

## COMPANY

**Mortenson Construction**

## LOCATION

**Minneapolis, MN**

## SOFTWARE

**Autodesk® Navisworks®**  
**Autodesk® Revit® Architecture**  
**Autodesk® Revit® Structure**  
**AutoCAD® Architecture**

“With BIM, we can model not only the design of a building, but the end-to-end construction process itself. So whether we’re managing a project or constructing the structure ourselves, we can analyze constructability, coordinate the process, address clashes, and schedule every step virtually before construction begins.”

## —Derek Cunz

LEED AP  
 Director of Project Development  
 Mortenson Construction

# Mortenson Construction – Adding Up The Benefits

## Delivering construction projects faster and more cost-effectively with Navisworks

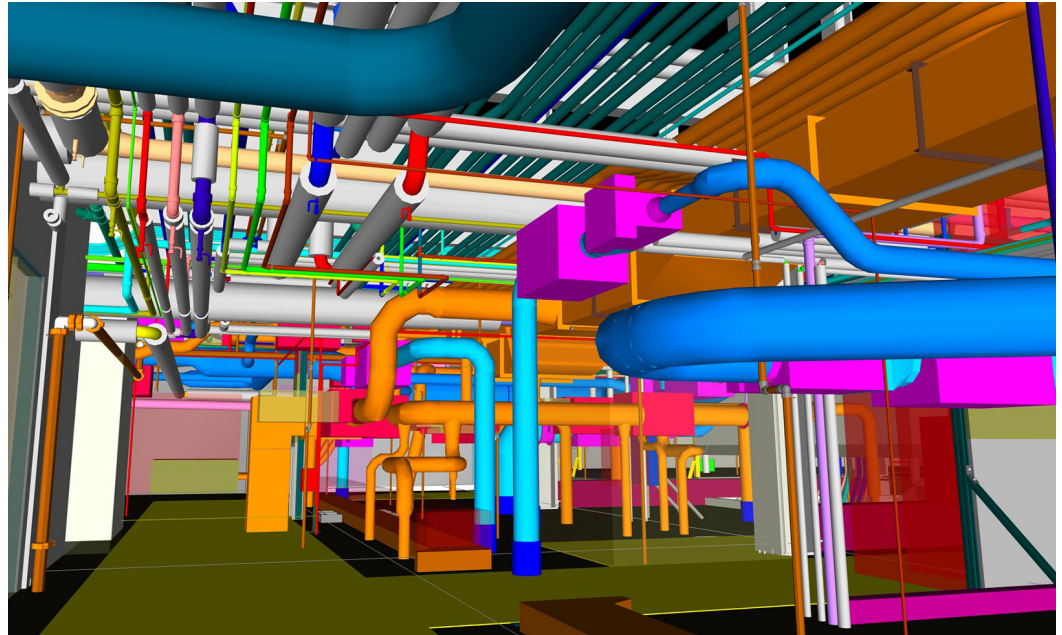


Image courtesy of Mortenson Construction

From planning to coordination to construction execution, Mortenson now relies on Autodesk® Navisworks® software and Autodesk BIM software, including Autodesk® Revit® Architecture software, and Autodesk® Revit® Structure software. With help from Autodesk BIM software, Mortenson has been able to:

- Increase the use of prefabrication
- Improve collaboration with design partners and subcontractors
- Reduce cost
- Improve efficiency and productivity
- Deliver completed construction projects earlier than originally planned

### A Pioneer

Many general contractors and construction management companies rely on surprisingly low-tech project management processes—even on buildings with budgets exceeding \$100 million. To detect clashes between building systems, some firms still overlay drawings on light tables. And to schedule subcontractors, they use spreadsheets and ad-hoc, on-site coordination. 2D drawings guide the process, and thousands of requests for

information (RFIs) are common. As a result, budget overruns, field coordination issues, delays, and change orders are likely.

A pioneer of model-based construction and virtual design and construction (VDC), Mortenson takes a different approach, according to Derek Cunz, the director of project development for Mortenson. “With BIM, we can model not only the design of a building, but the end-to-end construction process itself,” he explains. “So whether we’re managing a project or constructing the structure ourselves, we can analyze constructability, coordinate the process, address clashes, and schedule every step virtually before construction begins. It’s a proven approach that makes Mortenson a better builder.”

### BIM in practice

As BIM technology has evolved, Mortenson has progressed from the standard practices of conflict detection to embrace VDC to help enable effective planning, higher quality and safety control, collaboration, prefabrication, and better owner communication. Today, when starting a project, Mortenson uses Autodesk Navisworks to develop a virtual model of the entire building.



# Mortenson reduces RFI volume by 32 percent with help from Autodesk BIM software.

Navisworks allows the company to aggregate models, better detect conflicts, create 4D schedules that link the building model to timelines, and more easily coordinate subcontractors. One key impact of Navisworks is that it enables communication through a visual medium, helping to reduce the need for interpretation.

