

Autodesk® BIM Solutions

Even though building management is not our core business, we could see that BIM had the potential to transform that process. It was amazing to see the whole vision come together at Xavier University. Sharing the building model with Xavier University knowing that it's going to help people get more from those buildings for decades is very satisfying.

—Andrew Burg  
Executive of Operations  
Technology  
Messer Construction Co.

# BIM interoperability improves facilities management.

## University takes advantage of BIM for design, construction, and operations as it adds four buildings to its campus.



Conaton Learning Commons at Xavier University was designed and constructed using BIM processes.

### Project Summary

Founded in 1831 and located in Cincinnati, Ohio, Xavier University's three colleges offer 85 undergraduate and 11 graduate majors to more than 7,000 students. In less than five years, the university has added four buildings, expanding its total building portfolio by 25 percent. Xavier University chose local firm Messer Construction Co. to build the new facilities. Determined to stay on schedule and on budget for each of the buildings, Messer used Building Information Modeling (BIM) solutions from Autodesk™ to help keep the project on track. BIM allows project teams to use intelligent, 3D models to explore every aspect of a design—before construction. Impressed by the 3D models, Xavier University decided to leverage them in its facilities management solution from FM:Systems, Inc. With support from BIM solutions from Autodesk and FM:Systems throughout the building lifecycle, Messer and Xavier University have been able to:

- Save thousands of hours of data entry on facilities management
- Make more informed facilities management budgeting decisions
- Stay ahead of tight construction schedules
- Reduce requests for information (RFIs) with more precise building coordination

### The Challenge

As a longtime BIM user, Messer viewed the Xavier University project as one where BIM could deliver extreme value. The firm has found that BIM helps to prevent the kinds of issues that drive up costs and cause delays. Absent a BIM process, Messer saw that problems, such as interferences, were much more likely to be spotted in the field instead

of during planning. In a study the firm undertook comparing a number of similar projects, Messer determined that BIM helped to reduce RFIs by as much as 72 percent, change orders by 42 percent, and punchlist items by 56 percent.

“Using BIM on the Xavier University project was a no-brainer for us,” says Andrew Burg, executive of operations technology for Messer. “When you’ve seen what BIM can do, it’s hard to go back to the 2D world. We were faced with some very aggressive schedules, especially for a new residence hall that was started after the first three buildings. Delays and cost increases were not an option, so we turned to our proven BIM process.”

### The Solution

For three of the four buildings, the design teams used Autodesk BIM solutions, including Autodesk® Revit® Architecture software, to create intelligent, 3D architectural and structural building models. They then shared their models with Messer. Working with BIM solutions from Autodesk, Messer enhanced the models with the details required for construction.

For the design of the first building, traditional 2D design tools were used. Burg explains how Messer shifted to a BIM process: “The design team on one of the buildings, the new Central Utility Plant, was not up to speed on BIM when the design was done. We wound up taking the 2D designs and shifting to BIM software to create a 3D model of the building. You could view that as duplicate work, but we didn’t. We saw it as an investment. The returns take the form of smoother project execution, fewer RFIs, and a better quality building.”

# BIM adds value from design to construction to operations.

## The Path to Better Projects

Messer has documented that when projects are designed in BIM by all design disciplines and contract documents are produced from the design models, the firm can see a reduction in RFIs of up to 52 percent, when compared to projects where the model was created from the contract documents after the fact. That's because as design teams work together from a model, it's easier for them to see problems, such as minor interferences, and correct them as the design progresses. Design reviews also go better. Clients can visualize the design more clearly and provide feedback earlier in the process.

In terms of its role, Messer points to coordination as the area where BIM has been the biggest game changer. Messer uses Autodesk® Navisworks® Manage software to aggregate the Revit® design models and contractor fabrication models of the different aspects of a building. The software helps the firm to identify interferences as it plans construction. It also aids in construction planning by allowing Messer to create 4D schedules that tie construction activities to the 3D building model.

"By coordinating using a BIM process, we have more confidence in the accuracy of the design," says Burg. "It's not just that you address the concerns that can cause RFIs sooner. You can also do more off-site fabrication of things like mechanical systems because you know you won't have to redo it on-site. BIM helps to prevent problems to help maintain project schedules."

