

## BIM For Home Builders



BUILDING SOFTWARE

*Proponents of building information modeling software, like Warren Buffett, say now is the time for home builders to adopt the technology.*

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A new home has risen in a fancy new development, but it contains a flaw that is embarrassing and aggravating for the home builder's project manager. A window intersects with a roof line — a formula for leaks into a second-story bedroom. It's the type of mistake that is all too common in the industry. The window must be moved, a costly fix.

During a period when profit margins are tighter than ever, this kind of error eats away at the bottom line. Builders have longed for a system that can prevent such profit-stealing construction flaws, and in recent years have heard that building information modeling (BIM) is the answer. According to the sales pitch, BIM will not only drastically reduce design flaws and change orders, but will also enable home builders to increase productivity in design and drafting, reduce overbuying of materials and estimate costs more precisely — all of which will significantly boost profit margins.

Already a success in commercial construction, BIM has not been widely adopted to date by home builders. Many feel that the technology hasn't been tailored for the challenges of home-building's rapid scheduling. But that sentiment is beginning to change.

With recent upgrades of leading BIM systems, making them better suited to home building, is it time for the industry to get serious about BIM?

Some are saying "yes." Among them is Warren Buffett, chairman of Berkshire Hathaway, one of the most successful investors in history. The Oracle of Omaha is so bullish on BIM that he acquired software developer and BIM service provider Simpad/Blackpoint Builder Services, now a subsidiary of one of his holdings, MiTek. Buffett also authored a book touting BIM to home builders.

"We are making an investment in assisting a limited number of home-building companies to automate their CAD production and estimating processes," Buffett wrote in the book, which was distributed to CEOs of the nation's 50 largest home builders. "They will quickly realize the cost savings. The quality and accuracy of their design and construction process will be better than ever before, and they'll be delivered in a much shorter period of time."

BIM is commonly used in the design of major high-rise office towers, bridges, power plants and other complex projects with long timeframes. Architects, engineers, construction management firms and owners have reported notable results in improved efficiency on commercial and public works projects, and BIM is on its way to becoming an industry staple.

While many people define BIM as 3D design software, in order to get the most out of the technology, it is better to think of it as a system to manage a construction project from beginning to end. "People vary in their use of the term," says Ross Theilen, general manager of structural frame software for iLevel by Weyerhaeuser. "It's not just a software application; it's a mechanism for collaboration among platforms."

BIM 3D design tools represent elements of a home design as objects. The objects can be reused in multiple designs, saving time in the drafting process. Additionally, by presenting design in 3D, it's a lot easier to catch conflicts such as a window intersecting with a roof line. But more than that, on a BIM object of a window, for example, the designer can attach data including the size, type of glass, whether a screen is included and the window brand, to the 3D depiction. Then this information can be fed into an estimating component to obtain the unit price.

Analyze all of the windows in this way and you can get the total cost of all of the windows in the home. You can also try alternative window types and brands to find out how they would impact the overall cost. If you repeat the process with all of the elements of a home, you can come up with a reliable cost estimate of all materials to be used in the project. Then, ideally, the 3D plans and related construction documents such as bills of materials can be accessed by all suppliers and subcontractors over the Web. Thus, everyone can work from the same set of plans and data without having to do any redrawing or transposing.

Indeed, BIM promises much more than a fancy-looking electronic blueprint. It can be a valuable aid in making strategic decisions. This is the long-term vision for BIM, anyway, though very few home builders have achieved such an advanced degree of integration.

In order to maximize BIM's benefits, builders should use it as part of a Lean building process. Lean building is a project management approach that attempts to wring out waste such as overbuying of materials and to reduce errors that lead to change orders — and higher costs.

"Beginning with the crash of 2006, builders have become increasingly desperate to reduce costs and have pushed themselves to the limit, yet we see them walk right past some of their greatest savings opportunities," says Scott Sedam, president of TrueNorth Development and a Lean building guru. "There is a gold mine sitting right under their noses, yet builders fail to tap it because they don't know how to identify, measure and track waste. Most who do see it simply assume these costs are just part of doing business, or are just too difficult to deal with."

According to industry consultant Chuck Shinn, builders can improve profits from 2 percent to 10 percent just by streamlining management systems. Adding BIM

3D design software alone, however, will not cut all that fat from the building process.

