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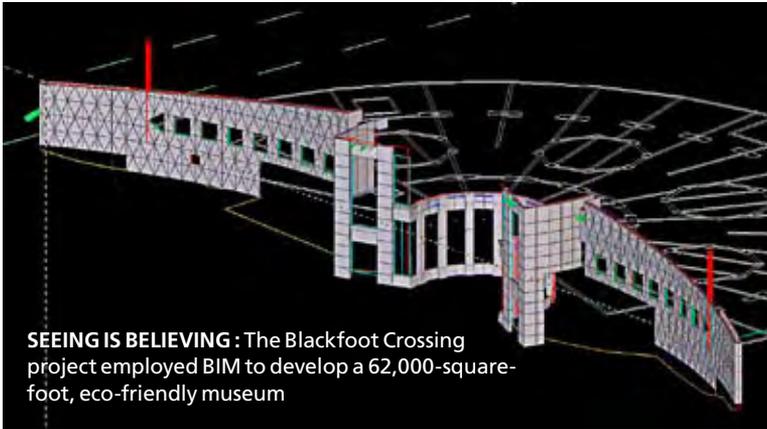
LIVING COLOUR

Building Information Modelling is a virtual system that takes the kinks out of the real world.

BY JIM VEENBAAS

Engineer Wayne Kassian builds walls, installs ceilings and even pours the foundation – all before meeting with the contractor. In fact, he will build the entire project and look for potential design flaws before the first shovel hits the dirt with the help of Building Information Modelling (BIM) and the unprecedented capabilities of three-dimensional design technology. Since acquiring the technology in 2005, the president of Kassian Dyck & Associates can complete a project in a virtual environment, work out all the challenges and find all of the problems before

ILLUSTRATION BY JAMES PROVOST



SEEING IS BELIEVING: The Blackfoot Crossing project employed BIM to develop a 62,000-square-foot, eco-friendly museum



BY MAKING IT EFFORTLESS TO CHANGE DESIGNS AND TEST OUT DIFFERENT CONCEPTS, BIM IS PUSHING THE ENVELOPE OF CREATIVITY. IT GIVES DESIGNERS TIME TO EXPERIMENT MORE FREELY AND THE ABILITY TO NUDGE AND TWEAK A DESIGN.

it ever goes to construction. “It helps reduce costs because you handle problems in a virtual world rather than on the job site, where mistakes can be expensive,” says Kassian, whose Calgary-based firm was one of the first in Alberta to adopt the computer program.

Unlike conventional blueprints and drawings that use lines to represent walls, windows and other items, BIM uses three-dimensional objects. Each object has its own set of properties and characteristics, but each is seamlessly integrated into the overall design, creating a comprehensive, detailed and precise three-dimensional view. When one object is changed – making a window bigger, for instance – all related structures are automatically updated.

“It’s fundamentally different than AutoCAD,” says Anneliese Fris, an architect with Shelterbelt Architecture in Edmonton. “It requires a huge mind shift

because it’s getting out of a drafting mentality and into conceptualizing a building in a three-dimensional way. As architects, we naturally think in three dimensions so it feels very comfortable. I can’t imagine doing anything else now.”

By making it effortless to change designs and test out different concepts, BIM is pushing the envelope of creativity. It gives designers time to experiment more freely and the ability to nudge and tweak a design, select different materials, experiment with new approaches and immediately see the structural implications of those changes.

“We can look at how the light falls on the building and adapt the design. We can quickly model a larger or smaller opening and compare how the light penetrates. If you’re looking at stairs, you can try designing them a couple of different ways and see what that does for the space,” says Fris.

PHOTOS COURTESY KASSIAN DYCK & ASSOCIATES



“There are huge advantages in data exchange and accuracy of information. Your risk of having errors on-site is substantially reduced, which lowers costs because you are not going to run into unforeseen problems. You have dealt with them already.”

