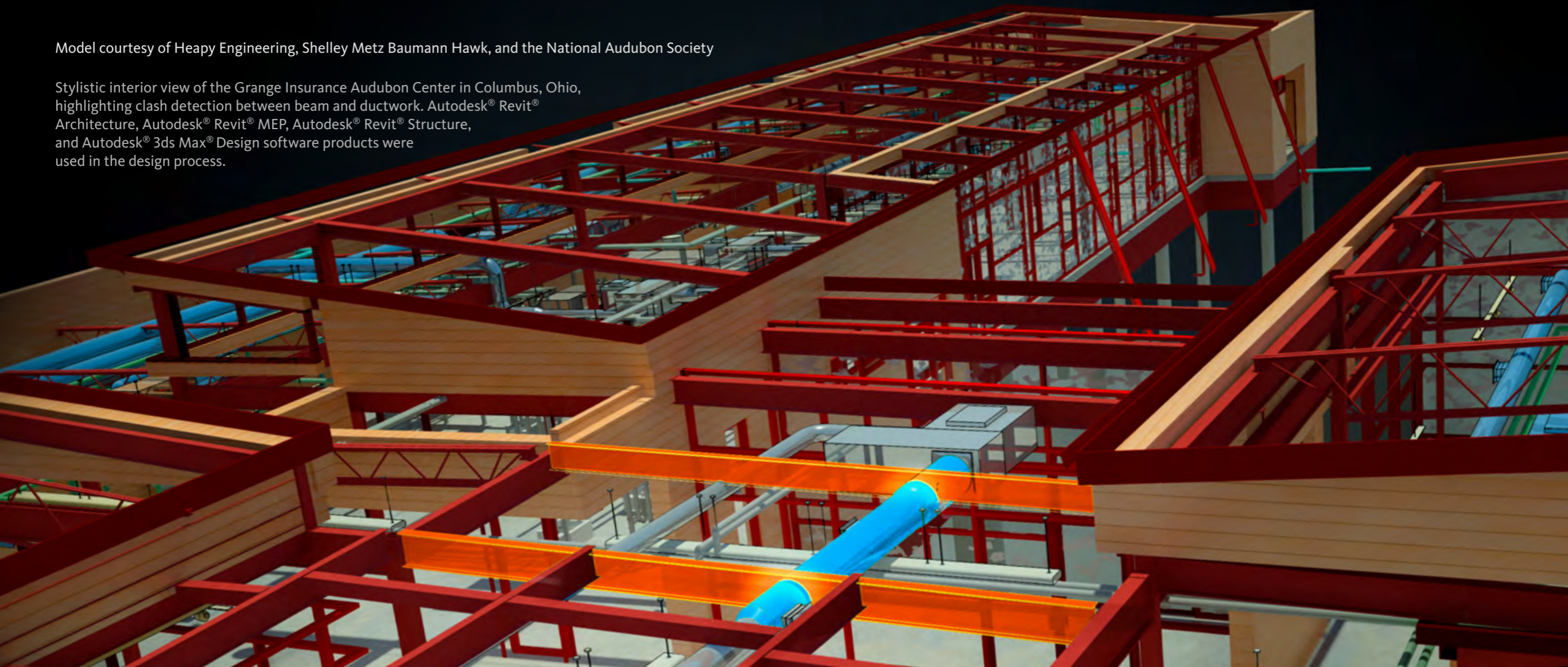


Autodesk BIM for MEP and Structural Engineers

Autodesk® Building Design Suite Helps Solve Key Business Challenges
with a More Coordinated BIM Workflow

Model courtesy of Heapy Engineering, Shelley Metz Baumann Hawk, and the National Audubon Society

Stylistic interior view of the Grange Insurance Audubon Center in Columbus, Ohio, highlighting clash detection between beam and ductwork. Autodesk® Revit® Architecture, Autodesk® Revit® MEP, Autodesk® Revit® Structure, and Autodesk® 3ds Max® Design software products were used in the design process.



