

More gain. Less pain.

Revit®

Structure 2009

Autodesk®

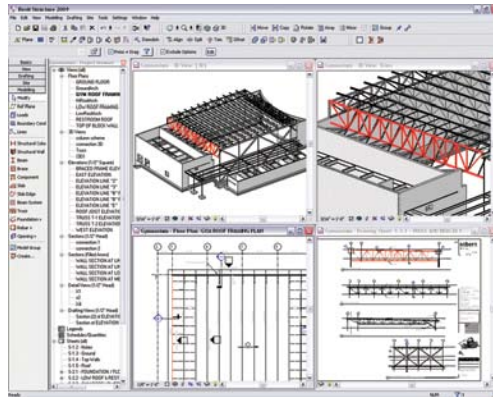
Improve Efficiency and Accuracy

Revit® Structure software offers concurrent modeling for structural design, analysis, and fully coordinated documentation.

Building information modeling significantly improves the quality and accuracy of the information that we push downstream. Our construction documents are created directly from the Revit Structure model. If the model is correct, then the drawings are automatically correct. As a result, we're able to spend a lot less time producing documentation and more time up front modeling the structure.

—Jim Jacobi
Principal
Walter P. Moore

Revit Structure software improves the way structural engineers and drafters work. It minimizes repetitive modeling and drawing tasks, as well as errors due to manual coordination between structural engineers, architects, and drafters. It helps reduce time spent producing final construction drawings and increases the accuracy of documentation, improving overall project deliverables for clients.



Revit Structure has helped us dramatically improve project coordination.

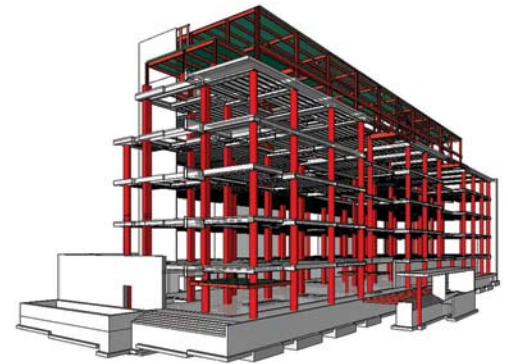
—Charles Guerrero
Vice President
WSP Cantor Seinuk

Seamless Coordination

Because Revit Structure uses building information modeling (BIM), every view, drawing sheet, and schedule is a direct representation of the same underlying database. As project team members work on the same project, making inevitable and necessary changes to the building structure, parametric change technology in Revit Structure automatically coordinates changes across all other representations of the project—model views, drawing sheets, schedules, sections, plans, and details. The design and documentation stay coordinated, consistent, and complete.

Bidirectional Associativity

The building model and all of its views are part of the same information system. This means changes to any part of the structure need to be made only once, maintaining consistency throughout the documentation set. For example, if the sheet scale changes, the software automatically resizes annotations and graphics. If a structural member changes, any views that include the element are coordinated and updated automatically, including name tags and other labels referring to the element properties.



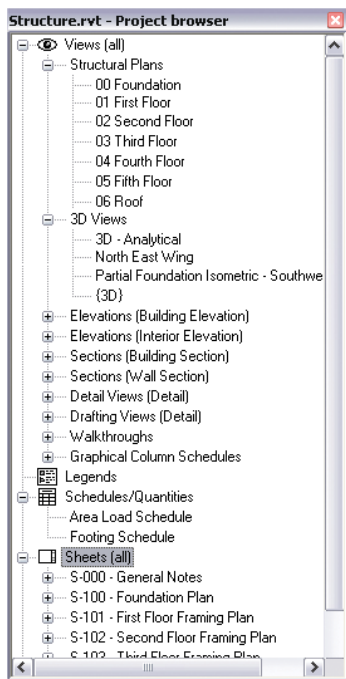
Enhance Structural Modeling Capabilities

Revit Structure focuses on the modeling of multimaterial building structures, from regular to complex shapes, such as curved and sloped roofs and floors.