“Just because you have a 3D model, if you don’t know how to leverage it, it’s not going to do you a lot of good,” says Tim Beckman, partner with CG Visions, a BIM development and implementation consulting firm. To get the most out of BIM, the design software must work seamlessly with estimating tools, and produce usable construction documents for suppliers and subcontractors.

The major players in BIM software and services have focused recently on making it easier for clients to leverage the technology beyond design and drafting. Simpad/Blackpoint Builder Services, for instance, offers a collaboration portal that allows trade partners and contractors access to clients’ BIM plans and documents through a secure Web site. In addition, Simpad’s technology, which is built to work with Autodesk’s AutoCAD and Revit, is now integrated with MiTek’s truss ordering system, eliminating the need for the truss manufacturer to rework designs. This not only speeds up the process but also diminishes the possibility of inaccuracies during truss manufacturing.

Another example of multi-partner cooperation is Cadsoft’s Envisioneer and Weyerhaeuser’s iJavelin integration that allows designers to model complete structural frames, including the floor, wall and roof systems, and send them along with materials lists directly to a lumberyard for fabrication. This, too, eliminates the need for redrawing plans and transposing data.

“The lumberyard can cut pieces to the exact length and cut holes for the plumbing elements,” says Theilen. “Everything can be labeled so that it can be put together like a jigsaw puzzle on site.”

There are other instances of collaboration between software vendors, and you can expect more of them to be announced. It’s in everyone’s interest for all of the various players along the supply chain to participate in BIM, because each participant stands to improve efficiency. The more players involved, the more benefits for all. This process will take some years to fully develop, though.

Recent improvements in BIM products are making more builders take the technology seriously, but there remains plenty of skepticism. Doug Smith, now executive director of estimating with BSB Design, Dallas, led a multi-year BIM initiative for his former employer, Centex, that was halted in 2008. The home builder had decided that BIM required too much training and did not improve plans and estimates enough to make it worthwhile. Smith still holds that view. “To where BIM has developed thus far, it is too time-consuming and not accurate enough for home builders,” he says.

But Smith’s former employer — Pulte Homes, which acquired Centex — is about to jump wholeheartedly into the BIM world. In 2008, “the value-add on the estimating side wasn’t really there,” says Scott Thomas, Pulte’s national director of production. Since then, the tools have improved to the point where the company is now evaluating which ones to embrace, not whether to buy into the concept at all.

The ranks of builders adopting BIM are growing, but implementation isn’t a fast or easy process. It’s essential to take a phased approach to implementing BIM tools and processes, and to allow enough time for staff to get up to speed with the software and procedures. “Initially, it looks expensive and difficult to implement,” CG’s Beckman says. “But you can do it in progressive steps. You can start with the product document set and leverage it to do other things later.”

A big challenge to Veridian Homes’ BIM implementation was allowing time for training while keeping up with production demands, says Dan Gorski, vice president of home-building services for the Madison, Wis., company. Veridian’s owners were strongly committed to BIM, including making sure staff was well trained, which was essential to success, Gorski says.

“A key was finding a trainer that worked best with our team,” Gorski says. The trainer provided a two-week course for the design team onsite, then followed that up with visits for one week a month for six months to provide one-on-one coaching. Making sure that the trainer had a good rapport with staff was crucial, Gorski says.

For Grant Giese, president of Green Goose Homes, based in Lafayette, Ind., there is no need to convert 2D plans to 3D, or revamp legacy estimating systems. The company is a start-up that will use BIM from inception. Giese says his biggest challenge will be working with suppliers and subcontractors who are mostly unfamiliar with BIM. “They are still going to want to do things their way,” Giese says. He’s ready to make a strong case to them, however. Suppliers will be enthused by the prospect of fewer material returns, he believes.

Thomas senses less opposition from Pulte’s trading partners than even a couple of years ago, partially due to the struggling economy. “They are more willing to do these things today than they were a few years ago, when everybody was making money,” he says. Some trades like component manufacturers will get on board early, while others, such as mechanical contractors that do their own designs, will lag.

Different home builders have different ways of designing elements and recording data. But software doesn’t work well when there are conflicting standards. In some cases, builders have to conform their methods to work with BIM.

Leslie Day, president of Inland Homebuilding Group of Tampa, Fla., which is implementing BIM using Simpad’s Blackpoint, says her company has had to adapt some internal processes to fit the specifications of the system. “Our biggest challenge right now is taking the way we bid and adjusting it to Blackpoint’s format,” she says.

