

Feature Story - June 2008

Building a New Way to Estimate

Harnessing the cost benefits of BIM

Venturous firms are already breaking the still-nascent BIM mold, taking the design-model application to 2.0 and saving time and money in the process.

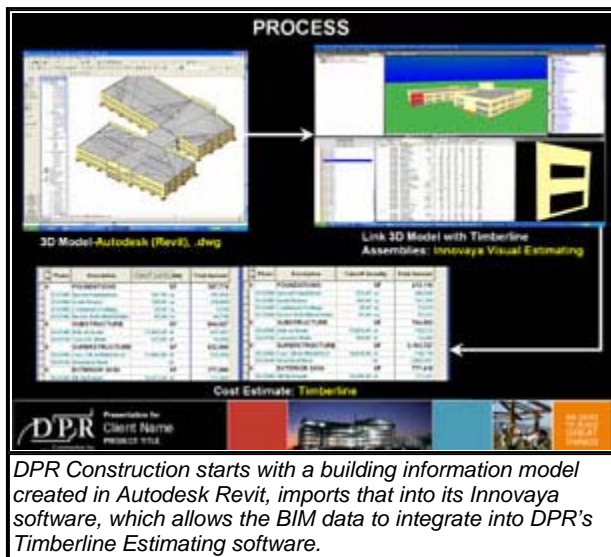
By Bruce Buckley

By definition, estimating isn't an exact science, but many enterprising build teams are eyeing opportunities to crunch quantities and costs automatically by using computer models.

Through the rising use of building information modeling, more contractors are searching for new ways to get accurate quantity takeoffs and analyses that will speed the estimating process and reduce administrative costs.

BIM, which at its base level produces 3D design models, has gained momentum in recent years among designers and contractors who see its value in visualization and clash detection.

However, applying BIM to estimating has proven a greater challenge because the longstanding divide between the roles of architects and contractors makes it difficult for team members to share common data, some users say. As a result, contractors often build their own models from scratch rather than relying on design model data for estimating.



DPR Construction starts with a building information model created in Autodesk Revit, imports that into its Innovaya software, which allows the BIM data to integrate into DPR's Timberline Estimating software.

Despite the redundancy, some large contractors still see value. [continued, scroll down]

Bonding With BIM

Eileen Schwartz

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Satterfield & Pontikes of Houston was awarded a major portion of the Cy-Fair ISD 2004 Bond Program, including work for various renovation projects at two high schools, a middle school and elementary school.

S&P's portion of the 2004 program, which serves the northwest side of Houston and Harris County, will cost an estimated \$120 million, not including work added through a 2007 bond. Work began in October and is expected to take about 30 months to complete.

The team, which includes the Cy-Fair school district and architects SHW Group, PBK and Bay Architects, is using BIM to help schedule and phase work efficiently while minimizing impact to ongoing school operations.

"BIM provides a great way to leverage the overall program to the benefit of each project," says George Pontikes, Satterfield & Pontikes president and CEO. "We used BIM to provide a comprehensive view of all the work to be done and then brought that detailed understanding to each project."

That level of understanding along with a program-level perspective "lets us deliver value in scheduling and phasing and gives the owner enhanced buying power," Pontikes says.

Much of the bond work that would have been done sequentially is being done simultaneously. "We could lay out phasing plans for the multiple campuses and plan the work to take advantage of timing, the sub market and material supplies."

BIM helped the team with its budget in two main ways, Pontikes says. The cost information and intelligence in the model allowed the development of a comprehensive estimate early in the process "without as many unreliable 'plug' numbers," he adds.

"With the specific unit of measure information, we could accurately compare numbers we were getting for specific scopes of work and go with the best value for the district."

Pontikes believes that BIM is superior to 2D construction documents.

"BIM is really about a process," he says. "Because all the information and intelligence about the project is merged into a single model, we see how those pieces and parts work together before we ever start in the field."

"This prevents a lot of costly mistakes and misunderstandings. That level of true collaboration and coordination is just not possible in the traditional 2D world."

Derek Cunz, director of project development at Minneapolis-based M.A. Mortenson Co., says his company looks to get involved early in projects, applying integrated project-delivery methods to help improve data sharing with architects. Still, the company often builds its own construction models.

"There are basically design-intent models and then there are construction models - and they are different in what they are intended to do," Cunz adds. "With design-intent models we see an opportunity to collaborate, do analysis, do validation and look at schedules early. In the construction phase, traditionally we're building from scratch

because of the amount of detail required in a construction model [that isn't in a design model]."

Cunz says that when a project is in the schematic design phase, Mortenson will work with the design team's model to give architects feedback on costs and analysis. However, it won't create its own model at that point because the design is still evolving.

"Once it gets to the construction documents phase, we'll take their model and start migrating anything we can into the construction model we build," he says.

Cunz says that even with the added work to build the construction model, the process ultimately saves money. Mortenson has tested its theory during construction of the \$200 million University of Colorado Health Sciences Center Research Complex II in Aurora, Colo., which is scheduled for completion this summer.

The company collaborated with architect KlingStubbins of Cambridge, Mass., to share all available data to create BIM models. In the end, the project saw a 37% reduction in requests for information compared to the amount generated during construction of Research Complex 1, which didn't use BIM. Research Complex 1 was designed by KlingStubbins and built by Hensel Phelps Construction of Greeley, Colo.

"If you look at just the administrative costs - writing an RFI, answering it, processing it, creating a solution and then responding - we had a 2-1 return on investment using BIM," Cunz says.

