PRODUCT FAMILY BROCHURE

RM™ Bridge

2D/3D/4D Bridge Design, Analysis, Fabrication, and Construction

KEY COMPONENTS

- RM™ Bridge Professional
- RM™ Bridge Cable
- RM™ Bridge Addcon
- RM™ Bridge Large Deflection
- RM™ Bridge Erection Control
- RM™ Bridge Wind CFD
- RM™ Bridge Wind Buffeting
- RM™ Bridge Cantilever
- RM™ Bridge ILM
- RM™ Bridge Rolling Stock
- RM™ Bridge Cast

Bridge engineers need a single, flexible design and analysis solution capable of solving intensive engineering challenges while addressing a full spectrum of structural, material, performance, and construction issues.

RM Bridge V8*i* is comprehensive software for structural design and analysis. It supports today's advanced understanding of bridge building to produce accurate, dependable results for all bridge types, classes, and materials. The software streamlines typically massive analytical tasks, handling complex engineering issues while enabling users to achieve substantial time savings.

Used worldwide by consulting engineering firms, government transportation organizations, contractors, and project consortia, RM Bridge sets the standard for both routine and signature bridge design and delivery. Routinely deployed on record-breaking projects, it continues to grow its reputation for solving complex engineering challenges.

WHY RM BRIDGE? FOCUSED AND DEPENDABLE

Many software design applications are developed for multiple types of structures. Ultimately, they only partially address the unique nature of bridges. RM Bridge was designed specifically for bridges – by bridge engineers directly engaged in many of the world's most renowned bridge projects.

RM Bridge has evolved in practice over several decades into a globally recognized, expert system capable of solving virtually any bridge design or analysis problem. It stands unchallenged as the most technically robust bridge software, offering the highest level of computational functionality and automatic conformance to design codes.

The value of RM Bridge is further strengthened by Bentley's strong customer support network, which focuses on helping bridge designers and engineers gain the most from their investment in this innovative software.

RM Bridge's 4D time-dependent analysis benefits bridge delivery – design through construction.

Engineers use RM Bridge to solve virtually any engineering challenge, and they depend on the software to deliver more than structural analysis results. RM Bridge enables engineers to take a more integrated approach in the creation and construction of bridge systems, which in turn reduces risk and helps deliver top-performing bridges.

COMPREHENSIVE, INTEGRATED SOLUTION

RM Bridge is a family of integrated software applications that enables users to solve any engineering problem in a single engineering environment. Engineering organizations no longer spend valuable time re-inputting information or re-engineering data midstream. RM Bridge users develop and analyze a consistent bridge model in a continuous cycle, greatly increasing engineering efficiency. The system ensures accuracy and fidelity of the bridge information as it is seamlessly reused, refined, and reprocessed across the design, engineering, and construction phases.

RM Bridge also performs 4D time-dependent analysis, providing immeasurable benefits throughout the design-to-construction process. The ability to model a bridge over time brings a wealth of analysis possibilities and delivers real-world results for construction sequencing and erection control. Through time-stepped analysis, engineers can consider all types of nonlinearity.

Comprehensive analysis and proof-checking procedures can be run at any time. RM Bridge allows easy modification of bridge model parameters so that users can quickly make changes without recreating new parametric and analytical models. The system comprehensively analyzes all changes for all results.

REAL-WORLD CONSTRUCTION ENGINEERING

RM Bridge offers extensive construction planning and engineering solutions. The system takes into account time-dependent material characteristics such as creep, shrinkage, and relaxation as the user computes the construction sequence. Engineers investigate in detail the different states in stage-wise construction – comparing results, detecting the relevant states, and producing result envelopes for proof checking.

RM Bridge enables users to solve structural problems and conflicts before construction begins, resulting in impressive project savings. During construction, RM Bridge is used to monitor the position of a structure in real time and ensure construction to an exact, predefined position or gradient. This reduces errors and prevents costly rectification during construction.

