MASS HIGH TECH

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Redesigning building design technology

By James M. Connolly

New technologies are bringing about new approaches to building, with an eye toward making the design, construction, maintenance and reuse of commercial space more efficient. Architects and contractors are using new tools to change construction.

Here's a look at three such developments:

Building Information Modeling

To architect Marc Margulies, principal of Margulies & Associates in Boston, building information modeling, or BIM, is "going to revolutionize how the entire construction industry works."

Margulies, who recently used BIM to design a campus at 175 Wyman St. in Waltham, notes, "For 6,000 years, when an architect wanted to represent something, he or she would draw a line on a piece of paper. Two lines would indicate a wall." With BIM, a key element of AutoCAD maker Autodesk Inc.'s Revit Architecture, they drag and drop objects. Each object represents a certain type of wall, door, mechanical system or other design element. Wall objects fit together, and doors and windows go through walls.

But the concept goes beyond automated drawing. Each object — developed by a materials manufacturer, architect or third party — carries metadata information that will be valuable to the contractor and the building owner responsible for maintenance schedules. "When the contractor looks at a drawing that is done in BIM software, he knows exactly how many linear feet of drywall he needs, how many doors of a specific type that he needs. It requires more knowledge on the part of the architect, but it makes it easier for the contractor." The result is a project that is more accurate with less risk and uncertainty, he says.

Auralization

Whether it's because of echoes in an atrium or the clink-a-plink of glassware, pretty much everyone has muttered, "What'd he say?" during a post-dinner presentation. Factoring acoustics into design is not new, but what is emerging is the ability to simulate the acoustical experience before the first hammer falls.

Consultancy Acentech Inc. of Cambridge offers computer-based modeling that enables architects to examine the acoustical tendencies of a room based on its size, shape and

building materials. Working from schematic drawings, Acentech can simulate sound performance, including problems such as echoes. Acentech uses surround-sound audio technology and color-coded schematics to demonstrate the differences among designs using a variety of sound-enhancing features. “If the space has an acoustical value that they aren’t happy with, it’s a lot easier to fix it before the space is built,” says Jonah Sacks, an Acentech consultant.

Acentech and other firms have worked in recent years on projects such as concert halls. “We’re now getting into auralizing more complex spaces that aren’t just cubes but do things like go around corners, and we’re auralizing a greater variety of source sounds,” says Sacks.

One of Acentech’s recent projects was the design of a space at the Museum of Fine Arts in Boston, where a courtyard is being enclosed to form an atrium. Acentech’s acoustic modeling helped the architect select sound absorbing ceiling fabric.

Raising the floor

Raised flooring, long a key element of the data center, is finding new applications, including use in common office and retail space. The U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) program calls for buildings to be designed for more efficient heating and cooling as well as easier remodeling methods that don’t pile drywall and other materials into landfills, notes David B. Atwood, vice president with Canton-based building products company ADS Inc. Atwood’s company and office furniture retailer Environments at Work of Boston are encouraging designers to use raised flooring to aid the environment while saving money in the long run, even with higher initial costs.

Raised flooring in an office eliminates 80 percent of the ductwork associated with ceiling-based heating and cooling systems, according to Atwood. The floor-based cooling system also allows air to be delivered at 65 degrees rather than the 55 degree figure associated with ceiling systems, he said.

Environments at Work president Ken Patrick said raised flooring supports changing business needs over time with minimal impact on the environment. “The raised floor acts as a platform for the rest of the space, and you have demountable walls on top of the raised floor. Instead of attaching drywall to studs, walls come in prebuilt in the factory. It allows you to reconfigure space over a weekend,” he said.