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Advancing Infrastructure

**CONNECT Edition**



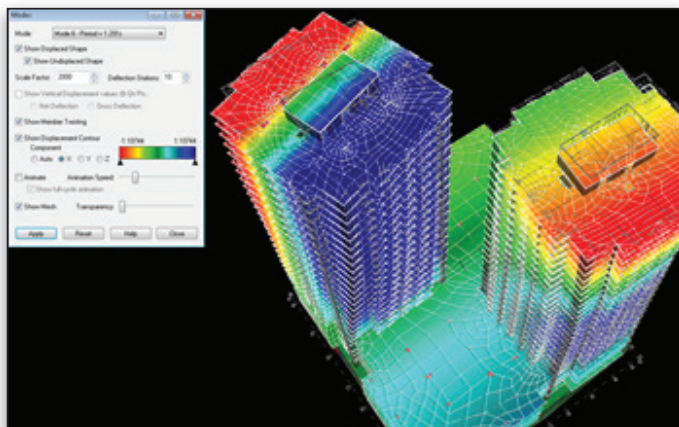
## RAM Structural System

Integrated Structural Analysis and Design of Concrete and Steel Buildings

RAM Structural System is an integrated three-dimensional static and dynamic structural analysis and design solution that automates time-consuming tasks. The application helps engineers deliver projects on time and within budget. It is developed for concrete and steel-framed building systems subjected to lateral, dynamic, and gravity loads.

### The CONNECT Edition

The SELECT® CONNECT Edition includes SELECT CONNECT services, new Azure-based services that provide comprehensive **learning, mobility, and collaboration** benefits to every Bentley application subscriber. *Adaptive Learning Services* helps users master use of Bentley applications through CONNECT Advisor, a new in-application service that provides contextual and personalized learning. *Personal Mobility Services* provides unlimited access to Bentley apps, ensuring users have access to the right project information when and where they need it. *ProjectWise® Connection Services* allow users to securely share application and project information, to manage and resolve issues, and to create, send, and receive transmittals, submittals, and RFIs.

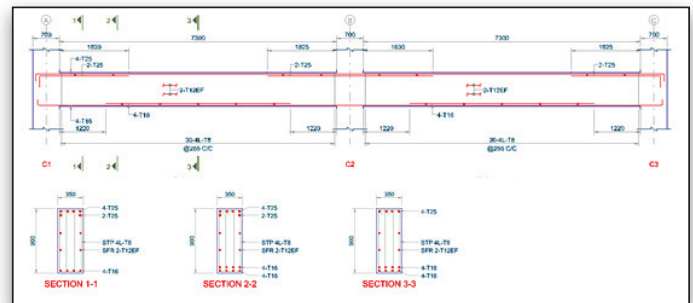


Modal analysis of concrete high-rise in RAM Structural System

### Perform Analysis for All Types of Building Structures Subjected to Static and Dynamic Loads

RAM Structural System is a highly sophisticated analysis package that includes many time-saving features, unavailable in competing software packages. RAM Structural System accommodates a wide range of building structural configurations including flat concrete slabs, slab and beam systems, composite

steel-framed floors, shear walls, moment frames, braced frames, isolated footings, strip footings, mat foundations, or a combination of these systems. Frames and walls can be of any building material including steel, concrete, masonry, or any combination of these materials. Gravity, wind, seismic, dynamic, and notional load cases are automatically generated and applied to the model.



Concrete design and documentation in RCDC working directly off the RAM model.

### Fully Integrated with RCDC

The concrete design and detailing software RCDC is fully integrated with RAM Structural System. Once the gravity and lateral analysis calculations are complete, the RCDC application can be launched directly from RAM Structural System. The model geometry and member forces are transferred automatically. The design and detailing of beams, columns, walls, and foundations, including special seismic requirements, can be taken through to completion with RCDC.

### Automatically Optimize Drift and Shear-wall Design Force Calculations

Two powerful post-processing modules are integrated into RAM. This allows the engineer to easily optimize drift in the structure and obtain wall force information for further design. The Drift module graphically identifies those members with the most significant contribution to structure drift, allowing the engineer to easily optimize the member sizes to control drift. The Shear Wall Force post-processor provides design forces wherever needed, whether through piers, between wall openings, or between levels.

### Produce Detailed Reports

RAM Structural System allows engineers to generate detailed reports in every step of analysis and design. Analysis results are reported for the structure as a whole and detailed reports for individual members are also provided. Many capabilities are available to interactively display analysis results graphically.