Whether engineers are designing steel, cast-in-place concrete, precast concrete, masonry, or wood structures, standard modeling objects in Revit Structure software include walls, beam systems, columns, slabs, and foundations. Additional structural objects can be created as parametric components.

Project Organization

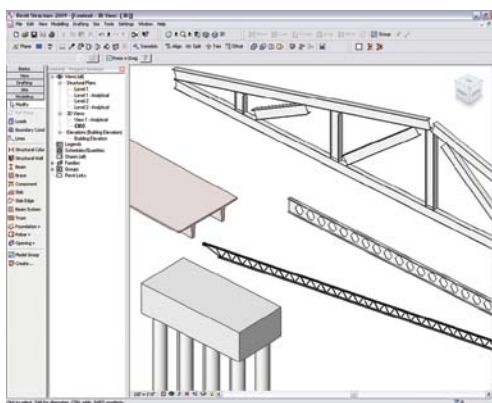
Because all information is conveniently stored in one file, design teams spend less time managing project content. The project browser helps users navigate through the various views, sections, elevations, details, schedules, and drawing sheets of a structural project, enabling them to customize project content organization as needed.



Parametric Components

Using Revit Structure, engineers can create all types of structural components, such as joist systems, beams, open web joists, trusses, and intelligent wall families. No programming language is required to use parametric components, also known as *families*. The family editor contains all the data to graphically represent an element in 2D and 3D at various levels of detail.

The term *family* refers to an element's ability to have multiple types defined within it, each of a different size and shape. Changes to a family or type definition ripple through the project and are automatically reflected in every instance of that family or type in the project. This capability keeps everything coordinated and saves the time and effort of manually tracking down components to update. Families are saved in a master database and can be conveniently loaded into new projects.



Design Options

With Revit Structure, engineers stay focused on structural engineering. Explore design changes. Develop and study several design alternatives to make key design decisions. Easily present multiple schematic designs to clients. Each option can be substituted into the model for visualization and quantity takeoff to help team members and clients make informed decisions.

Multuser Collaboration

Revit Structure enables multiple team members on the same network to work together on a model, while their work stays fully coordinated. A complete range of collaboration modes provides flexibility to meet the project team's workflow—from on-the-fly, simultaneous access to the shared model to formal division of the project into discrete shared units or individually managed linked models.

Digital Review and Markups

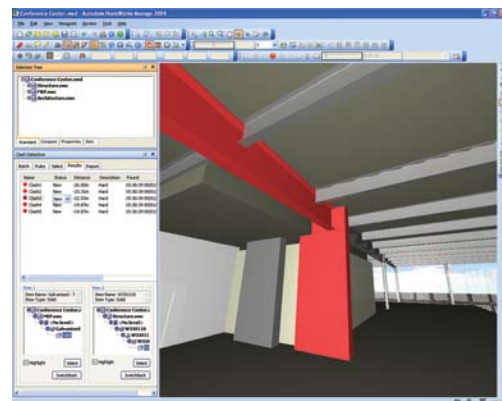
Accelerate reviews with the free* Autodesk® Design Review software, the all-digital way to review, measure, mark up, and track changes to 2D and 3D designs without the original design creation software. Because the Design Review markup capabilities combine with Revit Structure navigation and revision management capabilities, tracking changes is easy.

Project File Sharing

The Publish to Autodesk® Buzzsaw® functionality enables design teams to easily upload files from Revit Structure to a Buzzsaw project site and automatically convert Revit Structure files to either the DWG™ or DWF™ file specification.

Project Management and Review

NavisWorks tools help project teams collaborate, coordinate, and review project information crucial to the design and construction of a project. Autodesk® NavisWorks® Manage helps streamline and centralize workflow processes across the organization to reduce waste, increase efficiency, and all but eliminate change orders, while Autodesk® NavisWorks® Review helps design and construct/build teams streamline efficiency and optimize quality by accurately visualizing all types of models, regardless of file format or size.

