The Bentley Advantage

An integrated solution – Bentley’s fully integrated water and wastewater solution addresses the needs of owner-operators and engineers who contribute to the water infrastructure lifecycle. Its powerful capabilities enhance mapping and data management, information sharing and collaboration, hydraulic simulation and analysis, design and construction documentation, field engineering and inspection, and operations and maintenance.

A commitment to interoperability – The Bentley solution allows water professionals to work with an entire suite of interoperable Bentley products that access Oracle Spatial, ESRI ArcGIS data, and DGNs stored in a relational database management system (RDBMS), or leverage AutoCAD or ArcGIS data directly from the modeling products. The interoperability of Bentley products with users’ existing technologies (including ArcGIS, AutoCAD, and MicroStation) extends the value of their current technologies and training investments.

More time engineering for increased productivity – Bentley water products use modern technology that maximizes return on investment. Bentley water technology allows users to spend more time solving engineering problems and less time on the modeling process.

Support for the entire water lifecycle – The Bentley solution meets the needs of water infrastructure professionals by covering the entire design, build, and operate lifecycle, and providing a comprehensive mapping, modeling, and engineering design environment.

Sustaining Water Infrastructure – Sustaining Society

Satisfying the world’s demand for clean water is a growing challenge, one that can only be met with optimally designed infrastructure. The world needs treatment and distribution systems that deliver potable water and sanitation systems that manage sewerage and storm runoff. In developing countries, where fast-growing populations and inadequate infrastructure are pressing issues, the priority is broader access to safe drinking water and sanitation in accordance with the Millennium Development Goals – an initiative of the United Nations to fight poverty. In developed countries, water and wastewater utilities face the difficult task of maintaining or upgrading aging infrastructure while reducing operating costs.

By delivering sustainable water infrastructure to meet these needs, engineers help sustain our society. Bentley helps architectural, engineering, construction (AEC), and geospatial professionals successfully complete this critical mission by providing a comprehensive set of software tools to design, build, and operate water infrastructure for the 21st century.
Bentley® Water and Bentley® Wastewater are desktop GIS products that help engineers and GIS professionals in water utilities and municipalities design, document, and manage water and wastewater networks more efficiently. They provide all the functionality of Bentley Map®, including map management, thematic and overlay analysis features, business and topological rules enforcement, and accurate editing, while incorporating configurable industry-specific data models for water and wastewater networks. In addition, they can access and edit all the standard GIS file formats and aggregate and display data from multiple sources for review and editing.

Bentley Water and Bentley Wastewater help engineers and GIS professionals understand what infrastructure needs to be replaced and when, and track equipment failures and breaks in pipes. Bentley Water helps engineers and GIS professionals actively manage infrastructure to reduce water leakage.

**Web Publishing**
Through Bentley® Geo Web Publisher®, Bentley’s solution provides the ability to share maps, via the Internet, with user communities that do not require editing privileges. This means spatial data can be presented easily to groups, including customer service representatives, senior management, maintenance crews, and sales and marketing.

**Enterprise GIS**
The Bentley® Geospatial Server supports the deployment of an enterprise-class GIS with access to spatial data stores and enterprise printing and plotting.

Bentley’s family of ProjectWise® servers configured and specialized for geospatial management enables users to work seamlessly with many different types of geospatial and discrete plant data. Bentley Geospatial Server accesses spatial data stores, such as Oracle Spatial and ESRI’s ArcGIS, and all types of data whether structured (as in an RDBMS) or unstructured (such as Microsoft Office files and Adobe’s PDF files). Engineering documentation can be searched for and found as quickly and easily as using the Google search engine.

**Advanced Design and Cost Estimation**
Bentley Expert Designer improves the efficiency and throughput of distribution infrastructure design by merging network design and work management in a single environment. It includes sophisticated functionality for design layout, work-order management, estimating, optimization, job closeout, and process measurement and tracking. Moreover, Bentley Expert Designer interoperates seamlessly with Bentley Water.