THE RM BRIDGE SOFTWARE FAMILY

RM Bridge Professional

RM Bridge Professional is the principal software in the RM Bridge offering and the foundation for specialized bridge design and analysis performed by all RM Bridge applications. A 2D/3D/4D modeling engine, a sophisticated bridge solver, and a structural database work in sync to manage all bridge information, from creation to completion.

As a standalone application, RM Bridge Professional is a workhorse that enables users to design the majority of concrete, steel, and composite structures, plan construction staging, perform erection control and construction engineering, and more.

RM Bridge Professional offers:

- 3D parametric modeling
- 4D time sequencing and time-dependent effects analysis
- Full structural analysis and design
- Hybrid finite-element modeling (FEM)
- Construction-stage engineering
- Traffic loading analysis
- 3D static and dynamic analysis
- Second-order theory and stability checking
- Seismic analysis
- Material nonlinearity
- Cracked tensile zones analysis
- Concrete reinforcement design
- Time History Analysis
- Steel and composite structure analysis
- Design code checks
- Post-processing of results
- Data exchange with civil engineering applications

Integrating modeling, analysis, design, and construction engineering, users of RM Bridge reduce risk and deliver top-performing bridges.

RM Bridge Advanced

Users can add powerful applications to RM Bridge Professional from the RM Bridge Advanced group to automate complex design and engineering challenges:

RM Bridge Cable • for cable-supported bridges
Calculates the nonlinear effects of cable sagging

RM Bridge Addcon • for cable-supported bridges
Optimizes the cable tensioning sequence – linear and nonlinear analysis

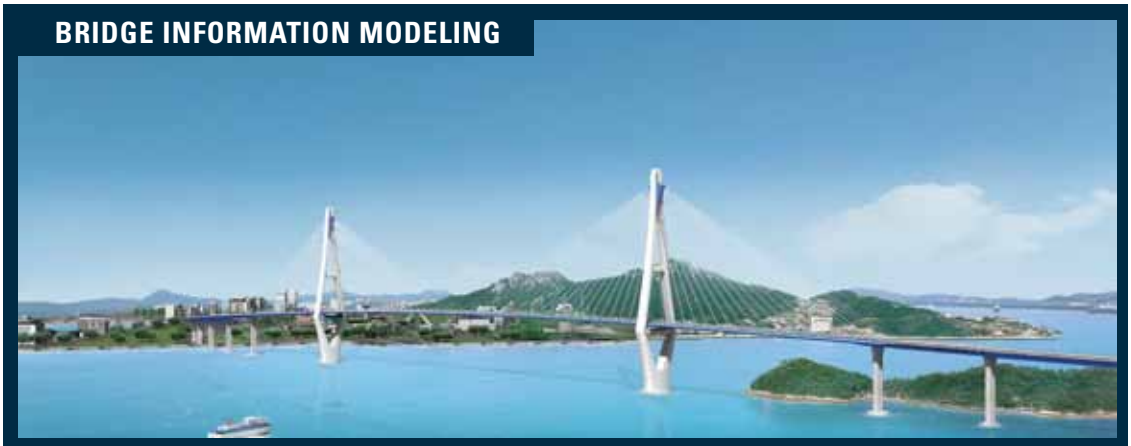
RM Bridge Large Deflection • for suspension bridges and large cable structures
Computes deflections for equalizing force distribution

RM Bridge Erection Control • for erection monitoring
Compensates for structural deformations during the erection sequence

RM Bridge Wind CFD • for bridges of all types
Simulates wind tunnel analysis by calculating aerodynamic coefficients using computational fluid dynamics

RM Bridge Wind Buffeting • for bridges of all types (complements RM Bridge Wind CFD)
Analyzes the effect of wind dynamics using CFD-calculated coefficients

BRIDGE INFORMATION MODELING



BrIM: A Synthesis of Planning, Engineering, Design and Construction

With the integrated process of RM Bridge, users synergistically develop a precise bridge data model that improves overall project accuracy and consistency. The results provide important information that proves to be a useful asset, not just for the design phase but also for the life of the bridge.