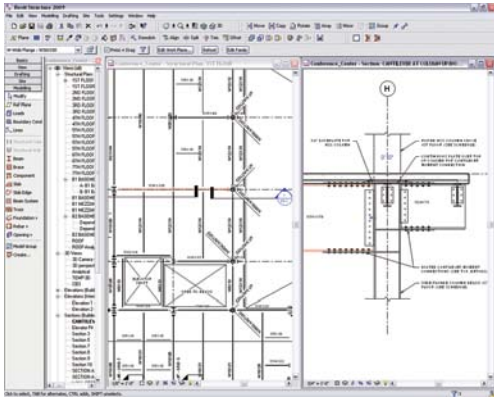


Deliver Comprehensive Construction Documents

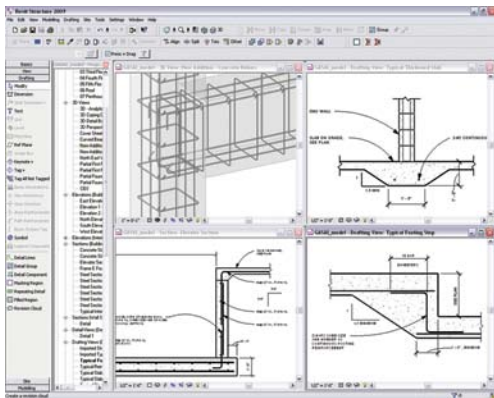
Revit Structure has a full set of dedicated tools to deliver accurate structural drawings and reduce errors due to manual coordination of design changes.

Material-specific tools help ensure that construction documents conform to industry and office standards.

For steel, features such as beam coping and automatic symbolic cutbacks, as well as an extensive library of detail components, are available.

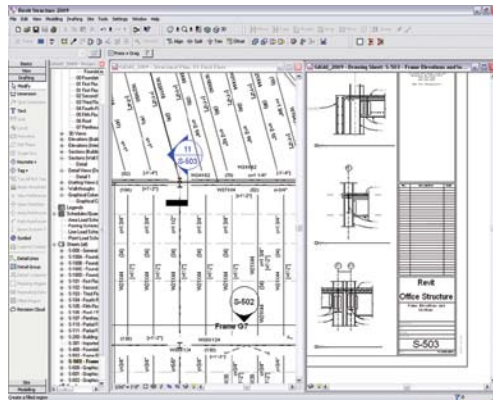


For concrete structures, display options provide control over the visibility of the concrete elements. Rebar are available for beams, columns, and footings. Area and path reinforcement enable drafters to symbolically represent the reinforcing in plan views while automatically creating rebar in wall and slab sections.



Automatic Sections and Elevations

Creating sections and elevations in Revit Structure is simple compared to traditional methods. Because views are just a different representation of the entire building model, users get instant cuts throughout a structure. Use them at any time to work in the most appropriate view. When the construction documents are ready to print, section tags and elevation symbols of the views that are not placed onto any drawing sheet are automatically hidden.



Automatic Drawing Sheet References

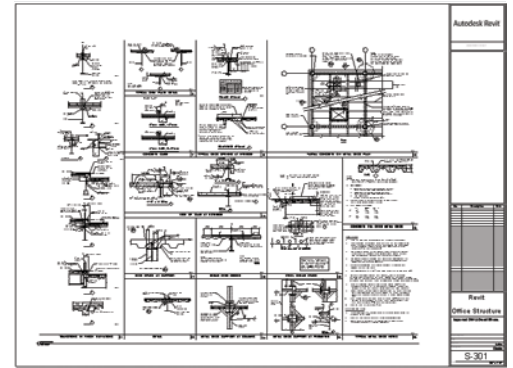
This functionality helps ensure that no section, elevation, or callout references the wrong drawing or sheet and that all data and graphics, details, schedules, drawings, and sheets in the drawing set are current and coordinated.

