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Walsh Improves Operational Efficiencies, Removes Waste, and Improves Coordination from Design to Construction Using Building Information Modeling

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Founded in 1989, Walsh Construction is a Chicago-based construction company with over $3 billion in revenue and over a dozen offices nationwide. It operates as general contractor, construction manager, and design builder and works on every type of building. One of the nation's 20 top contractors, it has invested over $450 million in capital equipment and regularly employs over 4,000 engineers and skilled tradesmen.

Beginning in 2001, Walsh started working with Autodesk® building information modeling (BIM) solutions, with the technology gaining significant traction about two years ago. The use of BIM has resulted in improved communication and coordination, less rework and fewer change orders, and reduced quantity takeoff. 3D visual phasing and scheduling saves time and effort compared with old manual processes, and more accurate cost estimates provide the firm with a competitive edge.

Drivers for Autodesk BIM Implementation

Prior to the Autodesk BIM implementation, all work was done in 2D computer-aided design. Design documents were developed by the architect, approved by the project owner, and sent to Walsh using paper and light tables. This led to unnecessary rework and inefficiencies. "In the 2D paper world, you figure out what you can on paper, then figure out the rest in the field," says Dan Klancnik, Director of Virtual Construction. "That leads to field fabrication, change orders, contingencies, and just general inefficiencies."

The decision to implement BIM was driven by a number of factors: Project owners such as government agencies were starting to require that designs be done in 3D/BIM and architects were beginning to design in it. But most importantly, the firm realized that by adopting BIM, it could introduce critical efficiencies, optimize processes, and reduce rework, contributing to greater profitability.

Business Value Highlights

Industry: Construction

Headquarters: Chicago, Illinois

Challenges: To improve efficiencies in construction business, remove waste, and improve coordination between general contractor, owner, designer, and subcontractors

Example project: $70M water treatment plant

Specific benefits:
- Reduced time to completion from 42 months to 34 months
- Reduced RFIs from 450 to 10, saving $150,000

Project ROI:
- Increased profitability by 1.6%
- Project NPV of $589,000

Based on its long-standing history with Autodesk and use of AutoCAD® software, Walsh decided to go with the Autodesk lineup of BIM offerings, including Autodesk® Revit® Structure, Revit Building, and Autodesk® Navisworks® software. According to Klancnik, "Revit has superior functionality to accomplish what we need, and there is not another tool like it."

Benefits Overview

The benefits of the Autodesk BIM implementation fall into several areas: improved communication and coordination using 3D modeling, which leads to fewer change orders and less rework, less field fabrication, reduced quantity takeoff, improved preconstruction cost estimating, and visual phasing for improved scheduling.

Improved Coordination Leads to Fewer Change Orders, Less Rework

The first area of potential savings is the ability to improve coordination between the key parties involved in construction projects: architect, general contractor, and subcontractors. Sharing documents in 3D models rather than 2D paper-based documents enables faster, more effective communication with fewer errors. In the words of Klancnik, "Just having the design in 3D and the ability to communicate in 3D rather than 2D is valuable."

There is now less ambiguity in the information Walsh shares with its subcontractors, allowing them to scope and plan their work more effectively and accurately and letting them do things they couldn't before. The direct result is fewer change orders during the design and build phases and less rework in the field. As Klancnik observes, "You used to make changes with a guy and a hammer in the field, and now you do it in software up front."

Less Field Fabrication

BIM reduces the amount of fabrication that must be performed in the field. Because exact models can be built in 3D in the design phase, more components — and more complex components — can be prefabricated by the subcontractor and shipped ready-made to the construction site. Because it's typically much cheaper to prefabricate components than to build them onsite, this has led to significant cost savings.

Reduced Quantity Takeoff and Improved Preconstruction Cost Estimating

Quantity takeoff — the process of estimating the amount of material such as yards of concrete and components such as lighting fixtures that will need to go into a building — is an important process used to create the total cost estimate on a project. With the building designed in BIM, these quantities can be estimated much more accurately. Specifically, Autodesk BIM tools help manage the process of doing the takeoff. "It takes something that we would traditionally do manually with a lot more effort and gets to the same place more quickly," explains Klancnik. The net effect is to lower project costs, improve the firm's competitiveness, and improve the project owner's satisfaction.

Visual Phasing and Scheduling

BIM improves the scheduling process by allowing Walsh to take the 3D design and directly create an activities schedule showing the build sequence and necessary order of assembly. The BIM tools generate a simulation of the construction process, which helps to manage the project and to save construction managers time and effort compared with the old manual process of performing this task with pencil and paper.

Case Study Project

Shortly after it began working with BIM, Walsh landed a project to build two similar water treatment plants. The decision was made to build one plant using BIM and one plant using traditional paper-based methods. In the end, BIM saved eight weeks of construction time off a 42-week schedule, providing significant man-hour savings (see Table 1). The traditionally constructed building had around 450 change orders, whereas the BIM-constructed building had about 10 change orders, and none of those change orders were due to interference. Looking only at hard cost savings, the firm conservatively estimates it saved $150,000 out of a $70 million job, but taking into account all "softer" cost savings (such as the value of FTE hours saved), Klancnik estimates the savings on the building with BIM to be on the order of more than $1 million.

Table 1. Key Project Benefits

Key Benefits of BIM	Traditional	With BIM	Savings	%
Time to completion (months)	42	34	8	19%
RFIs requiring labor to fix	450	10	440	98%

More Accurate Pricing Provides Competitive Edge

Walsh can more accurately estimate building costs and reduce contingency fees, allowing it to price more aggressively during the bidding phase. Klancnik credits BIM with making the firm more competitive, having become an important part of the estimating and bidding process.

Results

Walsh has had so much success with BIM that it is now using it on about 75% of its projects, and that proportion is growing. The firm is planning to extend its use of BIM in the future to enhance the accuracy of its layout (to better identify where the concrete pours go, etc.) and to tie its 3D model output directly into fabrication equipment to further reduce errors in the fabrication process.

Walsh realizes benefits not only in its capacity as general contractor but also when it acts as subcontractor on its own projects whereby it can prefabricate more easily and estimate costs more accurately. The tools have improved build quality with fewer errors in the final buildings. Finally, BIM has improved field safety both because less fabrication in the field leads to fewer accidents and because the firm uses the 3D models to help identify hazardous areas of the work site and posts appropriate signage for the workers.

Estimated Return on Investment

For the sample project, the company estimated that it reduced project costs by $1.1 million for an allocated additional cost of $50,000. If the company's share is 20% of the overall project savings, the firm has received a payback of $2.56 for every dollar invested in Autodesk BIM (allocated to the project). The project will yield an ROI of 156%.