Construction Firms Testing BIM Applications

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Building Information Modeling (BIM) is a young technology that is praised by architects for its versatility in developing design solutions and 3D visualizations. Less well publicized is the use of BIM as a construction productivity tool. Many large construction companies are experimenting with BIM to generate cost and schedule savings.

The construction sector is one of the newer members of the BIM community and is developing a growing and loyal following. Some contractors find it useful to partner with architectural designers to develop BIM models, others are actively acquiring the personnel required to develop models independently.

One of the leaders in BIM integration in the construction process is Mortenson Construction. “We are just getting to the point where we are getting valuable use of BIM,” says Derek Cunz, business development director for Mortenson’s Denver office. “Most of our projects use 2D documents and BIM on a parallel track because we are still learning. There is no question that the technology fosters greater collaboration between project stakeholders, inspires more ingenuity on site, and leads to more productivity — but it’s still too early to brag.” Kunz considers the most effective BIM applications to be clash detection, direct fabrication, scheduling, and planning.

Other contractors agree. Gilbane Building Company’s Kevin Bredeson, the BIM department manager, says that BIM has already helped his company streamline their business process. “We have begun implementing BIM company-wide, which is in 29 offices, in nine separate regions. Using the software on MEP plans, we’ve seen a drastic reduction in RFIs, and we’ve been able to optimize schedules. Right now, it is not a profit center but an internal business process. It’s an excellent way to differentiate our services.” At Gilbane, about half the models are built by in-house designers, while the other half is provided by or outsourced to architecture firms. Kevin notes, “As more and more projects begin to require models, we will continue to ramp up our amount of in-house designers.” In addition to scheduling and clash detection, Gilbane is using models for cost estimating. “For now, we are running automated estimating tools as a complement to traditional means of estimating. As we continue to develop trust for the automated process, we will use the traditional process less and less,” Kevin predicts.

Skanska's BIM implementation effort has already seen success with architectural and MEP models. Bernie Morrissey and Andy Deschenes are the senior vice president and design manager, respectively, for Skanska in Boston and are now exploring ways to further incorporate BIM into business processes. "We are doing a project for the Harvard Law School where we are using clash detection. By building a model we were able to pick up on a lot of coordination issues early on, that would have been costly — in both time and money — if we had picked them up later." Another area of Skanska's interest is cost estimating. "We have also been using BIM programs for general cost estimating. We have a good system working now where general information is extracted from a model and connects with a database for estimating," explained Andy. "We are working towards building models that have the ability to do complete estimations. We are very satisfied with our early results and are pushing to have the technology implemented in more places." Skanska primarily builds models with in-house staff. "We've found that trying to use models built by designers and architects is difficult because they are built for different purposes. This is something that the industry has recognized and is working to overcome, so a common model can be transferred easily between phases." Bernie went on to explain that although models produced by architects may have different purposes, but they provide very useful feeder documents for models Skanska constructs.

Turner Construction Company's Jan Reinhardt, a BIM program manager based in Alexandria, VA, is involved with many BIM-based projects, including a new dormitory in Connecticut, a hospital in San Francisco, and a medical center in Boston. Jan says that "the use of BIM, specifically with the medical center project, vastly improved the coordination on the project. We were able to predict issues easier and earlier, and the use of BIM reduced risk." Turner utilized BIM on a $180 million medical facility project where the adoption of a common model allowed coordination time with subcontractors to be reduced from six to four weeks. Discrepancies in the field during construction are also reduced, explains Jan, "When BIM programs are utilized before construction begins, we notice that clashes in the field are minimized, and often do not occur at all. The construction process gets shortened since inaccuracies are caught early in the process. This way, construction occurs more efficiently than if workers were finding mistakes along the way that were not detected earlier. We've found using BIM programs has eliminated a lot of risk before projects begins in the field, which is very valuable to us."

Sundt, Inc., headquartered in Tempe, AZ, is using BIM extensively. Dan Russell, Sundt's SIMCON department manager, says that his company's use of BIM has become part of their corporate policy, "At this point, we will not do a design-build unless it's BIM." Dan attributes the biggest advantage to BIM as the ability to do clash detection between building elements or systems, "For our new office, we ran a clash exercise. We came across 7,689 clashes, 862 of which needed engineering solutions. These are errors that we avoided in the field by taking care of them on a building information model." Dan also attributes a lot of his company's savings so far to the increased productivity that BIM helps bring along. "We see some reductions in overall schedules on some projects, but we really see increases in efficiency with the number of man hours and rework hours with our self perform work." Another good example of BIM usage is the ability to get instant quantity feedback from the model. Sundt, in conjunction with HDR Architecture and Steven Ehrlich Architects, are using BIM on the Walter Cronkite School of Journalism at Arizona State University. "During the Schematic Design Phase we realized that we were way over budget on the exterior skin. So we sat down, pulled the model up, and started playing around with it, we experimented with different materials in different places. By the time we were finished with this exercise, which lasted all of an afternoon, we had made enough changes to substantially reduce the budget problem. We were able to bring the budget back in order without making the architects feel like their design had been compromised."

The Denver office of JE Dunn Construction used BIM for the $25 million Belmar 6M3 mixed use project in Lakewood, CO. Rodd Merchant is the quality assurance/BIM manager at JE Dunn, and appreciates what BIM has done for his projects. Among the many uses of BIM for construction, Rodd believes visualization is one of the greatest benefits. "The amount of mistakes made in the field partially depends on communication between those that know what the building is supposed to look like and those actually building it. The tools BIM has to offer make explaining complex geometry more manageable, enabling us to minimize mistakes made in the field." Another important use is during MEP coordination during construction. In one case, a subcontractor reduced their anticipated scope of service as a result of receiving the superstructure model from JE Dunn. This ultimately saved the owner money through the elimination of duplicated effort and expedited coordination and shop drawing process. "There is a certain amount of value added when using a building information model. Our subcontractors understand the level of efficiency BIM programs offer." Rodd

adds, “There are increasing opportunities to partner, and subcontractors are eager to utilize the power of BIM.”

Experience is the best teacher for new technology applications. BIM will likely co-exist with traditional design technologies until the industry gains confidence and expertise in its implementation. Firms that are giving BIM the opportunity to prove itself are very excited about what has been realized so far, and what awaits them as Building Information Modeling continues to evolve beyond a design application into a powerful business tool.