We're better able to detail our projects because we can model the structure as it will actually be built. That allows us to cut a section anywhere in the project and immediately have about 80 percent of the detail drawing. The rest is just adding dimensions, and detail components, as well as some general cleanup. We end up with a much higher-quality set of documents.

—Jamie Richardson
CAD Manager
Ericksen Roed &
Associates, Inc.

Details

Revit Structure allows callouts for typical details and for specific ones. Entire sheets of typical details can be created from scratch in Revit Structure using its traditional 2D drafting tools.



Designers can also import DWG details from AutoCAD® software and link them into Revit Structure, using the project browser to manage them.

Specific details come directly from the views of the model. These model-based details are completed with 2D parametric components (metal deck, concrete masonry unit, anchor bolts in footings, fasteners, welded symbols, steel connection plates, concrete rebar, and more) and annotations such as text and dimensions.

When the geometry gets complicated, Revit Structure offers 3D model-based details such as 3D representation of building expansion joints, steel connections, rebar in concrete elements, and more.

Symbols

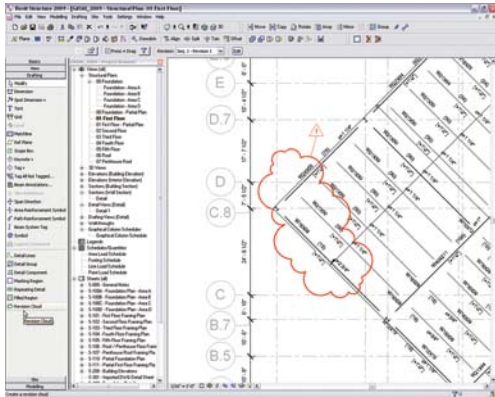
The library of structural symbols includes moment frame connections for beams, plate and splices for columns, brace representation in plan view, welded symbols, and more.

Legends

Create symbol and annotation legends for a project. Or use a legend view to place the same view on many sheets.

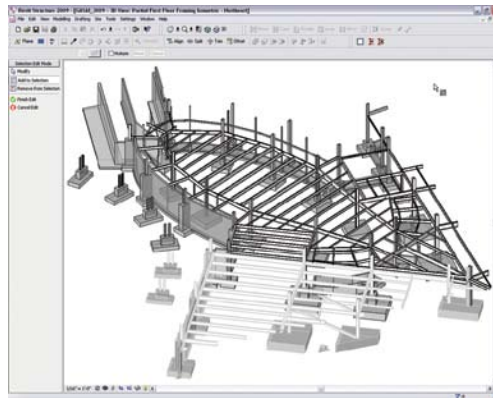
Revision Tools

Revit Structure includes a comprehensive revision mechanism. Revision clouds provide a way to insert bubble changes on construction documents and are associated with a revision number, for increased efficiency when tagging. Revision numbering can be either projectwide or sheet-specific. Revisions used on a sheet are displayed in a revision schedule on the title block. A comprehensive revision table lists all the changes made, by team member and date, so users can better manage changes and track documents.



Filters

The filter management tool enables users to highlight specific objects for improved visibility within the structural model. User-defined selection filters provide a visual method to call out objects that share common properties. Filters are also used to create selection sets of structural elements to send specific portions of the model for analysis and design.



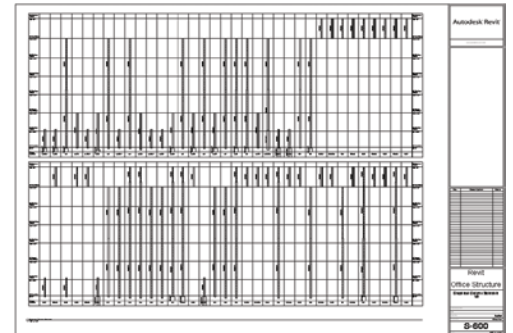
Schedules

Save time by creating schedules on demand. Schedules are just another representation of the same building model. Change a schedule, and all other views of the model coordinate and update automatically. Schedule features include sorting, filtering, grouping, and counting, as well as user-defined formulas.

