Amphion, a major joint venture between social and commercial home builders, is gearing up for large-scale panel production patterned after Japanese and Canadian methods.

In the short term, small builders are more likely to stick with the familiar masonry construction methods. However, block manufacturers are developing new technologies, such as thin mortar beds using adhesives rather than cement mortars and composite blocks that include the block, insulation, and brick finish all bonded together into one unit. These are all aimed to improve efficiency, speed, quality, and cost. There is also increasing research into the use of waste materials (such as sewage slag) in the manufacture of bricks and blocks, for environmental reasons. The TRADIS system, by Filcrete, has attracted attention from many smaller house builders. This system, imported from Scandinavia, uses engineered timber I-beams in a prefabricated panel system, with cellulose insulation blown into the panel in the factory or on site. Window and door frames and surface finishes can be incorporated in the factory, and the system has good environmental performance.

UK's social housing providers are perhaps the most willing to adopt new ways of building and higher standards. The Housing Corporation (www.housingcorp.gov.uk), a government agency that funds much social housing, has developed its own Scheme Development Standards, which demand a higher level of performance than is currently required by regulations. They also use *Housing Quality Indicators* to assess and compare proposals. Leading social housing providers have shown the way by building exemplar schemes using prefabrication systems, super insulation, high performance triple glazing, mechanical ventilation with heat recovery, and other features (see Figure 14). In this sector, there is also increasing interest in environmental issues, such as the environmental impact of materials, water use, and construction waste, which is likely to spread to commercial house building in the future.

Table 3 — UK's Existing and Proposed Insulation Requirements

Element	Current regulations RSI (m^2K/W)	New regulations (2002) RSI (m^2K/W)
Walls	2.2 (R-13)	2.9 (R-17)
Floors	2.2 (R-13)	4.0 (R-23)
Pitched roof (with joists)	4.0 (R-23)	6.3 (R-36)
Pitched roof (with rafters)	3.3 (R-19)	5.0 (R-29)
Flat roof	2.9 (R-17)	4.0 (R-23)
Windows	0.3 (R-2)	0.5 (R-3)

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Figure 13 — A semi-detached pair of houses assembled from volumetric units (four per house) and built in a week. The developer wanted a traditional look so they were clad in brick tiles to look like traditional brickwork.

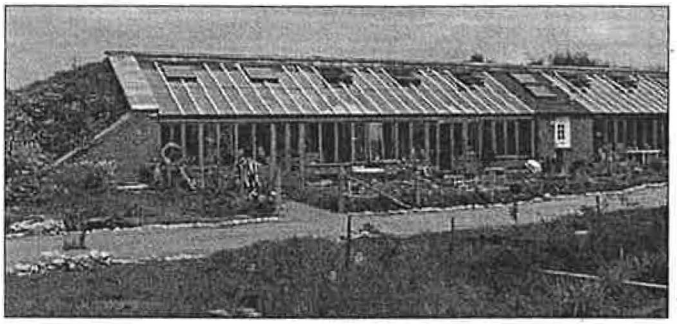

Figure 14 — The Hockerton Housing Development is a zero-energy, earth-sheltered housing scheme pointing the way for future developments. Several similar schemes are now under way.

To date, 308 installers and other individuals have been trained or are in the process of being trained. Of the 308 trained, less than 20% are based in California. Furthermore, our original plan was to conduct a pilot program in California, but this was later expanded to a national pilot program instead. Additionally, 208 trainees are already certified or will be certified this month, and 82 instructor candidates (27 from nonmember companies) have been accredited.

During a March 13 meeting in Washington, DC, National Institute of Building Science (NIBS) President [David] Harris and Vice President [Earle] Kennett met with two AAMA board members and staff. During this meeting, there was a constructive interchange of ideas to accelerate the training and expand the reach to qualified installers. The leadership of both organizations pledged to work together to promote InstallationMasters to the widest possible audience of window installers.

Finally, the aluminum versus wood manufacturers innuendo and rumors reported from "one source close to the action," is irresponsible journalism. As the association that represents all three primary window framing materials and both the architectural and residential market segments, AAMA meetings often feature spirited discussions with competitive points of view. On the other hand, broad material and market perspectives are invaluable in developing North American fenestration performance standards, finishes, and accessory standards and the industry's largest certification program.

Rather than "rumors," wouldn't it be more responsible to get educated opinions from several sources? To obtain representative feedback when window product performance and installation are discussed in the future, please call us.

Richard G. Walker, Executive Vice President
American Architectural Manufacturers Association
Schaumburg, Illinois

Editor's Reply,

We very much appreciate you taking the time to explain AAMA's perspective on the history and future of the window installers training program. And we're encouraged about the meeting you describe between AAMA and NIBS that took place on March 13. Perhaps it will breathe new life and direction into the program. But we do not believe that our March article in any way did a "disservice to our readers," and we assert that everything stated in the article referring to the InstallationMasters program is, to our knowledge, true, or at least was at the time of publication. These points, in summary, are:

- The BETEC board has repeatedly expressed displeasure with the way that AAMA has handled the program and the lack of speed in deploying it.
- Though the program is almost two-and-a-half-years old, few window installers have been trained. You state that "208 trainees are already certified or will be certified this month" (April). But whether you use the number 208 or some smaller number that was accurate when we wrote our story at the end of February, we think you'll agree that the number is almost insignificant in light of the tens of thousands of window installers in the US.
- BETEC is looking at other mechanisms through which the program might be expanded and accelerated.

Finally, we stand by our decision to mention the rumors that have been circulating concerning a possible rift within AAMA and the possibility that some members are considering leaving. While we do not traffic in rumors and very seldom give them currency, the fact that such rumors are circulating is germane to the topic, because a split "would be a blow to the fledgling window installation program, which needs a unified voice."

Had you categorically denied the rumors in your letter, we would have been happy for the clarification. But your description of the status quo — "AAMA meetings often feature spirited discussions with competitive points of view"— doesn't help much to clear the air.

And let us point out that we have repeatedly given full coverage to AAMA's point of view on the InstallationMasters program. In our lengthy, front-page article published in the May 2000 ***EDU*** we quoted AAMA Installation Program Manager Larry Livermore and AAMA Technical Director Carl Wagus. Livermore was also quoted at length in earlier articles, published in September 1999 and October 1998.

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Also, health and safety legislation is making traditional ways of building more complex and costly.

All these changes have led many builders to consider how the construction of housing can be improved and examine new ways of building. The larger home builders, which build 5,000-10,000 units a year, are investigating opportunities for off-site prefabrication using more semi-skilled labor. Steel frame housing is increasing significantly, generally using the "warm frame" approach with some or all insulation outside the steel frame. Increasingly, steel is being used in modular buildings, employing technologies from the budget hotel market.

Thus, manufacturers such as Terrapin, Britspace, and Yorkon, which specialize in prefabricated hotel bedrooms, classrooms, and burger bar restaurant buildings, are linking up with large home builders to develop

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