



3-D modeling software recalls 'master builder' concept to construction

By **BARBARA HOWINGTON**, Special to the Daily Transcript
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Building Information Modeling (BIM), a technology that recalls the "master builder" concept in construction, continues to gain popularity in the building industry. Some construction firms have discovered that this trend toward 3-D computer modeling also brings cost savings and heightened efficiency to projects.

Previously used exclusively by larger architecture, engineering and construction (AEC) firms, 3-D modeling has made its way into some medium and small firms, where it is bringing profound changes to the construction process, according to project manager Al Berry of **T.B. Penick and Sons Inc.** in San Diego.

"Using BIM can be compared to the way the ancient pyramids were built in Egypt, with a master builder totally responsible for the entire project. We're finding that the 3-D modeling software that is now available to us takes the time and cost savings even further," Berry said.

Mid- and small-sized construction firms began to try out the software over the past few years, and the trend is picking up speed. T.B. Penick started working with Autodesk's Revit 3-D modeling software within the past year and has found it to be a powerful tool that outperforms traditional two-dimensional CAD architectural drafting software.

T.B. Penick is employing BIM in projects for NAVFAC (Naval Facility Engineering Command), helping it set a system-wide example of how the construction experience is managed with 3-D computer modeling as a key component. The firm is one of several local builders to recently win a construction contract with NAVFAC as part of a \$5 billion federal investment in military infrastructure in San Diego County.

The Revit software program gives the client the benefit of having a single firm responsible for an entire project. The client also profits from the cost-savings and efficiency enhancements that 3-D modeling brings to the process. Three-dimensional modeling also has a place in design/bid/build projects, where the client signs off on an architect's design before taking bids on the various construction elements.

"Where 3-D is direct, real and tangible, 2-D modeling is more abstract and subject to different interpretations, which requires more meetings and discussion. A lot slips through the cracks and errors are often discovered after construction is under way. That means having to do costly rework," Berry said.

"With 3-D modeling software you can build a detailed prototype in the computer and test a design before you ever place a brick. Design and build are completed quicker, with fewer change orders and cost overruns. You get more value for your money and a higher quality finished building."

The software's highly collaborative nature is one reason 3-D modeling is more efficient. Entire construction teams, from the architect to the structural, mechanical and electrical engineers are able to contribute. This high integration factor helps diminish coordination and design issues early in the process, allowing "aha" moments that pinpoint and circumvent problems before they have the chance to happen.



TB Penick & Sons created this three-dimensional rendering for the design/build construction of the Child Care at Youth Center at the Naval Air Facility in El Centro, Calif.

To develop a 3-D building model, designers add different building elements, the same way they actually construct it. The Revit software includes libraries of the most typical and essential components such as ceilings, floor plans, interior and exterior doors, windows and staircases. Users also have the ability to create their own custom elements. Changes made by various team members come together in a final project file. When a project is complete, the customer comes away with a robust 3-D model to use in ongoing management of the building.

Three-dimensional modeling and drafting were first developed more than 30 years ago. The technique was first applied to manufacturing, and the industry saw shortened development cycles, lowered costs and increased quality, said Berry. He predicts that the 3-D modeling trend in building construction is going to take off and revolutionize the industry.

"I'm surprised 3-D modeling has taken this long to come to the building construction industry. It's really powerful, and it's going to change for the better the way construction is done. Eventually, we'll all wonder how we ever worked without it," he said.

Howington is with McCabe Associates.