Structural Framing Schedule				
Type	Length	Camber Size	Number of studs	Count
07 Penthouse T/Steel				
WB8X10	8'- 0"		8	5
W1 2X14	14'- 8 1/4"		14	1
W1 2X19	17'- 4"		18	1
W1 2X19	29'- 9 1/4"	c=3/4"	30	1
W1 2X19	29'- 11 1/8"	c=3/4"	30	1
W1 2X19	30'- 10 5/8"	c=3/4"	30	1
W1 2X19	31'- 1 3/4"	c=3/4"	32	1
W1 2X19	31'- 2 1/4"	c=1"	32	1
W1 2X19	32'- 0"		32	1
W1 4X22	8'- 0"		8	8
W1 4X22	10'- 6"		10	1
W1 4X22	12'- 0"		12	1
W1 4X22	17'- 6 7/8"		18	1

Engineers and project managers can use customized schedules to check the overall structural design. For example, they can schedule and review structural loads before integrating the model with analysis software. If the load value needs to be changed, it can be modified in the schedule and automatically coordinated throughout the model. Use graphical tools to split the schedule table once it has been placed onto a drawing sheet. Split sections of the schedule table are associative; if users extend a section, the other section shortens accordingly.

In addition, automatic graphical schedules—which users can customize to meet project requirements—are available for columns.



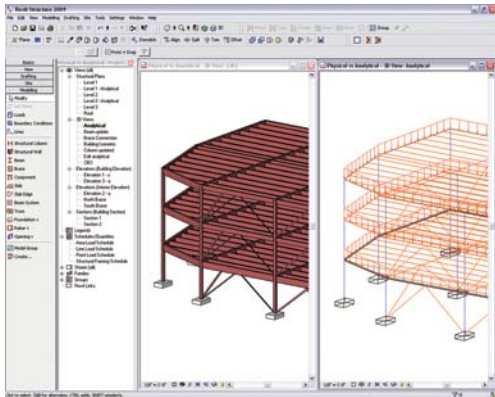
The bottom line is that we believe Revit Structure will help us reduce RFIs, as well as the amount of field support we have to perform. It adds tremendous clarity to the design process.

—Joe Ferzli
Senior Associate
Cary Kopczynski & Company,
Inc. P.S. (CKC)

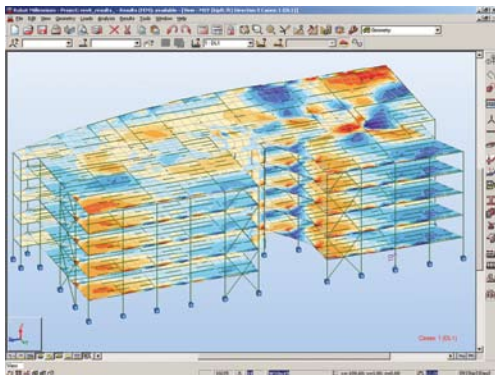
Integrate with Leading Analysis Software

Revit Structure concurrently delivers a physical model as well as a fully associated analytical model of the building.

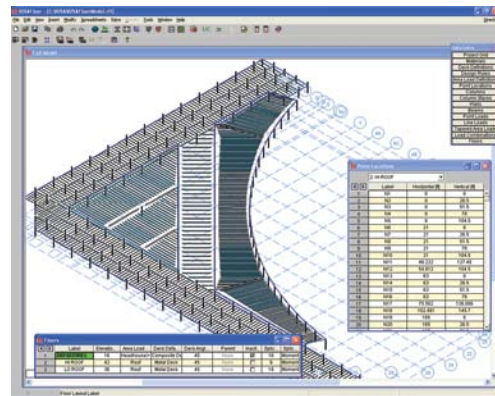
Physical models drive construction documentation. Drafters use physical models to produce the drawing and detail sheets. Engineers and architects use it for coordination purposes, such as interference checking.