BIM for Engineering

In this e-book, discover how Autodesk® Building Information Modeling (BIM) software—including in Autodesk® Building Design Suite—can enable mechanical, electrical and plumbing (MEP) and structural engineers to gain competitive advantage by helping them:

- Create better buildings using more coordinated and consistent Information
- Gain project insight through design, visualization, and analysis
- Collaborate more effectively to inform design and construction decisions

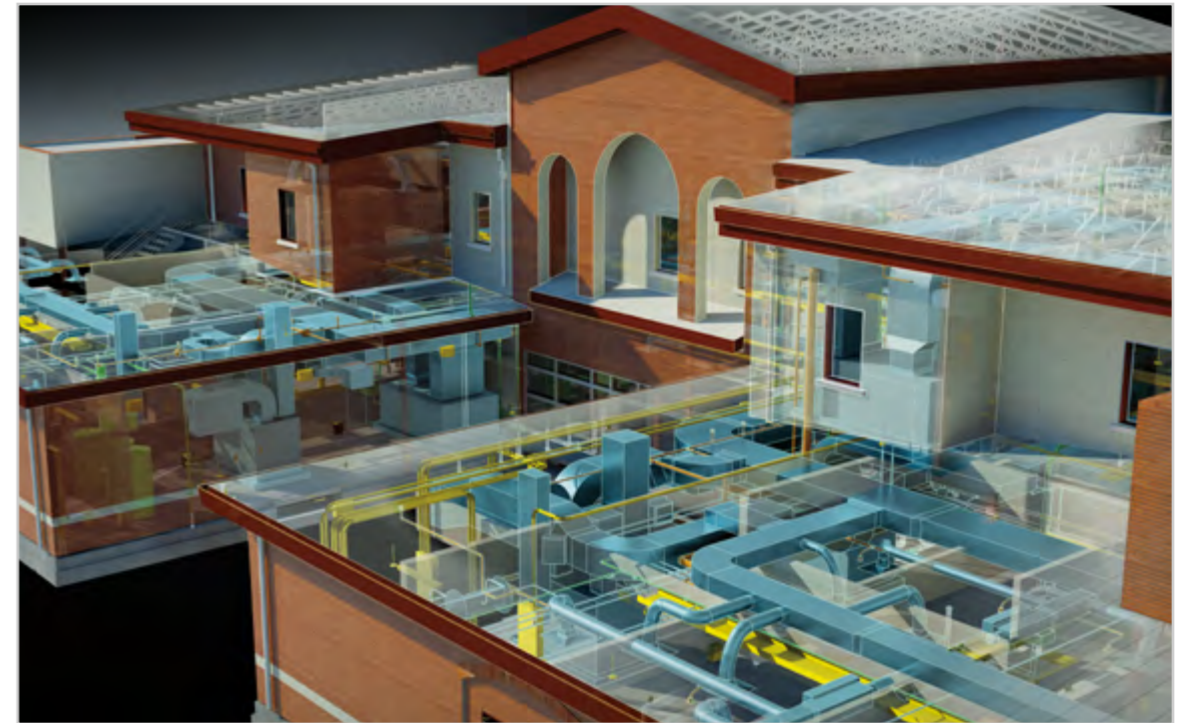
Why This is Important

Due to the transition from computer aided design (CAD) to BIM, design practices in the building industry have shifted. Architectural firms led the change by adopting BIM for design. Engineers now recognize the benefits of BIM and are transitioning as well.