Wayne Kassian, *President.*
Kassian Dyck & Associates

Another obvious advantage is the computer’s ability to spot mistakes. Traditional methods can be more difficult to read, to spot inconsistencies such as inaccurate measurements or geometric clashes. Different sets of blueprints can have a beam and an air vent in the same location, which will cause delays at the construction stage. Moreover, traditional drawings give no indication of cost. Architects have to keep a list of materials and a schedule that is continually updated as the project progresses. If you alter the design, you have to alter the entire schedule. If you change something in BIM, it changes throughout the entire project.

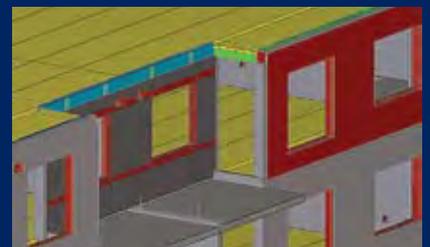
“You don’t have to go back and revise all your drawings,” says Fris. “You can immediately cut new sections and see the impact of the changes. Mechanically, if you have ducts running through a certain space, you can see if they are interfering with the structure or the electrical system.

“Those kinds of things are an enormous advantage,” says Fris.

Kassian believes the model’s real strength is the flow of information between all the parties involved in a project. Everyone has access to the same information and if there are changes, everyone can see them. Plans, sections and elevations can be extracted, as well as cost estimates, scheduling and specifications. Blueprints can also be generated but they play a secondary role to the computer model.

“There are huge advantages in data exchange and accuracy of information,” he says. “Your risk of having errors on-site is substantially reduced, which lowers costs because you are not going to run into unforeseen problems. You have dealt with them already.”

Kassian vividly remembers the first job in which BIM came in handy. In the middle of the construction of the Blackfoot



OUT OF THE BOX: A housing project in Fort McMurray by Kassian Dyck & Associates was modelled using BIM with changes figured onscreen, not on-site

In Living Colour

Crossing Historical Park, east of Calgary, he got a call. The builder and operator had decided to change the design, after the cast-in-place concrete walls had already been poured at the \$25 million, 62,000-square-foot museum. The walls were concrete and curved, “so you can imagine how challenging that was,” he says. “We imported the data into our software so we could build precast concrete panels to fit very complex geometry. The project was very successful because BIM could take all the data and produce precise, accurate designs.”

That’s not the only way the advent of BIM changes the way Kassian and his team work and exchange information with members of the construction team. The advantages are so overwhelming, most designers are hooked the first time they try it. “It’s the biggest change in the industry since we switched from manual hand drafting to computer drafting. It’s changing the whole design process,” he says. 

BIM vs. AutoCAD

AutoCAD

- AutoCAD is a computer-aided design software application for 2-D and 3-D design and drafting.
- Developed by Autodesk, a multinational American corporation, AutoCAD was first released in the early 1980s and was one of the world’s first such design applications to run on personal computers.
- For most architects and designers, AutoCAD remains the industry standard and it is still taught at educational institutions around the world.
- Modern AutoCAD includes a full set of modelling and 3-D tools, but it runs exclusively on Microsoft PCs.

BIM

- Building Information Modelling is a software application that can be used to demonstrate the entire lifecycle of a building, from construction to operation. The building’s materials, electrical and mechanical systems can be isolated and improved. BIM models show the actual parts and pieces being used. Instead of having to go over

the building physically when a problem occurs, an owner may turn to BIM for clues. If they find that a valve is the problem, BIM will tell the owners the valve’s size, manufacturer and part number.

- BIM emerged in the late 1990s, and includes commonly used software versions such as Revit by Autodesk, Bentley Architecture by Bentley Systems and Graphisoft by ArchiCAD.
- BIM has been used in projects such as the Freedom Tower in New York City and the Frank-Gehry designed Walt Disney Concert Hall in Los Angeles.
- The National BIM Standard Committee in the U.S. is working on ways to get all of the software tools to speak the same language in order to establish a global industry standard to share information across BIM applications. The U.S. is already mandating that major projects receiving design funds must incorporate BIM on a schematic level. Our province may not be far behind. For more info, visit www.buildingsmartalliance.org.



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