Over the last 20 or 30 years, numerous changes have taken place in building methods, materials and processes in the residential construction industry. These changes, which have occurred on the exterior as well as interior of homes, have been driven by numerous factors. These include new material and process technology, natural resource availability, regulatory requirements, changes in construction practices, as well as homebuyers who have demanded more amenities, tailored aesthetics and enhanced design features—all at a reasonable cost.

The list of materials used in the construction of a home is a long one and comprises many distinct technologies. In many cases, the home’s performance and serviceability is a function of how these products and technologies interact with one another. In all cases, when products change, the impact of the change must be evaluated and understood by all relevant parties involved in the construction process. It must be recognized that changes to one material, method or process may have an effect on performance attributes and, in some cases, may create the need for changes to other products. If the inter-relatedness and compatibility of the methods and materials are not understood and taken into consideration by the manufacturers, designers, builders and contractors, there may be unanticipated results.

Research into changes that have occurred in construction materials over the last several decades yields a list that is far longer than space

By
William F. Egan
allows. The following examples, however, will help illustrate some of the changes and their impact.

**Energy Efficiency**

*Then* — Many years ago, houses were drafty and heat flowed easily into and out of buildings, resulting in wasted energy and high heating and cooling costs.

*Now* — Minimum energy requirements were put in effect to boost efficiency. As part of the energy enhancement effort, perimeter insulation was used on the foundation and continued below grade. However, some construction methods hindered pest control contractors from easily inspecting the foundation for termite tunnels. In some cases of homes with foundation and below grade insulation, termite damage was not immediately identified and treated. As described below, compounding this issue were changes in the type of termite treatment.

**Termite Protection**

*Then* — Homes constructed in termite-prone areas of the country were typically treated with Chlordane during the construction process to counter the effect of termites. Although the effectiveness of this product in treating termite infestation was recognized, its use was discontinued by the United States Environmental Protection Agency in the 1980s due to its negative impact on other wildlife.

*Now* — Chlordane has been replaced by less hazardous products that are also considered by most pest control companies to be less effective. As a result, homes in termite-prone areas of the country seem more vulnerable to termite attack. This has further spawned the introduction of products, such as “bait and trap” systems, which are intended to determine if termite activity is present.

**Paint**

*Then* — Paint typically contained lead that was used in part because of durability. However, it was discovered that lead-based paints had serious health risk, and consequently the use of lead-based paints was banned in the United States in 1978.

*Now* — Lead-based paints have been replaced in large part with environmentally safe oil and latex paints and stains, which are commonly used today in limitless colors to decorate and protect homes. With latex paints, application and cleanup is easy. But some of these products need frequent recoating.

**Low-Flow Toilets**

*Then* — Before 1994, toilets used 3.5 gallons of water per flush.

*Now* — A water conservation measure, the 1992 Energy Policy Act required that by 1994 new toilets sold in the United States must use no more than 1.6 gallons of water per flush. Product modifications were necessary to comply with these new requirements. However, in some cases, toilets meeting the new criteria have been found to clog easily and may require sev-
Only One Product Would Do

In areas like the Carolinas, the road back to acceptance of EIFS takes work, but even skeptical homeowners are now being won over once again. One homeowner in Florence, S.C., had invested a lot of time and money designing an exquisite home with a Mediterranean flair. It encompasses 12,000 square feet of house under roof — 8,000 square feet of heated area on one level. The home, completed in fall 1999, is their “labor of love,” adorned with Italian marble, Brazilian rosewood, granite countertops, hammerd copper lavatory bowls and woodwork finished with a stippling effect to look aged. Only EIFS could create the look they wanted to complete their masterpiece and retain that flawless beauty for years to come.

Asa Godbold of Powers-Godbold Construction and Joe Griffin of Griffin Insulation and Drywall convinced the homeowners that there was no better product available than water-managed EIFS to give them the look they wanted with the flexibility to design ornate details and the confidence that their investment would be well protected.

Though all homes may not be as elaborate as this one, any home is typically the largest single investment many individuals will make in their lifetime. Everyone wants their home protected. With the attention now paid to EIFS, the advanced systems now available and the exchange of information currently going on, EIFS today is one of the best values on the market.

Secondary Weather Barriers

Then — Asphalt saturated building paper was typically used to provide secondary weather resistance.

Now — Although they are often more expensive, various types of housewraps are becoming popular today as a replacement for building paper due in part to features such as the large roll size, ease of handling, tear resistance, as well as ability to create an air barrier. However, some have asked whether the housewraps are equivalent in all respects to traditional building paper.

Interior Wall Finishes

Then — Interior wall surfaces were constructed of wood lath and a thick coat of plaster, creating a hard surface.
Now — Wood lath and plaster was replaced by manufactured gypsum wallboard and thincoat or veneer plaster during the construction boom of the 1950s. Today, many walls are constructed with gypsum wallboard and a bed coat of tape/veneer plaster applied only at joints in the wallboard. Although this is cost-effective, it does not create the hard surface typical of other products. In response to this, some wallboard manufacturers have introduced new boards that are more resistant to impact.

