

# Perfecting the model

BY SANDRA LOWE SANCHEZ

The William Brennan High School in Northside Independent School District is set to open later this year, but already it and a number of other education-related facilities have taught architects, engineers and contractors a good deal about technology that is transforming their industry. Awarded in November 2006, the high school was the first project in which San Antonio architecture firm Marmon Mok used a building information modeling (BIM) software package produced by Autodesk Architecture Engineering and Construction Division. The building's contractor, Bartlett Cocke, also used the software, which includes a design package called Revit along with other programs that work with it to detect "clashes," incidents where pipes run into ducts and other potential problems.

At the actual building of the project, the contractor had less than 10 field related conflicts, an incredibly low number for a 437,000-square-foot project. It was able to start construction on areas quicker than expected, and if, as expected, it is completed in May, it will be six weeks ahead of schedule.

It's those kind of results that have led Marmon Mok and many other San Antonio architecture firms to declare that the remainder of their projects would use BIM — in particular Autodesk's family of Revit software products — for all of their future projects. While there are numerous advantages, the No. 1 reason is productivity — and that means lower costs. While requiring a learning curve to get architects up to speed on the software — and faster computers to run the graphic-intensive programs — it allows clients to determine differences in costs of materials or sizes of windows at the click of a few key strokes; it helps estimators more accurately calculate costs; it catches potential clashes on the model; and it allows for scheduling the various phases of construction. What's more, recently introduced products in the family can help an architect compare wind and daylighting impact depending on the placement of the building.

"I think in a few years it's going to be the basic form of practice," says Stephen Souter, managing partner of Marmon Mok. "Clients are going to drive it."

In fact, the Texas Facilities Commis-



Souter

## Software transforming design and building business; Savings are in time and money

Marmon Mok's Briant Harkiewicz and Eric Bowman extol the virtues of Building Information Modeling.

sion issued a mandate in 2008 that all its new construction and major renovation projects would have to be done utilizing BIM software. "Owners like ourselves are starting to see the benefits (of BIM)," says Chris Tisdell, BIM manager for the TFC. He saw it immediately when he first was presented a digital model for document review. "What maybe took weeks, now takes days," he says. "It's a big labor reducer."

The city of San Antonio is also supporting BIM. "We did a survey to find out if the local architects would be able to deliver our projects in Revit and found out that they all felt it was possible," says City Architect Betty Feldman, who has used Revit for the last five years. Before joining the city, she used the software to design a medical education training facility at Fort Sam Houston. "We are asking that our projects be delivered in Revit but not currently requiring it on all projects. We are moving in that direction because it will allow us to maintain better records on our buildings and I feel that the quality of construction drawings developed in Revit is better."

The General Services Administration and the U.S. Army Corps of Engineers are also requiring that BIM be used for its new buildings. Several other public vendors, such as Texas A&M, are also at the lead at the BIM movement.

### Ramping up

Not long after designing Brennan High

School, Marmon Mok went looking for a BIM manager to help facilitate training and the transition of all its design systems to Revit. In 2008, it hired Eric Bowman, who had worked on BIM projects for the Dallas office of the national firm HOK. So far, half of Marmon Mok's 24 architects are trained to use the software. The remaining half are scheduled to be trained. "I have a goal to have everybody transitioned by the end of this year," Bowman says.

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**Chris Tisdell**  
BIM manager, Texas Facilities Commission

Marmon Mok is not alone.

Three years ago, Overland Partner began transitioning to Revit after building a student activity center at the University of Texas-Austin. Today, says James Andrews, principal with the firm, all of its architects are trained in Revit and all of its projects are designed using the software. At Alamo Architects, 24 Revit stations are available. All but two of its 21 architects have gone through training, and since last year all of its new projects are designed in Revit.

Ariel Chavela, BIM manager for Alamo Architects, notes that a favorite feature

is coordinating scheduling among the trades. "It's all done by computer," he says about the feature called "4-D," or setting the timeline for the various subcontractors to do their work.

But as architects have stepped up their use of Revit, contractors and other trades have also, as Autodesk has continued tailoring products for them as well. For example, take Shah Smith and Associates of Austin, which is working with Marmon Mok on the renovation of the Lila Cockrell Theatre. Wesley Stidham, a project manager for the firm, says three years ago Revit became more than a buzzword and the mechanical, electrical and plumbing engineering firm began using the software. Now Revit MEP is able to interface with Revit Architect to fit into the total model.

