

New Tools for Your Tool Kit

BY RICK DEL MONTE, AIA

Going beyond accepted practices helps businesses survive in a tough and changing world.

THERE ARE THREE KEYS to success for any professional service firm involved in steel construction and design: Always hire and train the best people; provide outstanding client service; and complete projects on time and on budget. While those continue to be important practices, the convergence of integration, sustainability, and building information modeling (BIM) is having a powerful impact on the building industry today.

For the last few years building information modeling (BIM) has been the buzzword around our industry. BIM facilitates the creation of an intelligent 3D model of a building that typically contains physical properties of the model components, the cost, and the schedule for construction. Building components translate to 3D and 2D drawings that are generated from the model. The term *intelligent model* refers to the fact that the elements of the model have physical properties and behave in an intelligent way. A wall “knows” whether to go to the ceiling or to another structure, whether it has a fire rating, sound insulation, or even what finishes it will have. Floor plans, elevations and sections automatically update and interact with each other as changes are made. BIM is fundamentally changing the way we architects design modern buildings, including all types of steel structures.

New, upgraded and emerging BIM packages allow us to leverage this powerful tool by doing energy modeling at a very early stage where major changes in the building and site placement are most cost-efficiently accomplished. Programs also are beginning to incorporate energy attributes,

such as daylighting calculations, that take into account glass types and exterior shading. By allowing the design team to explore multiple sustainable options at an early stage in the design, cost impacts can be minimized. BIM tools continue to grow in sophistication and the software manufacturers have all made commitments to increasingly incorporate sustainability functions into their base programs.

This tool has become so valuable that some architects, engineers and contractors are constructing their own 3D models, designed specifically for the tasks that they need to perform. In the traditional approach, the architect seldom creates a complete and accurate model in a format that will work with the contractor’s estimating package. The architect has no incentive to do this additional level of work without an integrated agreement that allows him to share in the project success. There is also an additional danger to the architectural profession in that production of the documents will increasingly be taken over by contractors as owners question why they should pay for the creation of two separate models.

It is our experience that additional money invested to create a more complete model and documents up front will pay for itself several times over during construction. At Beck, our technology division created a simple, yet intelligent 3D modeling application driving a real time cost estimate. The user can evaluate numerous project alternatives with very little effort and convey the assumptions clearly to all participants in the early stages. (See www.becktechnology.com.)

Left: The unique design of the 475,000-sq.-ft steel, glass, and concrete Hunt Oil Corporate Headquarters in Dallas presented numerous geometric and engineering challenges. Using BIM facilitated the close teamwork among multiple disciplines that meeting those challenges required.



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Essential Green Thinking

A second trend is incorporating sustainability, which I define here as the design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and their occupants. Some estimate that buildings currently consume 65.2% of the electricity produced in the U.S., emit 48% of the nation's greenhouse gases, and produce 136 million tons of waste each year. By 2010, there are expected to be 38 million new buildings in the U.S. The potential impact on the environment is huge and our industry cannot expect to escape scrutiny and regulation from an increasingly concerned public. Dallas, for example, has recently passed a green building ordinance, and other municipalities are rapidly following suit.

If we are going to claim that any particular approach to construction, such as using steel framing, is sustainable, we first should understand how sustainability is measured. The United States Green Building Council's Leadership in Energy & Environmental Design (US-GBC LEED) is the most recognized standard in place today. The points-based system focuses on five areas: site planning, water efficiency, energy efficiency, conservation of materials, and indoor environmental quality. Achieving a cost-effective strategy for securing the maximum number of points, and following through with the documentation of those points, requires a joint effort focused on sustainability from conceptual design through completion.

We are now on our third or fourth generation of LEED projects. Through each iteration, it has become increasingly evident that achieving higher levels of LEED certification requires a strong early commitment from all the members of the team. To avoid surprise cost increases, it is essential to seek opinions from the contractor(s) and key consultants in the process of determining what can realistically be accomplished within the project budget. Through incorporation of these opinions, price overruns as well as project delays may be avoided.

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Extreme attention to detail was necessary for the alignment of 712 sq. ft of ridge-modified metal fabric panels in the lobbies surrounding Victory Plaza in Dallas. The mesh met the combined needs of aesthetics, ventilation, acoustics, and lighting.

Integrate to Improve Structures and Processes

The third key trend is integration, which refers to one process by which all of the building team members work together in a collaborative manner that rewards each member for the success of the project as a whole rather than for their specialized and specific contributions. Integration is sometimes used interchangeably with design-build; however, much of design-build is simply a traditional relationship wrapped up under one contract. This concept is not new, and has been known by many names such as, teaming and partnering. We have always understood that collaborating and working together will produce better results. However, despite promising rewards, very little has changed in most relationships among the architecture, engineering, and construction entities. All too often, firms continue to operate in isolated or territorial ways, jealously protecting their own turf. AEC partners will do well to recognize that integrated teams can leverage technology and gain significant competitive advantages, but only if they change the reward structure so that the interests and expectations of team members are aligned.

We're in This Together

Times are tough; but structural firms and their design and construction partners can learn from each other—and learn together—to build a better future. That future, however, must involve cooperative use of technologies and processes.

Our world risks environmental challenges that require participative solutions that draw from the knowledge of the entire building team. Today, we have technology that gives teams collaborative tools beyond anything we have known in decades past. Integration gives us a platform by which we can face these challenges and optimize the processes we jointly employ. But to be successful, we are going to have to overcome some traditional barriers. Architects need to be willing to take price risks, contractors need to be willing to take on design risks, engineers need to be more open and communicative, and owners need to be willing to share the rewards of a better process. If we all work together, we have much to achieve. **MSC**