

## Project Team Collaboration

By Scott A. Hammond

In the first article of this series (STRUCTURE®, August 2007), we looked at the process of implementing building information modeling (BIM) within an engineering firm. This second article takes BIM a step further, touching on the design process and communication benefits. As practicing structural engineers are aware, the design process can be a time consuming process in which there are often miscommunications and delays.

The conventional way architects, structural engineers, MEP engineers and civil engineers collaborate on projects usually consists of exchanging 2D information at various milestones throughout the project. To start off the project, an architect would most likely create a preliminary design of a building and share it with the structural engineer, who would then leverage the architectural information to start creating the structural drawings as well as a reference to create various analytical models. With BIM, the entire design team can constantly share critical information and work together in a coordinated, consistent and computable design process. The building design created by the architect can be used directly by the structural engineer to easily visualize all aspects of the building, saving overlap of efforts and time in modeling the structure. At the core of BIM is the concept of parametric modeling – each change made is automatically reflected throughout the entire design. All views, dimensions, and relationships are immediately updated when a change is made. This makes team integration easier, and creates an environment in which confusion and miscommunication are no longer an issue. Along with increased integration, BIM improves the ability and efficiency of designing complex building projects through visualization, clash detection, and team communication.

### Benefits of BIM

#### Visualization

With BIM, engineers can easily visualize their designs – not only individual parts, but the entire building. 3D visualization within BIM depicts the building model not as lines and objects, but as a complete 3D model. Communication with clients is improved because of the ease of understanding that comes with looking at a true-to-life model of a building, as opposed to a flattened 2D design. Software such as Autodesk Design Review (ADR) allows outside players such as owners to view the building model, creating a greater sense of understanding earlier in the design

process. Improved communication means fewer errors, more satisfied clients, and a better end result.

#### Clash detection and analysis

BIM allows a greater range of flexibility to explore a wider range of design options early on in the design process, with greater accuracy than before. Using BIM, structural engineers can easily automate interferences and clashes. Automatic clash detection within BIM guarantees that problems are found before the design is built, while still easily addressed – saving time and money. Interoperability between structural analysis software, such as ETABS, ROBOT Millennium, RISA 3D, RISA Floor, ADAPT, RAM Structural System, and Revit Structure provides a completely integrated building analysis and design environment in which structural engineers easily exchange structural models created in Revit Structure with multiple third-party applications for structural analysis and design optimization. Following structural analysis and design, the model can be automatically updated to reflect changes made in analysis application. Review tools, such as ADR, allow BIM designs to be easily shared and reviewed throughout the design team and extended project players, including owners and contractors. Architects, engineers and clients are able to track all changes made during the review process without affecting the original building design.

#### Collaboration inside structural engineering offices

While BIM does foster communication and integration within the larger design team, including architects structural engineers and MEP engineers, BIM also plays an important role in the efficiency and quality of design within a single structural engineering firm. In-house, BIM allows structural engineers and drafters to work more closely, with a clearer sense of communication. A structural engineers' intent is clearly identified and



displayed in the construction documents created through BIM. Drafters can create the structural documentation, and engineers can then digitally review the documents instead of using the old process of marking up documents with red pens and colored pencils on print outs. A structural engineering firm benefits from increased productivity and quality when working together with BIM.

### The Bigger BIM Picture

The benefits of BIM do not end with the design team. The entire building lifecycle benefits from the improved communication and coordination made possible through the use of this new design software and process. Contractors, builders and owners are able to enter earlier on in the design process, furthering the communication and integration fostered by BIM. Leveraging BIM through the use of interoperable software solutions such as on-demand Collaborative Project Management (CPM) solutions facilitates information flow, centralizes project information and optimizes project performance by providing anytime, anywhere access to accurate and reliable information during all phases of a project via the web. These kinds of solutions further extend the benefits the building information model, enabling easily accessible information and design creation and analysis. ■

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