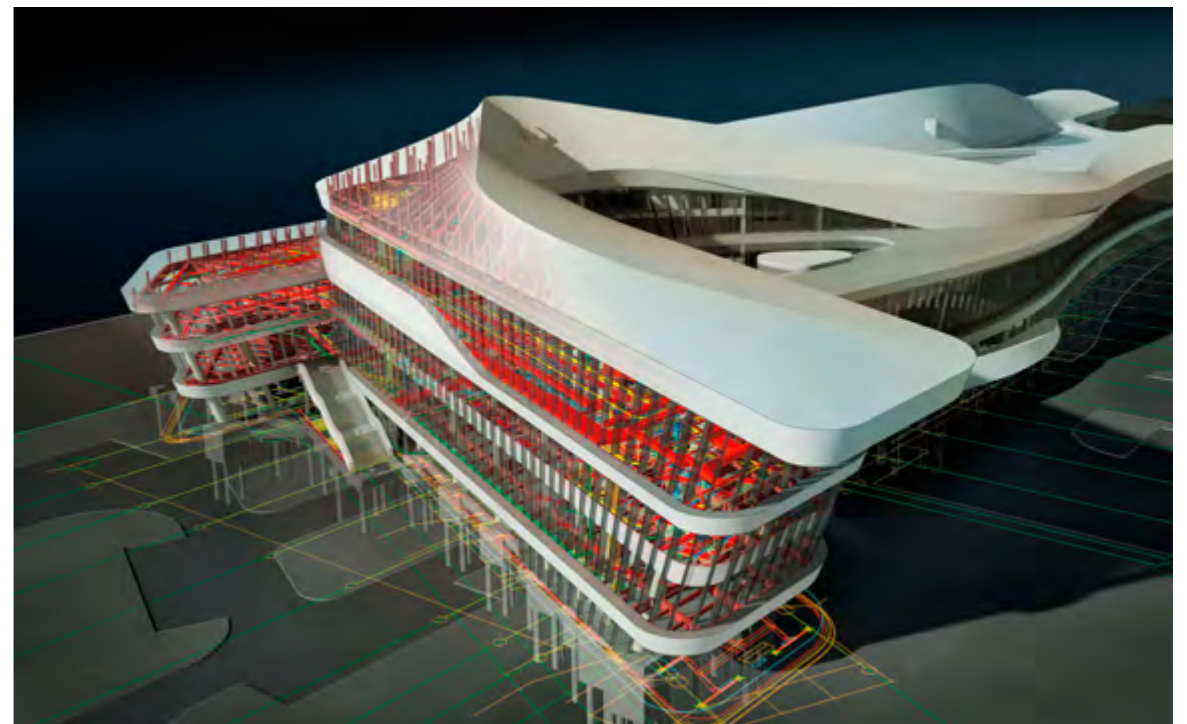
BIM awareness and adoption is increasing globally. According to a McGraw-Hill report published in 2010, more than one-third (36 percent) of Western European industry participants reported the adoption of BIM in 2010*. This can be compared to the 49 percent adoption rate in North America in a similar report published in 2009. In Japan, a recent survey conducted by Nikkei demonstrates that BIM is gaining momentum, with 80 percent of respondents confirming they recognize the term BIM. As MEP and structural engineers become keenly aware of the benefits that BIM can provide, it is expected that adoption will increase steadily over the next few years.

Therefore, as you pursue MEP and structural engineering project opportunities, you may need to reevaluate how to win new work. With owners and architects mandating and using BIM, it appears there has never been a more appropriate time for engineering firms to promote themselves as BIM-ready firms.

*McGraw-Hill (2010), The Business Value of BIM in Europe. Getting Building Information Modeling to the Bottom Line in the United Kingdom, France and Germany.



Rendering of a Warriors in Transition facility, highlighting MEP systems. AutoCAD® Revit® MEP Suite and Autodesk® 3ds Max® software products were used in the design process. Courtesy of TME, Inc., and Corgan Associates.



Rendering of Tianjin International Cruise Terminal Building, Tianjin, China. Autodesk® Building Design Suite and Autodesk® 3ds Max® software products were used in the design process. Image courtesy of CCDI Group.

Industry Challenges

MEP and structural engineers in the building industry face many challenges. For example, economic pressures have negatively impacted the architecture, engineering, and construction (AEC) industry. Despite experiencing a decrease in new construction spending, engineers have been better able to emerge from challenging times by diversifying their services. Research* shows that firms that adopt BIM can better weather the economic storm and should be ahead of the competition as the industry continues to recover.

Another challenge engineers face concerns shifting contractual structures and the continuing evolution of business relationships in the industry. Integrated project delivery (IPD) is changing the nature of collaboration across project teams. Because teams extend well beyond owner, architect, and contractor, tight coordination is imperative for success.

Engineers are also challenged by increasing demand for sustainable design and the expectation from owners to ensure compliance. The green movement has become a green mandate, with rapidly increasing regulatory changes specifying energy and water use targets. Sustainable design is placing increased pressure on the engineering design segment as firms look to meet and exceed targets set by project stakeholders.

*McGraw-Hill Smart Market Business Value in BIM



Courtesy KlingStubbins

COORDINATION

Create better buildings using more coordinated and consistent Information.

Coordination Between Architects and Engineers

BIM software can help design teams improve coordination. With BIM, a change anywhere is a change everywhere as building information is stored in a coordinated and consistent model. Autodesk® Revit® Architecture and Autodesk® Revit® MEP software—included in Autodesk® Building Design Suite Premium—provide architects and MEP engineers with an intuitive design environment. Sharing accurate models helps users streamline the design process.

Solution

Design West Engineering, an MEP engineering consulting firm, recently made the decision to move to Revit MEP to help improve collaboration with their architectural counterparts. Right from the start, Revit MEP and its intuitive tools for system design and analysis helped the firm save valuable time.