Who Uses Bentley’s Water and Wastewater Solution?
- Owner-operators (including municipalities, other publicly owned utilities, and investor-owned utilities)
- Engineering procurement and construction (EPC) firms
- Engineering consulting organizations
- Transportation departments
- Regulatory agencies
- Research institutions and universities
For more than two decades, utilities, municipalities, and civil engineering firms around the world have trusted Bentley’s easy-to-use and multiplatform Haestad Methods® products to generate master plans, support land development projects, design and optimize system expansions, and streamline the operation of water distribution, wastewater conveyance, and stormwater drainage infrastructure.

**Water Distribution**

WaterGEMS® and WaterCAD® are the most widely used software products for the analysis and design of water distribution systems, from automated fire flow, water quality, criticality and flushing studies to energy cost analysis and genetic algorithm optimization modules for automating pipe design, calibration, water loss detection, and pump scheduling.

HAMMER® helps engineers determine appropriate surge control strategies and reduce transients. It uses the Method of Characteristics, the benchmark standard and unquestionably the most rigorous and robust algorithm for transient analyses. Engineers can run both transient and steady-state (for initial condition calculation) analyses in HAMMER, and choose to use it as a stand-alone product or use it along with WaterCAD or WaterGEMS.

**Wastewater Collection**

From overflow remediation and water quality analysis to urban sewer planning and detailed network design, SewerGEMS® and SewerCAD® are designed to grant more engineering time. They also allow engineers to detect system bottlenecks easily, improve capacity, and limit sewer overflow, enabling utilities to comply with sewer regulations set by regulatory agencies and therefore to minimize customer complaints. Engineers can analyze sanitary or combined conveyance systems accurately with built-in hydrology tools, a variety of wet-weather calibration methods, and sewer loading allocation tools.

**Stormwater Systems**

Bentley’s stormwater modeling products provide a solution for many stormwater projects:

- Site design - for projects involving site development or detention and retention facility design;
- Urban stormwater - for pursuing and completing municipal projects for cities, counties, or departments of transportation;
- Master planning - for completing master plans and prioritizing future improvements;
- Floodplain modeling - for projects involving floodplain hydrology, floodplain mapping, river analyses, and GIS integration.

StormCAD helps commercial and industrial site designers, land developers, and roadway and transportation designers analyze and design site drainage systems, from rainfall to outlet.

With PondPack®, site and detention pond designers, regional drainage planners, and Best Management Practices (BMP) designers and reviewers can perform design and analysis for simple or complex detention and retention facilities, outlet structures, and channels.

With CivilStorm®, for the analysis of complex stormwater systems, engineers can model inlets, storm sewers, open channels, streams, culverts, pump stations, control structures, detention ponds, and overflows. It can be used to analyze drainage and detention facilities for systems with hydraulically connected elements, develop stormwater master plans, perform water quality studies, prioritize the rehabilitation of an existing system, and evaluate systems with stormwater pumping.

For quick element calculations, water engineers can use CulvertMaster® to solve culvert hydraulics and FlowMaster® for the design and analysis of pipes, ditches, open channels, weirs, orifices, and inlets. The results are obtained quickly and easily and are report ready.

**FEMA Approval**

StormCAD, PondPack, and CulvertMaster are accepted by the U.S. Federal Emergency Management Agency (FEMA) and are on the list of numerical models accepted for use in the National Flood Insurance Program (NFIP). StormCAD, PondPack, CulvertMaster and FlowMaster, which are used by thousands of municipal governments, state and federal agencies, and consulting firms worldwide can be used for determining flood hazards and developing flood mitigation strategies.
Superior Hydraulic and Hydrology Technology