Wood Fabricated Products

Then — Products fabricated from wood were typically created from individual or pieces of solid wood glued together. Finished products that used solid wood components included cabinets, shelves, window frames, exterior sheathing products and studs.

Now — Providing the design and quality customers want at a price they will pay has meant turning to engineered wood products. These products are often fabricated using smaller pieces of wood that are formed into sheets, boards and dimensional lumber with adhesives. Engineered wood has gained popularity because of cost advantages, labor savings, resource availability, uniformity, consistent size and its ability to be engineered for specific applications such as long spans. Common examples of engineered wood products include trusses, sheathing such as plywood and oriented strand board, as well as finger-jointed wood, which is used to construct window frames.

Providing the design, quality and price customers want has meant turning to engineered wood products like laminated veneer lumber and OSB. Engineered wood has gained popularity because of cost advantages, labor savings and its uniformity and consistent size. They may look like scraps swept off the sawmill floor, but they are very stable and reliable, and they allow builders to keep costs down.

Engineered studs stay straighter than their solid-sawn counterparts. Wood I-joints span much longer than traditional joists, and they shrink less than 2-by-10 or 2-by-12 joists. With less shrinkage, there are fewer problems with things like drywall pulling away from the tops of walls or around baseboards. An engi-
neered floor system can span the width of a house to give consumers the open designs they want for kitchen-family room combinations and basements, whereas stick framing would require load-bearing walls that would break up the space.

In addition, before the 1980s, most of the commercially available wood was dense and durable, harvested from old-growth forests. Young forests are increasingly being used for today’s lumber because of the logging restrictions that have been placed on old-growth forests. But the growth rings are far apart on these trees, and the wood is weaker and more susceptible to rot. The engineered wood obviously doesn’t require big trees to produce and uses more of the wood from each tree as the pieces are bonded together with resins and glues.

Plumbing, electrical systems, flooring, heating and air conditioning systems as well as many other components within a home have all changed dramatically during the past 20 years or so. Every change in product design may have some impact on factors such as cost, serviceability or other products used in the home. One key to successful construction using new products is to recognize that changes have occurred, determine the impact of the change and prescribe what, if any, modifications need to be made to other products/systems to accommodate the change.

A case in point is the effect changes in construction have had on the exteriors of homes, including those dad with barrier-type exterior insulation and finish systems. The deterioration found in homes in North Carolina due to moisture intrusion was initially blamed on the cladding. However, as reported in past articles, investigations have revealed that the moisture intrusion was due to a number of factors including changes that have occurred over the years in residential construction: windows, alternative sheathings, shortages of skilled labor and supervision, ambiguous building codes, etc.

In many cases, building components and installation processes were treated separately. Proper sequencing and appropriate procedures were not treated as an integral part of a system, resulting in avenues for moisture intrusion.

Investigation into adjacent products and the realities of construction practices in the field prompted new market demands and building code requirements which resulted in manufacturers offering additional design options. There is now more information available than one might have ever imagined on how to avoid moisture intrusion problems, and it is
typically not directed solely at one product or one trade. The attention that became focused on this problem has resulted in an industry collaboration that is improving the quality of residential construction.

Residential Water-Managed EIFS Gaining Acceptance

As information came to light about the changes in residential construction that were directly capable of affecting the integrity of the cladding, additional EIFS design options were introduced. Incorporating weeps and a drainage plane, these new water-managed EIF systems create an escape route for incidental water between the weather barrier and the EIFS. Once these systems were developed, tested and approved, in 1998 Senergy required that its drainable system be used on all one- and two-family residential construction projects.

Today, everyone from the homeowner to the builder is asking more questions. Everyone wants to be more knowledgeable about the products and systems being used on homes today. Manufacturers and industry associations are devoting extensive efforts to training. Distributors are asking more questions before they will sell products to ensure application is being done properly.

Accountability is also being built into systems today. Senergy provides a 10-year warranty the Senturion® III Controlled Drainage System, and other EIFS manufacturers also back up their products with a warranty. Senergy also provides extensive sets of details addressing typical design and applications requirements. And very importantly, prior to issuing the warranty, it is required that both the builder and the applicator sign off on projects indicating that they have followed these guidelines.

The lack of communication and coordination that led to the North Carolina situation has left the EIFS industry with a tarnished reputation in the residential marketplace. Now that we as an industry are devoting significant effort to making sure that everyone knows how to “do it right,” the EIFS industry has to
Logging restrictions have replaced dense, durable mature wood in windows with younger, fast growth timber that is softer, more porous and, therefore, more susceptible to deterioration. Finger-jointed wood is also replacing solid wood in windows, which some say opens up the potential for weakening and sealing problems. In some cases, life expectancy of windows is being shortened dramatically.

As an industry, when new technological advances come along, we need to study the impact of these advances on the products around ours and those in the trades who will be working with these advances. Then, we need to communicate. The price of silence is too costly.

About the Author
William F. Egan is vice president, Engineering & Development for Senergy, Inc.