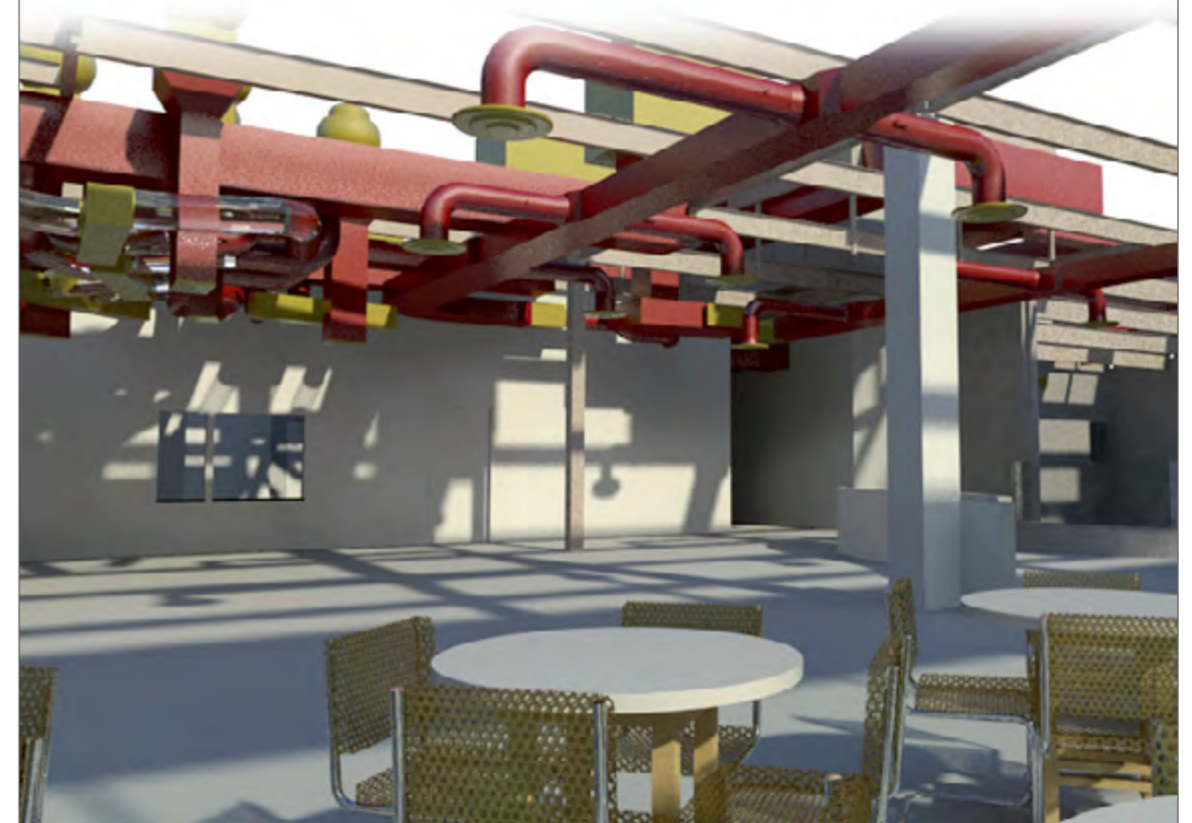
“The principal architect was absolutely tickled to receive our 3D Revit MEP model,” says Robert Cronk, Principal, DesignWest Engineering. “He used Autodesk Revit Architecture to cut a section from every single wall and quickly get all the information the theming team needed to do its job.”

We began to notice that more and more architects were using Autodesk Revit Architecture software and becoming quite passionate about wanting to collaborate with us via a complete building information model.

—Robert Cronk

Principal

Design West Engineering



Create better buildings using more coordinated and consistent Information.

Video: [A Change Anywhere is a Change Everywhere with Revit MEP for BIM](#)



INSIGHT

Gain project insight through design, visualization, and analysis.

Sustainable Design Goals

Autodesk® Building Design Suite Premium includes Autodesk® Revit® MEP software for design and analysis. These products help MEP engineers conduct conceptual energy analysis and heating and cooling load calculations to better understand building performance and energy requirements. Also included in Building Design Suite Premium is Autodesk® 3ds Max® Design software for visualization and lighting simulation.