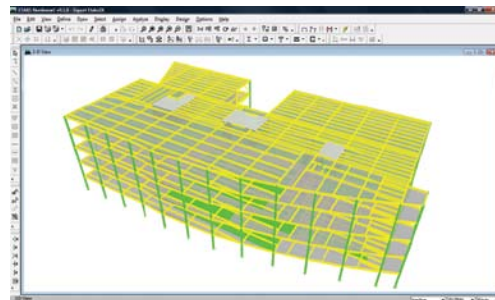
The analytical model contains information such as loads, load combinations, member sizes, and release conditions for use in leading third-party analysis applications. The analytical model could be the entire building model, one wing of the building, or even a single structural frame. Engineers use selection filters with structural boundary conditions to send substructures (such as a frame, floor, or wing of the building) to their analysis software without sending the entire model.



The creation of the analytical model uses engineering rules to produce a consistent analytical representation of the physical structure. Engineers can override initial analytical settings and edit the analytical model before linking to structural analysis packages.

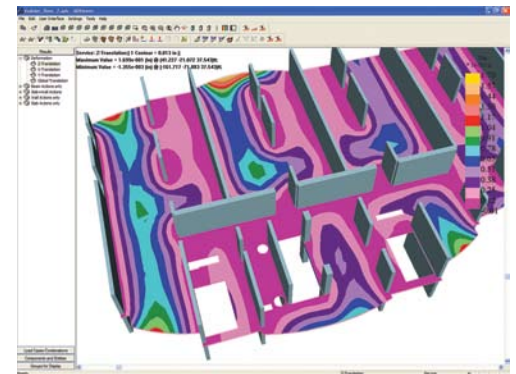


Revit Structure inspires structural engineers to greater engineering insight: user-defined rules help the analytical models adjust their location to the analytical projection planes of attached or adjacent structural elements. Engineers can automatically check analytical inconsistencies such as missing supports, global instabilities, or framing anomalies before sending the model to structural analysis.



The analysis programs then return the design information and dynamically update the physical model and documentation, eliminating many redundant, repetitive tasks such as modeling frames and shells in a variety of different applications.

To find out which software partners have linked their applications to Revit Structure through the Revit® platform API (application programming interface), visit www.autodesk.com/revitstructure-partners.



The ability to export the Revit Structure model to structural analysis software greatly minimizes duplication of effort because we can use the same model to produce construction documents and perform structural analysis. And our team can stay better coordinated throughout the design process.

—Gregg Kite
Director of Production
SCA Consulting Engineers

Coordinate Across the Disciplines

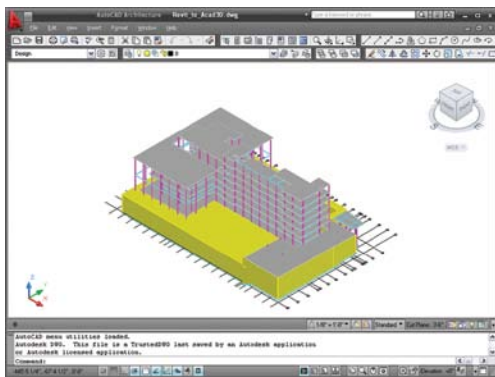
Revit Structure supports popular industry workflows with architects; mechanical, electrical, and plumbing engineers; and contractors.

