

Is It Time for Shotcrete Homes?

There is no doubt that concrete is gaining acceptance as the material of choice for framing residential structures. Attractive, fire-resistant, storm-resistant, and energy-efficient structures built with concrete and masonry products have gained market share as consumers look beyond the lowest initial price to the implications of living in a structure for an extended period of time.

Reducing fossil fuel consumption seems to be in every news-cast in the media these days. For the most part, the automotive industry is taking the brunt of the abuse with Congress debating increased Corporate Average Fuel Economy (CAFÉ) standards. The popularity of hybrid vehicles and interest in alternative engine technologies is well documented. However, what would happen if a standard similar to the CAFÉ standard was adopted for new residential construction? Heating and cooling homes cause utilities to use fossil fuels. There could be energy limitation requirements for new construction. Concrete used for framing could have a significant role in reducing the amount of fossil fuel used for heating and cooling. For example, a typical 2000 ft² (185.8 m²) house requires 44% less energy to heat and 32% less energy to cool when built with insulated concrete forms. These savings are even more dramatic in regions of extreme temperatures.

Fire resistance is another important feature gaining attention, particularly where homes have been built in more rural and forested areas.

The ability to resist damage due to high winds is an additional advantage. In regions with exposure to hurricanes, concrete-framed homes provide homeowners with an increased probability that their home will survive. For example, when Hurricane Andrew devastated Florida several years ago, a report aired on the evening news showing a community with homes built for the Habitat for Humanity program constructed with shotcrete still standing while the surrounding plywood-framed homes were totally destroyed.

What kinds of concrete-framed structures are available? Cast-in-place, precast, concrete masonry, autoclaved aerated concrete, insulated concrete forms (ICF), and shotcrete structures are currently being built. The use of concrete masonry and ICF methods are the most prevalent at this time with the ICF option being the most energy efficient. According to the Portland Cement Association, concrete systems account for about 20% of the above-grade walls in today's residential market.

What does this mean to the shotcrete industry? Previous attempts to use the shotcrete method for residential construction have largely failed to gain much market share against conventional wood framing. The market has not been ready to demand concrete framing until recent years. Now that the benefits of using concrete for above-grade walls has captured the attention of some consumers resulting in significant market share for concrete framing, it may be time for shotcrete contractors to revisit this large part of the construction market.

Why is this being discussed in the Sustainability feature? Concrete has many advantages that make it a more environmentally friendly framing material over the life-cycle of the structure. Critics of the concrete industry point to the energy consumed in producing cement as a major problem with cement-based materials. When the amount of cement used is considered over the life of the structure, however, typically over 50 years, the environmental impact of cement production is more than offset by the other benefits of improved energy efficiency and recyclability. Cement and cementitious supplements combined with other locally-produced aggregates to produce concrete that is transported over a short distance from the plant to the job-site results in a lower total energy impact over the life of the structure.

Is it time to reconsider the shotcrete method to meet the demand for sustainable features in residential construction? It just might be an idea whose time has come.