Solution

Stephenson&Turner (S&T) is a team-oriented, multidisciplinary architecture and engineering practice specializing in the creation of inspirational, environmentally sustainable solutions for clients in New Zealand, Australia, and other Asia-Pacific countries. Since adopting Revit MEP for Building Information Modeling, S&T has completed numerous projects, including an award-winning multipurpose building at the Ministry of Agriculture and Forestry's (MAF) National Centre for Biosecurity and Infectious Disease (NCBID), located near Wellington, New Zealand. MAF wanted to emphasize the building's relationship to the natural environment, requiring S&T to incorporate natural building materials and harmonize the building's layout. To meet the sustainable design goals for the building, high-performance insulation, passive solar construction, and a sophisticated natural and mechanical ventilation system were scoped. Revit MEP was used to help the S&T team adhere to a passive solar strategy that required maintaining artificial lighting levels at or below 400 lux.

BIM is a natural extension of our total building approach. We had to achieve an energy efficiency of fewer than 120 watts per square meter per annum. The BIM process with Revit MEP definitely played a part in that success.

—Michael Warwick

Lighting and Sustainable Design Consultant

Stephenson&Turner



Gain project insight through design, visualization, and analysis.

Video: [Achieving Sustainable Design](#)



COLLABORATION

Collaborate more effectively to inform design and construction decisions.

Interference Checking with Other Disciplines

Autodesk® Building Design Suite Premium, which includes Autodesk® Revit® MEP software for intelligent model-based design, helps MEP engineers improve coordination with other disciplines. Autodesk® Building Design Suite Ultimate includes Autodesk Revit MEP and Autodesk® Navisworks® Manage software. Navisworks Manage complements the design process with features that support model and data aggregation and interference detection helping to support coordination across integrated design teams.

Solution

Autodesk Building Design Suite Premium, which includes Revit MEP, can help engineers overcome constructability challenges by using intelligent information in the model to better identify potential clashes prior to construction. With Autodesk Building Design Suite Ultimate, Navisworks Manage can be used in conjunction with Revit MEP for project coordination and clash detection.

Kohrs Loennergmann Heil (KLH) engineers recently worked on the renovation of the Hebrew Union College Klau Library in Cincinnati, Ohio. The project included the renovation of an existing five-story library and the construction of a new building. The library included very tall book stacks, which KLH had to coordinate with the existing structure, and then fit the new duct work, lights, and technology systems. The firm used an integrated model and reduced potential clashes on-site, helping avoid costly changes during construction.

Early on, we recognized that the BIM approach could benefit our firm, our clients, and our industry. Our strategic commitment to BIM and Autodesk Revit MEP software helps give us a more lasting competitive advantage.

—Jeff Millard
Principal
KLH Engineers



Collaborate more effectively to inform design and construction decisions.

Video: [Conduct Interference Checking with Autodesk Revit MEP](#)



COORDINATION

Create better buildings using more coordinated and consistent information.

Coordination with Design Teams

Autodesk® Revit® Structure software for BIM—which is included in Autodesk® Building Design Suite Premium—and Autodesk® Robot™ Structural Analysis Professional software which is sold separately, help engineers to better optimize coordination with design team members. When a design change is requested, it affects both the physical and the analytical model that the structural engineer is responsible for. Using Revit Structure, engineers can create coordinated physical and analytical models, and then export the analytical model to Robot Structural Analysis Professional via a bidirectional link. By integrating analysis in the BIM process, engineers can analyze structural designs and conduct code checking to help ensure safety of structure prior to construction. Design changes can then easily be communicated back to the architect by linking the intelligent Revit Structure model with Revit Architecture.

Solution

In 2014, the FIFA World Cup™—soccer's world championship and the world's most widely viewed sporting event—will return to South America for the first time since 1978. In preparation, 12 Brazilian cities will host matches in new and significantly renovated stadiums throughout the country. Buro Happold, a multidisciplinary design and engineering consultancy, used Revit Structure and Autodesk Robot Structural Analysis Professional software to help create the Natal stadium. Revit Structure enabled the firm to use intelligent models to better collaborate with the architects.

By sharing our Revit design models, we could more accurately visualize the project and understand the spatial relationships between the structural framing, the architectural elements and the building systems.

—Daniel Batt
Structural Engineer
Odeh Engineers



Create better buildings using more coordinated and consistent information.

Video: [Interoperability between Autodesk Revit Structure and Autodesk Robot Structural Analysis Professional](#)



INSIGHT

Gain project insight through visualization, simulation and analysis.

Visualizing Analytical Results

Autodesk® Building Design Suite Premium, which includes Autodesk® Revit® Structure and Autodesk® 3ds Max® Design software, helps structural engineers gain project insight at the very early stage of the project life cycle. Revit Structure enables engineers to view analysis results from within the design environment; 3ds Max Design can help firms more effectively market ideas.