Burg adds that the 4D scheduling was particularly valuable on the residence hall. He explains, "On this building, we had an extremely aggressive schedule. Being able to tie the model to the schedule made a big difference. For concrete, we would pour a slab at 4:00 a.m. and then pour the columns on top of it at 6:00 p.m. the same day. Everyone could see how we were sequencing that in the model, and everyone knew what they needed to do and when."



Messer developed building models of the 20,000-square-foot Central Utility Plant to aid construction.

**Autodesk®**

## BIM Interoperability for Facilities Management

During the course of construction planning and execution, Messer met with the facilities management department at Xavier University. Messer referenced the building model, and facilities management personnel immediately saw the potential for BIM to contribute to operations.

Greg Meyer, assistant director for facilities assessment for Xavier University, explains: "I went to a building coordination meeting and saw the model. It included just about everything we need from a data perspective to manage our facilities. Upon further exploration, we realized that the model had the potential to be integrated into the FM:Interact® system we use in our facilities management process."

Messer worked with Meyer to prepare the construction model for use in FM:Interact by removing data not relevant to facilities management and adding information relevant to handover, such as space classification codes. Messer then worked with FM:Systems to connect the model data to FM:Interact. This is notable, as it was the first bidirectional integration with a model and space management software. Now, authorized users, such as maintenance people and department heads, can access more accurate building information on their desktops and mobile devices.

"The timesaving we've experienced by taking advantage of BIM has been staggering," says Meyer. "Preparing and entering the data using traditional methods might have taken as long as a year. The process would have been more error-prone, too. Instead, we had instant access to building information flowing directly from the design and construction model into FM:Interact. Maintenance people have access to the information they need to help keep our building operating efficiently."

Meyer adds, "Decision makers can make more informed budgeting and space management

| Facility | Description            | Units | Life Cycle | Years | Replacement Cost |
|----------|------------------------|-------|------------|-------|------------------|
| 01-0001  | General Office         | 10    | 10         | 10    | 100,000          |
| 01-0002  | Administrative Support | 10    | 10         | 10    | 100,000          |
| 01-0003  | Classroom              | 10    | 10         | 10    | 100,000          |
| 01-0004  | Laboratory             | 10    | 10         | 10    | 100,000          |
| 01-0005  | Library                | 10    | 10         | 10    | 100,000          |
| 01-0006  | Student Center         | 10    | 10         | 10    | 100,000          |
| 01-0007  | Student Residence      | 10    | 10         | 10    | 100,000          |
| 01-0008  | Student Dining         | 10    | 10         | 10    | 100,000          |
| 01-0009  | Student Gymnasium      | 10    | 10         | 10    | 100,000          |
| 01-0010  | Student Theater        | 10    | 10         | 10    | 100,000          |

FM:Interact links BIM data to lifecycle data.

decisions. BIM data helped me to prepare a comprehensive, 10-year capital plan for Xavier. The data demonstrated that additional funding for maintenance and renovations was needed to support the school's mission. As a result, Xavier's administration raised the facilities budget from US\$750,000 per year to US\$12 million per year."

## The Result

Since starting to leverage BIM applications in 2006, Messer has seen dramatic improvements in its construction processes. But the firm is especially pleased that BIM is having a positive impact on the entire lifecycle of the four buildings it constructed for Xavier University. "From the start of design to completion, the residence hall took only about 18 months," says Burg. "BIM helps make those kinds of accelerated project schedules not just possible, but practical."

He adds, "Even though building management is not our core business, we could see that BIM had the potential to transform that process. It was amazing to see the whole vision come together at Xavier University. Sharing the building model with Xavier University knowing that it's going to help people get more from those buildings for decades is very satisfying."

## Learn More

Learn more about **Building Owners** and **FM:Systems**.

The timesaving we've experienced by taking advantage of BIM has been staggering. Preparing and entering the data using traditional methods might have taken as long as a year. The process would have been more error-prone, too. Instead, we had instant access to building information flowing directly from the design and construction model into FM:Interact.

—Greg Meyer  
Assistant Director for Facilities Assessment  
Xavier University

Images courtesy of Xavier University

Autodesk, Navisworks, and Revit are registered trademarks or trademarks of Autodesk, Inc., and/or its subsidiaries and/or affiliates in the USA and/or other countries. All other brand names, product names, or trademarks belong to their respective holders. Autodesk reserves the right to alter product and services offerings, and specifications and pricing at any time without notice, and is not responsible for typographical or graphical errors that may appear in this document. © 2013 Autodesk, Inc. All rights reserved.