Still, the system only works if all the entities involved in a project use it. He recalls an earlier project when a structural engineer had not updated the model. "It still requires the professionals involved to manage the project ...," he notes.

Stidham believes the technology is still in its infancy. "There'll be a day where (contractors) won't be carrying rolls of drawings to the job site," he says. "They'll be carrying flat screen displays and maybe projectors."

### History

By 1990, Autodesk's Autocad had gained  
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## REVIT: Autocad's maker bet its business on building information modeling software

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marketshare among architects for a 2-D computer animated drawing feature. But in 1997, a Massachusetts software company began working on a 3-D design product that offered quite a bit of promise to architects in the area of building computer models. Revit Technology Company introduced the building information modeling tool in 2000.

It was not unnoticed by the makers of Autocad. "We looked at the company in 2000 and said, 'This is the next generation for this industry,'" says Jay Bhatt, senior vice president for Autodesk AEC, which is based in Waltham, Mass.

Revit was underfunded, and Bhatt and his colleagues believed that with some work and further development, it could easily replace Autocad and offer clients a building information modeling tool that would change how they did business.



Bhatt

In 2002, it purchased Revit.

"We really bet this business on Revit," Bhatt says, referring to Autodesk. "We said we're going to disrupt our customers because we really think this is the next generation."

In recent years, it added components to work with structural engineers and mechanical electrical and plumbing engineers. And three years ago, the company purchased NavisWorks, the clash-detection software. It also acquired other firms that have allowed it to introduce Green Building Studio and Ecotect, both pro-

ducts that help owners determine the value of energy saving techniques.

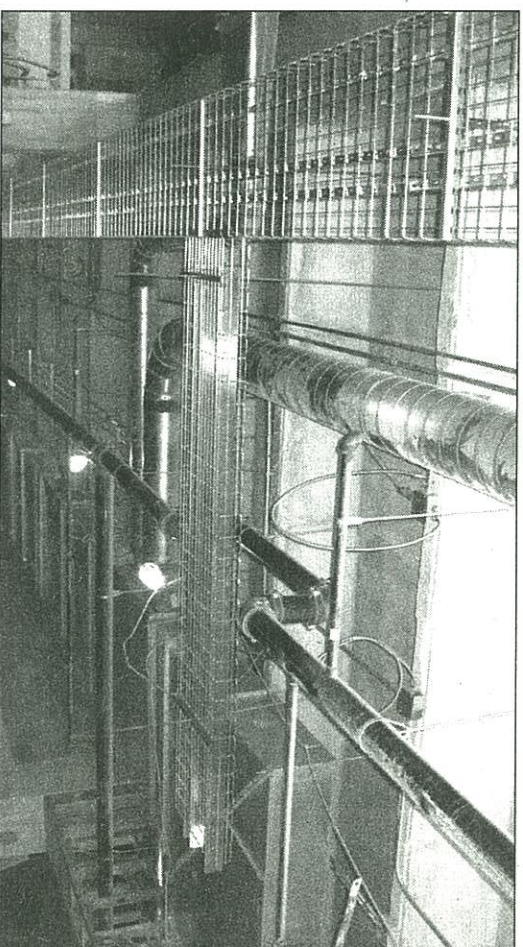
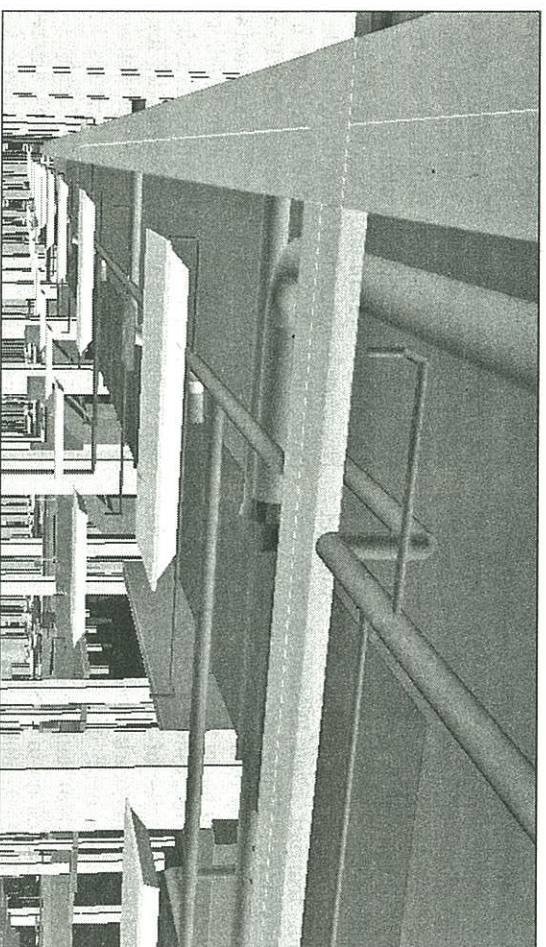
By finding and purchasing software companies that offer to fill in the gaps that architects, contractors, subcontractors are looking for — and allowing all those products to work together — the company has rapidly gained marketshare in the BIM industry.