Solution

Revit Structure allows for analysis results to be viewed within the design environment helping engineers to visually interpret results and inform decision making. For communicating design intent to project stakeholders, intelligent information from Revit Structure can be exported to Autodesk 3ds Max Design. Odeh Engineers, Inc, recently completed a design for a project that has tall masonry walls. The design team illustrated for their client how the contractor could brace the walls in different schemes, in different sequences and keep construction flowing by using Revit Structure and Autodesk 3ds Max Design. Odeh Engineers Inc, were able to take the intelligent information in the Revit Structure model to help their clients to visualize their design intent.

BIM leads to better coordination, improved visualization, and higher quality construction documentation.

—David Odeh

Principal

Odeh Engineers



Gain project insight through visualization, simulation and analysis.

Video: [Viewing Analytical Results in a Visualization Framework](#)



COLLABORATION


Collaborate more effectively to inform design and construction decisions.

Coordinated Documentation

Autodesk® Building Design Suite Premium—which includes Autodesk® Revit® Structure, AutoCAD® Structural Detailing, and AutoCAD® software—can help structural engineers overcome many challenges by using Revit Structure and AutoCAD Structural Detailing to create fabrication details. For example, for concrete reinforcement, it is critical to have accurate documentation that represents design intent through to fabrication and construction.

Solution

BIM helps structural engineers extend design information through to fabrication and ultimately construction, helping to ensure intent and accuracy is carried through. For example, Odeh Engineers shared their Revit Structure design model with the steel fabricator during a MassArt project to minimize the potential number of requests for information when the project moved into production. Odeh Engineers exported the Revit Structure design to CIS/2 format using Revit Extensions for Autodesk Revit Structure and sent the files to the steel fabricator for use in the steel detailing process.



Transparency and collaboration were critical for the success of this project and BIM enabled both.

—Daniel Batt
Structural Engineer
Odeh Engineers

Collaborate more effectively to inform design and construction decisions.

Video: [Creating Fabrication Details with 3D Reinforcement](#)



Autodesk® Building Design Suite

Autodesk Building Design Suite provides MEP and structural engineers the power of BIM, with tools for model-based design, visualization, and documentation—all in a comprehensive solution.

Autodesk® Building Design Suite Premium provides MEP and structural engineers an optimized set of tools in a single, economical, and convenient package. The suite supports BIM, offers the familiarity of AutoCAD® products for efficient documentation, and provides Autodesk® 3ds Max Design® software for compelling visualizations and lighting analysis.

Building Design Suite Premium includes:

- AutoCAD®
- AutoCAD® Architecture
- AutoCAD® MEP
- AutoCAD® Structural Detailing
- Autodesk® Showcase®
- Autodesk® SketchBook® Designer
- Autodesk® Revit® Architecture
- Autodesk® Revit® MEP
- Autodesk® Revit® Structure
- Autodesk® 3ds Max® Design

Autodesk® Building Design Suite Ultimate is suited for MEP and structural engineers who are looking to bridge the gap between design and construction. Autodesk® Navisworks® Manage software, which is included in the suite, helps support design and construction workflow needs. Navisworks Manage is a comprehensive review solution for analysis, simulation, and communication of project information. Multidisciplinary design data can be combined into a single integrated project model to better coordinate disciplines, help resolve conflicts, and plan projects virtually before construction or renovation begins.

Building Design Suite Ultimate includes all of the products in the Building Design Suite Premium, plus:

- Autodesk® Navisworks® Manage
- Autodesk® Quantity Takeoff
- Autodesk® Inventor®



Try Now: Maximize Your Building Engineering Workflows Today

Autodesk® Building Design Suite 2012 is a comprehensive building software solution, combined in a single economical and convenient purchase, and includes the tools that engineering professionals rely on every day for CAD and BIM workflows.

Download a free* 30-day test drive of Autodesk Building Design Suite now.

Have an Authorized Autodesk Reseller Contact You

The content in this e-book is just part of the Autodesk BIM and Autodesk Building Design Suite story. To learn about upcoming live or online events for MEP and structural engineers, or to get more suite and pricing information, **click below** to have an Autodesk Authorized Reseller contact you.

Tell Your Team

Autodesk BIM can help improve MEP and structural engineering projects—share what you have learned in this e-book with your team, and encourage them to download a trial version of Autodesk Building Design Suite.

Abstract visualization using Autodesk® 3ds Max® software.

*Free products are subject to the terms and conditions of the end-user license and services agreement that accompanies the software.

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