- Automated constraint-based design of water distribution systems, sanitary and storm sewers, and pond and outlet – for new designs or system improvements;
- Advanced scenario management to prioritize system improvements by comparing alternative designs or a variety of system conditions – for use in master plans, drainage studies, and BMP submittals;
- Interconnected pond modeling to simulate tidal and tailwater effects in interconnected ponds – for an accurate understanding of real-world situations;
- Operating cost and energy usage minimization, by:
  » Identifying old pumps that no longer perform at their pump curves;
  » Analyzing when to use variable speed vs. constant speed pumping;
  » Determining energy costs for different operating rules to find the best operational strategy;
  » Finding optimal pump operation schedules;
- Water safety and security: Prevent, detect, and respond to emergencies and customer complaints, by modeling emergency planning scenarios, real-time operations, and forensic analyses.
- Interoperability to run hydraulic and hydrology products stand alone or in up to four platforms: MicroStation, AutoCAD, ArcGIS, and PowerCivil; no other modeling software product lets users share models across different software platforms within a single product.

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○ Option to run on this platform is available for an additional fee

Conserve Water, Control Water Loss With Bentley’s Water Software

Bentley’s integrated water software helps engineers improve customer service, reduce nonrevenue water, and generate a comprehensive and proactive plan to manage water loss strategically. The leakage detection technology used by the WaterGEMS’ Darwin Calibrator module received a Project Innovation Award from the International Water Association.
Multi-Discipline Plant Design

Treatment plant design is a multidisciplinary problem, often spread across many offices. Bentley solutions provide all the necessary tools to design a treatment plant from the initial site grading to 3D visualization of the final design in a fully managed, collaborative team environment. Bentley’s plant, structural, and building applications are used together with ProjectWise around the world on projects ranging from small retrofits to existing facilities to large greenfield facilities.

Today’s best in class treatment facility is at the forefront of environmental impact design, delivering minimal (to zero) energy footprint, zero emissions, 100% water recycling (zero water usage) as well as minimizing visual impact. Bentley’s users are delivering such best in class plants using a wide range of integrated applications for centralized data management, 2D functional design, multidisciplinary 3D plant modeling, design analysis and simulation, and visualization and reporting.

Benefits

This solution models and manages not only graphics, but also information — information that allows the automatic generation of drawings and reports, design analysis, schedule simulation, facilities management, and more — ultimately enabling the construction team to make better-informed decisions.

Collaborative information and visualization workflows are central to realizing innovation within successful alternative delivery projects such as design-build and Construction Management (CM) At-Risk. Bentley’s 3D visualization and design review applications allow the entire project team to undertake design reviews directly from the multidisciplinary digital plant models. Design files can also easily be shared with owners, consultants, fabricators, and contractors using 3D PDFs.

Importantly, Bentley’s leadership in BIM (Building Information Management) ensures that plant and building information serves design-build teams through all phases, from design into construction and beyond facility hand-over into plant operations.

Project Examples

“This design/build project developed a water recovery treatment system that recycles 80 percent of the production wastewater from a snack-food facility to deliver water that meets federal drinking water standards. CDM proposed a design alternative that saved $2 million from the original planned treatment system and still met the aggressive 16-month delivery schedule. The ability to produce 3D designs with 4D data enabled the team to deliver a more cost-effective solution and dramatically reduced workflow inefficiencies. The collaborative, integrated environment made it possible to compress the design schedule to four months. The facility’s 4D model will support efficient operations, asset management, and knowledge transfer for generations to come.”

– Excerpt from Casa Grande (Arizona) Water Recovery and Reuse Project case study – CDM, United States

“As part of a five-year £3 billion asset management plan, joint venture partners Galliford Try, Costain, Atkins, teamed with United Utilities to develop the £13.6 million Wigan wastewater treatment plant. The biological aerated flooded filter improved process flexibility and compliance with tighter standards. Using MicroStation, Bentley Navigator, and AutoPLANT, Atkins modelers created each element in various configurations to enable designers to refine the layout for cost-effective operation and sustainability. The software allowed designers to quickly and easily review equipment layouts, analyze possible pipe work clashes, and assess lifting and maintenance issues. As a result of constructability reviews, costs were forecasted to be 15 percent below budget.”