Holder Construction of Atlanta is currently researching the benefits of applying BIM to the estimating process. Michael LeFevre, the firm's vice president of planning and design support services, says that to date the company has been mostly focused on the 3D geometry and collision detection benefits of BIM.

"Those have proven payback and are widely adopted, but they don't represent the high-level opportunities of BIM," he says. "We know there's more you can do with BIM, and things like quantity takeoffs are among those."

Although the company's analysis is still in the works, LeFevre says he is confident it will pencil out.

"Speed and automation are what excite me," he adds. "My argument is that it takes time to build the model, but you also save time by having the model. Even if all things are equal and you save as much time as you spend, you still end up with a model that can be used for other things like collision detection."

For contractors who do a lot of self-performed work in the field, like DPR Construction of Redwood City, Calif., using BIM to help with estimating is even more compelling. Atul Khanzode, director of virtual building at DPR, says that in situations where the company is the general contractor and also self-performing the drywall and concrete work, using BIM makes sense.

advertisement

The advertisement is a vertical rectangular graphic. On the left side, the text "BREAKING NEWS" is written in large, bold, blue capital letters. Below it, the word "from" is in a smaller, lowercase blue font. Underneath "from", the text "McGraw Hill CONSTRUCTION" is displayed in blue, with "McGraw Hill" in a larger font and "CONSTRUCTION" in a smaller font below it. At the bottom left, it says "Conference Partner:" followed by the logo for "AGC of America". On the right side of the graphic is a photograph of the United States Capitol dome, illuminated at night against a dark blue sky. At the bottom right, there is a small red and yellow banner with the text "The McGraw Hill Companies".

“Having self-performed work helps that decision,” he says. “We need the data for estimating, and we want the model for work in the field.”

To add to the challenge, DPR works with multiple software platforms that need to be integrated in order to share data. On a recent pilot project, the company used Revit Architecture for the architectural components; Revit Structure for the structural systems; AutoCAD Architecture 3D for non-BIM architectural and structural component work; Navisworks JetStream for clash detection; Google StetchUp for simple 3D work; VICO Software for architectural and structural systems; Revit MEP for MEP systems work; and Innovaya to integrate BIM with the company’s Timberline Estimating software.

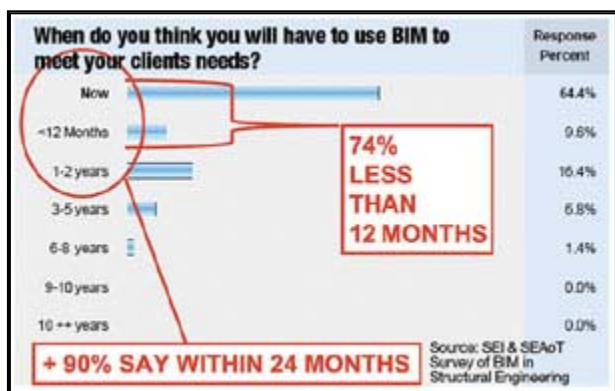
The project was a two-story 150,000-sq-ft office building with tilt-up construction, a structural steel frame and concrete on metal deck. DPR estimated the concrete scope work based on the 3D model.

DPR spent four days modeling from the architect’s 2D drawings, which Khanzode says the architect was reluctant to provide. Estimating in Timberline using Innovaya took two days. Using traditional methods, Khanzode says estimating would have taken six days. With better integration and sharing of data, he says the process could have gone faster, however the resulting 3D model was worth the effort.

“Right now, I don’t think we’re seeing more savings [with estimating in BIM] than the normal way of doing things,” he says. “The key is that once we produce [the BIM], we have something we can put into the field. That has value.”

Although many adopters of BIM have accepted the need to build their own models, not everyone agrees it needs to be that way. Jim Bedrick, director of systems integration for Webcor Builders in San Mateo, Calif., says Webcor is working with its regular design partners such as St. Louis-based HOK to create models with data that all team members can use.

“There doesn’t have to be fundamental differences between design and construction models,” Bedrick says. “There are challenges to work out, but the potential benefits of being able to turn cost information around fast and often is worth the effort. When we make the clerical drudgery an automated process, more time can go into the valuable thinking that design professionals bring.”



Although BIM has the potential to automate many aspects of estimating, Bedrick says it has its limits.

“BIM can measure quantity and costs, but it takes estimators to look at the special conditions under which a project is being built,” he says. “They still need to adjust costs up or down to account for those conditions. That’s where the estimators’ experience and knowledge come into play. You can’t automate that.”

Texas Construction asked team members featured in this month’s Top Projects feature if BIM was used on their project. Here are some of the responses:

“What is BIM?”

“You mean the computer system format that everyone thinks is ‘revolutionary’ but isn’t?”

“BIM allowed the owner to better determine the logistics and sequencing of the project.”

“The project level of understanding combined with a program level perspective lets us deliver value in scheduling and phasing the work and also gives the owner enhanced buying power.”

More than 25% of the 40 top public/private projects use BIM in varying degrees. They are:

Baylor College of Medicine - Clinic and Hospital

UT M.D. Anderson Cancer Center Alkek Building Expansion

Fidelity Investments Westlake Campus

Methodist Hospital Research Institute

UT Health Science Center at Houston Research Park Complex

Park Lane (block C, D, F & E)

Joint Center for Excellence for Battlefield Health and Trauma (BHT) Research Facility

The Domain II

Spring Condos

West 7th

Rice University - New South Plant