A 2009 report by McGraw Hill notes that nearly 50 percent of the industry is now using BIM — a 75 percent increase in users over the prior two years. In addition, the majority of those users said they planned to significantly increase their use of BIM in the next year.

It's likely that those users will be happier with the software's work in the future, as the learning curve is evident in the responses. Reducing rework was the greatest benefit responders to the survey noted. According to the survey, 80 percent of experienced users noted the value in reducing rework was high to very high, compared to 23 percent of beginners.

### Greenshare

There are three leading companies that make BIM software: Autodesk (Revit), Bentley (Microstations), and Graphisoft (ArchiCAD). But by the accounts of all the architects interviewed for this story, Autodesk's Revit has the leading share of the market in the U.S. According to Autodesk, its Architecture, Engineering, and Construction (AEC) revenue increased 9 percent to \$525 million in fiscal 2009, compared to fiscal 2008. This segment represented 23 percent of total revenue for Autodesk. Revenue from the Autodesk Revit



COURTESY OF MARRON MOK  
Before and after: Above is the MEP engineer's rendering of a room at Brennan High School in Revit using NavisWorks. Below is the actual photo during construction.

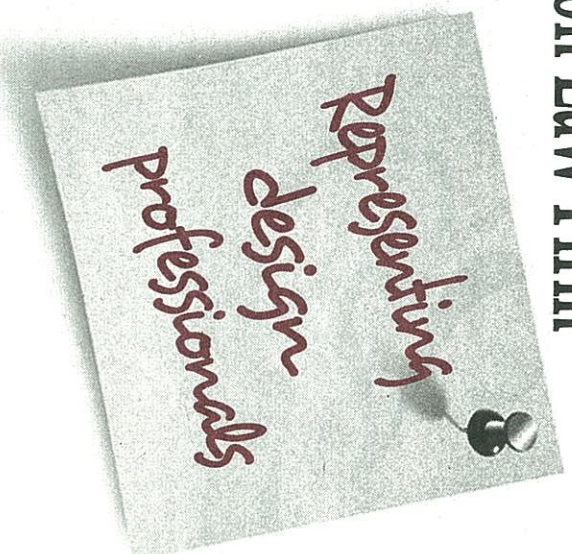
family of products increased 22 percent in fiscal 2009 over fiscal 2008.

"I don't know of any architect that's using BIM that's not using Revit," notes Stidham. Why is it so popular with architects? Ken Brown, an associate and BIM manager for LakelPlato Architects, credits "the R&D Autodesk it's able to put behind Revit."

Brown says LakelPlato initially used Revit before it was purchased by Autodesk, along with other products. Today, it has 46 Revit seats, or user licenses. Some of the new plug-ins like Green Building Studio that allows an architect to test the R-Value

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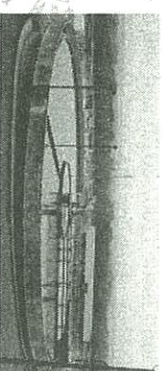
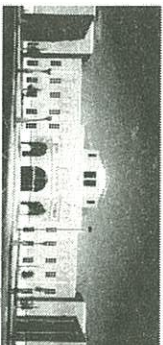


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Sketch 7.2

$$0_2 = \epsilon_2 = \epsilon_{2x} = \epsilon_{2y} = 0$$

$$u = u_0(x, \theta) + \beta_1(x, \theta)z$$

$$v = v_0(x, \theta) + \beta_2(x, \theta)z$$

$$w = W(x, \theta)$$