– Excerpt from Wigan Q Project: Wastewater Treatment Plant case study – Atkins Water and Environment, United Kingdom
**Reference Books**

Bentley Institute Press reference books are an essential component of any water-resource professional’s library, and are recognized as a leading source for explaining complex concepts in clear, easy-to-read language.

These are not how-to guides for using software. They teach the concepts of applying hydraulic models and provide practical guidance based on the experiences of industry experts.

> www.bentley.com/Books

**Bentley Institute Press Water and Wastewater Network Analysis and Design books include:**

- Computer Applications in Hydraulic Engineering
- Stormwater Conveyance Modeling and Design
- Advanced Water Distribution Modeling and Management
- Wastewater Collection System Modeling and Design

**Training and Learning**

The Bentley Institute develops and delivers accredited professional training programs that help busy infrastructure professionals stay competitive and increase productivity. Through a unique blend of theory, software instruction, and practical know-how, our industry-expert instructors teach water professionals to confidently apply models in their day-to-day decision making.

> www.bentley.com/training

**Be Communities**

The Water and Wastewater community focuses on developing trends in asset and facilities management, environmental compliance modeling, 2D and 3D design, GIS, network modeling, and enterprise integration. Participants include individuals from global consulting engineering firms, major municipalities, and leading utilities, and their discussions center on the application of technology to achieve savings and efficiencies in engineering processes, minimize environmental consequence, preserve public capital investment, and enhance the level of service of costly but necessary water infrastructure.

> http://communities.bentley.com/Water

**Support, Maintenance, and Subscriptions**

Bentley’s portfolio of subscriptions encompasses a range of subscriptions to meet the needs of users in any size of organization – from individual infrastructure professionals in small firms to large project teams in global organizations.

A Bentley SELECT® subscription helps organizations lower the total cost of ownership for Bentley software by providing flexible licensing options, 24/7/365 assisted support, and anytime software upgrades all for a fixed annual fee per license.

> www.bentley.com/SELECT

The Enterprise License Subscription helps large, multi-office, and global organizations gain significant operational and competitive advantage, reduce annual software costs, and enjoy unrestricted access to a comprehensive software and learning portfolio - all for a single annual fee.

> www.bentley.com/ELS

The Enterprise License Subscription for Municipalities helps local governments maximize budgets and resources, and improve taxpayer services. Subscribers access a comprehensive software portfolio and the Bentley LEARN® training subscription for an annual fee based on population size.

> www.bentley.com/ELSM

The Passport Subscriptions are an affordable alternative to buying software for architectural, engineering, and mapping professionals. Each unique Passport Subscription includes a discipline-specific portfolio of software products and training courses for different types of project work.

> www.bentley.com/waterpassport
Bentley Water and Wastewater Offerings:

Water Distribution
- HAMMER
- WaterCAD
- WaterGEMS
  - Darwin Calibrator*
  - Darwin Designer*
  - Darwin Scheduler*
  - Skelebrator*
  - SCADAConnect*
  - Pipe Renewal Planner*

Wastewater Collection
- SewerCAD
- SewerGEMS

Stormwater Systems
- CivilStorm
- StormCAD
- PondPack
- CulvertMaster
- FlowMaster
- HEC-Pack

Cost Estimation/Design Comparison
- Bentley Expert Designer

Asset and Facilities Management
- Bentley Water
- Bentley Wastewater
- Bentley Geo Web Publisher
- Bentley Geospatial Server
- Bentley PowerMap Field
- Bentley sisNET

Treatment Plant
- AutoPLANT Piping
- AutoPLANT Equipment
- AutoPLANT P&ID
- ConstructSim
- OpenPlant
- PlantSpace Piping
- PlantSpace Equipment
- PlantSpace P&ID
- BIM product line
- PlantWise
- promis•e

* These modules are included in WaterGEMS and available for WaterCAD for an additional fee.