Workflow with Industry-Standard File Formats

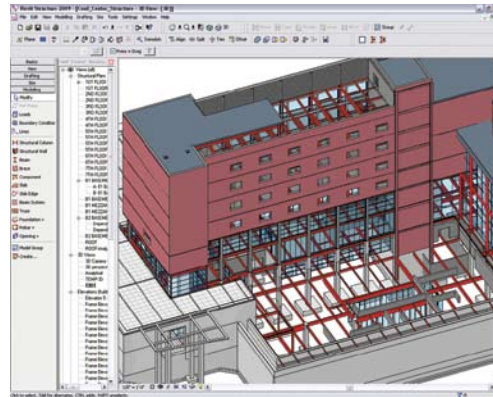
The ability to import, export, and link to DWG, DXF,™ DGN, and IFC formats helps ensure fully compatible data exchange between engineering firms and their client architects. Revit Structure supports the traditional workflow in which structural modeling begins with 2D DWG files created by the architect using AutoCAD software. This workflow offers timesaving features such as the direct selection of DWG lines, with no need for tracing. Structural engineers can also import and export their models in CIS/2 format for coordination with steel detailers and fabricators.

Collaboration with Architects

Revit Structure also supports the workflow where structural modeling starts with an architectural design done in AutoCAD® Architecture software. Engineers can reference individual plan views from AutoCAD Architecture when they start their structural layout. For better coordination, structural engineers can export 3D Revit Structure models to AutoCAD Architecture. Architects using AutoCAD Architecture 2009 can review the exported structural elements as true AutoCAD Architecture objects. Engineers working with architects using



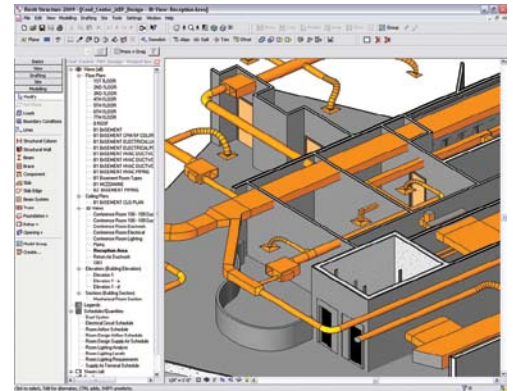
Revit® Architecture software can experience the advantages of BIM and share the same underlying building database. Creation of the structural model is faster with integrated Revit platform tools. With interference checking between structural and architectural objects, engineers can quickly detect coordination problems before sending drawings to the construction site.



Using the coordination monitor feature, engineers and architects get electronic notification of any changes made during the design process by either discipline on levels, grids, columns, walls, slabs, and openings. The result is synchronized workflow and better-coordinated construction documents. If engineers work with in-house architects using Revit Architecture, they can navigate through the multi-discipline design using the Worksharing tool. Finally, all structural drawings, details, and schedules are directly available on the Revit platform for architectural review in Revit Architecture.

Collaboration with Engineers and Designers

Structural engineers working with mechanical, electrical, or plumbing engineers using AutoCAD® MEP software can improve design coordination. Revit Structure users can export their structural model into AutoCAD MEP, where the engineer can perform clash detection between pipes and structural elements. Revit Structure users can also import 3D duct and pipe objects from AutoCAD MEP into the structural model via ACIS® solids to detect interferences visually. In addition, structural engineers who are working with mechanical, electrical, and plumbing engineers using Revit® MEP software can take full advantage of building information modeling.



Using the Revit platform, architects can link our structural model directly into their architectural model, so when we look at architectural drawings, we can see the structural components from our model reflected in theirs. It has resulted in much tighter integration between structure and architecture.

—Jos Arpink
Digital Design Manager
Glotman-Simpson

We'd been watching building information modeling for several years but were unable to find a structural design product that did what we needed. When we saw the demo of Revit Structure, we knew that there was finally a solution.

—David Pluke
Principal and VP of Technology
Ericksen Roed & Associates, Inc.

AutoCAD Revit Structure Suite

AutoCAD® Revit® Structure Suite is a bundle consisting of Revit Structure and AutoCAD software with a single serial number and a single authorization code. This combination enables organizations to maintain their investment in technology and training, while offering the competitive advantage of building information modeling, and provides the flexibility to move to a new technology platform when the time is right. For more information, visit www.autodesk.com/revitstructuresuite.

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