## System Requirements

### Processor:

Intel or AMD processor 2.0 GHz or greater

### Operating system:

Windows 7, 7 x 64, 8.1, 8.1 x 64, and 10 x 64 RAM 2 GB minimum recommended

### Hard Disk:

500 MB free disk space recommended

### Display:

OpenGL compatibility recommended

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## RAM Structural System At-A-Glance

### General Analysis and Design Features

- Static and dynamic analysis of buildings with moment frames, braced frames, shear walls and/or any combination of these systems
- Members with any material types, including steel, concrete, or user-defined materials
- Automated mesh generation for walls and diaphragms
- Analysis with tension-only members
- AISC 360 Direct Analysis Method option
- P-delta analysis option
- Foundation springs
- Rigid, semi-rigid, and flexible diaphragms
- Construction sequence analysis
- Concrete creep and shrinkage analysis
- Automatic generation of steel and concrete design load combinations per specified code
- Automatic calculation of K-factors (effective length factors) and unbraced lengths, with user override capability

### Static Load Generation Features

- Gravity loads distributed and applied to structural model in RAM Frame
- Live load reduction factors automatically calculated
- Automatic calculation of member self-weights for beams, columns, walls, slabs, and decks
- Automatic generation of wind story forces per IS875, IBC, ASCE 7, UBC, BOCA, SBC, BS 6399, NBC of Canada, AS/NZS 1170.2, China GB 50011, and Eurocode
- Automatic generation of seismic story forces per IS1893, IBC, ASCE 7, UBC, BOCA, SBC, NBC of Canada, AS/NZS 1170.2, China GB 50011, and Eurocode
- Automatic calculation of notional loads based on dead, live, roof, and snow loads on diaphragms and on members, per IS800, AISC 360, BS 5950, BS 8110, CAN/CSA S16, AS 4100 or user-defined notional load cases

### Dynamic Analysis Features

- Automatic calculation of structural mass properties (story mass, center of mass, and mass moment of inertia)
- Optional inclusion of effects of the offset of center of mass to account for accidental torsion moments
- Response Spectra analysis, with option for SRSS or CQC combination of modal results with signs, and option to consider eccentricity of story masses

### Reports, Outputs, and other Graphical Features

- Animated deflected shapes
- Calculation of story drifts at any point in the structure
- Automatically generates CAD DXF export of frame and wall elevations
- Analysis and design results displayed graphically or in text format with ability to export
- Comprehensive material takeoff, including piece count and steel tonnage allowing for comparison of various design schemes

### Concrete Design

- RAM Structural System is seamlessly integrated with RCDC for design, detailing, drawing, and documentation of concrete elements.

### Steel Standard Design Features

- Member and joint design checks based on IS800, AISC 360 LRFD and ASD, AISC 9th ASD, AISC 3rd LRFD, BS 5950, CAN/CSA S16, AS 4100, and Eurocode
- Designs column web plates (doublers) and stiffeners (continuity plates) for wind and low seismic applications
- Automatically calculates effective length factors, flange bracing, and unbraced lengths
- Full interactive control for review and design refinement

### Steel Seismic Design Features

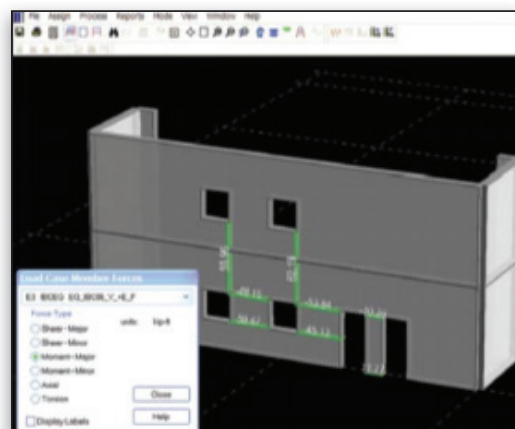
- Performs additional special seismic code design and detailing checks for members and joints, based on AISC 341 ASD and LRFD, AISC 358 and 2002 LRFD, UBC 1997 LRFD and ASD, and FEMA 350
- Automatically generates seismic load combinations
- Supports all concentric braced frame, eccentric braced frame, and moment frame structural systems
- Considers reduced beam sections (dogbone) where applicable in moment-frame joint checks
- Analyzes and designs Star Seismic and CoreBrace Buckling Restrained Braces and SidePlate® Moment Frame connection
- Supports all seismic zones for each seismic code

### Drift Control

- Provides a functionality to study and control the drift behavior of buildings

### Shear Wall

- Provides detailed analysis results for shears, moments, and axial forces in shear walls
- Allows the engineer to define vertical and horizontal section. Cuts through any cross-section on any wall
- Cross-section forces reported either per load case or per load combination



*Shear wall forces displayed at any cross section.*