The University of Colorado-Denver Health Sciences Center Research 2 (R2) provides an ideal illustration of how Mortenson relies on BIM. On the 11-story, 540,000-square-foot research center, Mortenson used AutoCAD® Architecture and Navisworks to create 3D constructability models and sequence the construction process. The software also helped Mortenson streamline the use of prefabricated materials and collaborate with the extended project team.

"We used BIM on the project from day one," says Ricardo Khan, integrated construction manager at Mortenson. "Before we even broke ground, we had addressed most of our questions about the design with the architects and engineers. And with 4D scheduling, all our subcontractors better understood the plan for construction. They could actually see where and when they needed to contribute." With the project coordinated and communicated with help from Navisworks, construction progressed even more smoothly than anticipated. "We completed the project two months ahead of schedule," reports Khan. "Everyone on the project executed everything as planned, from pouring concrete to installing prefabricated MEP systems."

## Saving Six Weeks

To drive model-based construction, Mortenson prefers to begin with the 3D building models and building systems created by architects and engineers using Autodesk Revit Architecture and Autodesk Revit Structure. When design teams use 2D tools, that still doesn't impede Mortenson's process. Mortenson simply creates its own 3D construction models from 2D drawings in Revit®-based software.

The \$131 million Tulalip Hotel and Conference Center in Tulalip, Washington, is an excellent example of how that extra effort can pay off for Mortenson and its clients. Mortenson was slated to complete the concrete and other structural work, and the structural engineer on the project delivered the design in a 2D format. Mortenson used the 2D documents as a foundation and translated the

data into Autodesk Revit Structure to create a 3D BIM model of the structural elements. Using the model, Mortenson's team developed an optimized construction process that included sharing 4D construction sequences with its construction crews.

"Autodesk Revit Structure allowed us to color-code the variables in the 3D structural models," explains Khan. "Our team sees design intent more clearly as they work. Sharing BIM with our construction crews has allowed us to increase production rates for sheer walls by 26 percent, on average. On the Tulalip project, we beat an aggressive schedule for the structural elements by six weeks."

## The Result

As a long-time BIM user, Mortenson lacked a way to measure the benefits of BIM on comparable projects. So when Mortenson realized that the R2 project in Colorado would be built next to the similarly sized and recently completed Research 1 (R1), the company engaged the University of Colorado to conduct an independent study comparing the two projects.

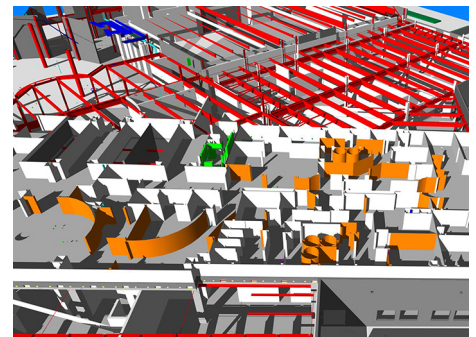
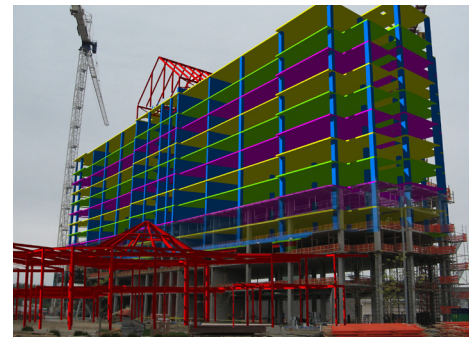
"The R1 building was constructed and coordinated by another contractor using traditional techniques, and we used BIM tools, including Navisworks, on R2," says Khan. "The University of Colorado analyzed and compared the two projects, and the data doesn't lie. BIM is better. There were 780 fewer RFIs on R2, leading to a \$585,000 savings just on the cost of administering RFIs. This savings calculation does not account for the actual cost aversion if the issues were addressed during construction. The project was also completed six months faster than R1."

Because Mortenson often self-performs concrete work, the company was particularly interested in comparing the structural aspects of the two projects. Khan reports that, "Compared to R1, there were 74 percent fewer RFIs during the foundation phase and 47 percent fewer during steel erection. As a self-performing contractor, we see that as a great bottom-line benefit of BIM. That's just one of the reasons we've used BIM and VDC on more than 100 projects with a total construction value of more than \$6 billion."

For more information, visit <http://www.autodesk.com/products/navisworks>

## About Mortenson Construction

Family owned since its founding in 1954, Mortenson Construction provides general contracting, construction management, design-build services, and more to building owners. The company's commitment to quality and innovation has helped it grow into one of Engineering News-Record's top 25 contractors. It has also driven Mortenson's leading-edge use of building information modeling (BIM) to enhance the construction process.



Images courtesy of Mortenson Construction.