Making sure that all of a builder’s suppliers and contractors use and understand designs, estimating methods and other data points the same way is another complication when tackling BIM. Brookfield Homes Southland of Costa Mesa, Calif., hires multiple architecture firms, each with slightly different ways of presenting designs. For example, “Each one has a different style of representing MEP systems,” says Chris Formes, Brookfield’s IT manager. That will soon change, as the company is now requiring its architects to adopt a standard approach.

## **Tips On Adopting BIM In Your Business**

- **Be realistic with the timetable.** While BIM can help transform the business with badly needed cost-saving capabilities, remember that people need time to adjust to change. Trying to do too much too fast is a recipe for failure. Use a phased-in approach with realistic benchmarks.
- **Don't skimp on training.** The more proficient your staff is with the software, the higher the return on your BIM investment, so budget enough money and time for training. "You have to maintain your commitment to training even while you have production demands," advises Dan Gorski, Veridian Homes' vice president of home-building services.
- **Consider outside help.** The initial stages of converting 2D plans to 3D and setting up the related systems that provide estimating data and construction documents are labor-intensive. "We would have needed to increase staff dramatically to bring the new platform online," says Jim Risch, director of architecture for DeLuca Homes, based in Yardley, Pa. DeLuca's solution was to hire consultant CG Visions of Lafayette, Ind., to assist in the move to the new platform. "They helped us set up libraries, material databases and output formats," says Risch.
- **Standardize at the outset.** Design specifications, estimating methods and other key data points must be developed consistently across the company and throughout the supply chain. This includes architecture consultants, subcontractors and suppliers. The sooner in the implementation process that these standards are harmonized, the better.
- **Develop a sales pitch for suppliers/partners.** Be prepared with some salesmanship to persuade suppliers and contractors that participating in your BIM plan will benefit them, too. In a nutshell: Suppliers will have fewer material returns and contractors won't have to spend as much time correcting design mistakes in the field.

### Colorado Builder Implements Building Information Modeling

In 2009, while most home builders would have been thrilled just to match the previous year's sales, Oakwood Homes sold 330 homes, a big jump from 187 in 2008. The impressive results can be directly attributed to a new business strategy in which BIM plays an essential role.

Late in 2008, the Colorado builder decided that it had to reduce its price for entry-level homes from \$190,000 to \$150,000 in order to meet the demands of a changing market. Reduced price points meant reduced profit margins, so cutting costs was critical. Oakwood needed to scale back the size of these entry-level homes from 2,000 square feet to 1,400 square feet to make a profit at the new price point.

Also critical to gaining competitive advantage was to be able to offer customers a wider variety of options for base home designs. "A lot of builders are looking to offer fewer options to reduce costs," says Don Carpenter, Oakwood's director of product development. "A lot of our competitors are looking to limit choice, while we're looking to expand options."

Converting their designs to a BIM platform using Autodesk's Revit and Simpad's Blackpoint Builder Services was the first step. Using BIM models, Oakwood has been able to accurately gauge its unit costs, which gives the company the ability to obtain accurate costs on base homes and many options. Thus, the company can figure its profit margin on every site-specific plan at the onset of the project.

Also, option pricing can be adjusted quickly when the price of materials changes. Oakwood's sister company manufactures housing components used in its designs. "Our component factory lives and breathes costs; they work with materials every day," Carpenter points out. When the sister company finds a good deal on a certain brand of, say, insulation, the new price can be automatically reflected on all plans throughout the design database. Then Oakwood's designs can be switched to the bargain brand of insulation to reap the savings.

"All of us are operating with slimmer margins," Carpenter says. "The ability to measure and manage costs is critical — a matter of survival."

BIM is essential for accurately gauging costs, he adds. "Builders that are going to be successful will switch to this. Others are going to struggle."

### BIM Providers For The Home-Building Market

#### Ameri-CAD

Provider of 2D and 3D architectural services and software solutions

#### Argos Systems

Developer of Vertex BD software, a 3D design/BIM package

#### Autodesk

Developer of AutoCAD and Revit

#### Cadsoft

Developer of Envisioneer software

#### CG Visions

BIM technology, development and implementation consulting firm

**iLevel by Weyerhaeuser**

Products include 3D structural framing software

**Simpad/Blackpoint Builder Services**

Provider of BIM and Lean modeling services

**Softplan Systems**

Developer of residential and light commercial CAD design software