This synthesis of bridge information development can carry through all the project phases, from conception to detailed design, design to fabrication and manufacturing, and construction to operations. Bridge information modeling or BrIM is a practice that endeavors to enable any person requiring information about a given bridge to access and reuse information relevant to his or her purpose during the lifecycle of the infrastructure.

For example, a structural detailer can access rebar information, a bridge modeler can extract key design measurements, and a road design engineer can access the exact geometry and position of the bridge deck from accurate as-built information. Moreover, bridge owners can access historical trending, traffic analysis, and cost information along with physical models of the infrastructure for capital project planning.

ABOUT BENTLEY

Bentley Systems, Incorporated is the global leader dedicated to providing comprehensive software solutions for sustaining infrastructure. Architects, engineers, constructors, and owner-operators are indispensable in improving our world and our quality of life; the company's mission is to improve the performance of their projects and of the assets they design, build, and operate. Bentley sustains the infrastructure professions by helping to leverage information technology, learning, best practices, and global collaboration – and by promoting careers devoted to this crucial work.

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Bentley Sustaining Infrastructure

Applications for Specialized Erection Procedures

Users can choose from the following applications to seamlessly leverage information from bridge design to handle specialized erection procedures:

RM Bridge Cantilever • for segmental bridge design and construction
Wizard to rapidly define the bridge and tendons geometry and construction stages for balanced cantilever construction

RM Bridge ILM • for the incremental launching method of bridge construction
Wizard for full structural analysis of every bridge stage for incremental launching construction

RM Bridge Rolling Stock • for high-speed rail bridges
Application for analysis of loads, oscillation behavior, and location of resonance velocities for high-speed rail

RM Bridge Cast • for segment-by-segment casting of precast segmental bridges
Tool for precision control of geometry for segment casting using RM Bridge camber design calculations results

INTEGRATION WITH CIVIL/ROAD/ RAIL ENGINEERING APPLICATIONS

RM Bridge enables users to work with an array of project information – alignment data, vertical profiles, digital terrain models (DTM), isolines (contours), coordinate geometry (COGO), and surface point data – in DGN, DWG, and common raster file data formats. Likewise, the bridge design model data created in RM Bridge can be exported via LandXML for use in a host of parallel and downstream processes.

The sharing of road and bridge data is even more streamlined for users of the MicroStation platform and the many software families that it supports. RM Bridge shares data with these systems, which include InRoads, GEOPAK, MXROAD, and Bentley Rail Track. It also supports common content publishing tools, allowing users to write files and models to Adobe PDF or Universal 3D (U3D) format.

BENTLEY BRIDGE SOLUTION

Bentley is committed to providing tools that help engineering professionals design and deliver high-quality, sustainable infrastructure. RM Bridge is a major offering within the Bentley bridge solution, which also includes world-class applications for road design, digital terrain modeling, bridge design, structural engineering and analysis, steel detailing, concrete reinforcement, and bridge load rating and analysis.

RM Bridge is compatible with MicroStation®, Bentley's common design platform, and ProjectWise®, Bentley's platform for connecting people and information across project teams. This integration substantially broadens the movement of data not only within the bridge delivery disciplines (planning through construction) but also across the life of the bridge.

Running RM Bridge with ProjectWise and/or ProjectWise® Navigator, users are able to perform a synthesis of bridge information modeling, continuously sharing, reusing, and repurposing data. They enjoy the many benefits of real-time collaboration and streamlined engineering content management – working across multiple locations and time zones, among numerous contributors, companies, and stakeholders.

With this system, data integration happens at a fairly granular level, enabling users to:

- Browse quickly for the right information, including legacy bridge data
- Create an array of structure and infrastructure project models and flyarounds
- Utilize raster and other data formats
- Check for geometrical conflicts in the multidiscipline infrastructure model
- Simulate and manage construction schedules

By implementing the Bentley bridge solution, users enjoy the full benefits of a real-world solution for delivery, maintenance and operation of bridge systems, and improve ROI in data at every step of the bridge lifecycle.

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