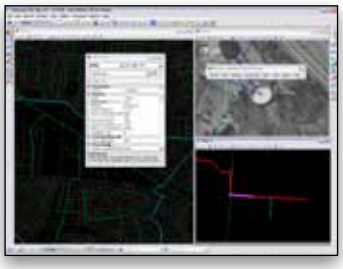
PRODUCT DATA SHEET

HAMMER®

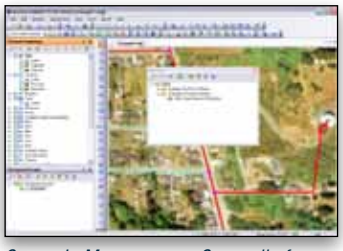
TRANSIENT ANALYSIS AND MODELING

If left unchecked in a water or sewer system, transient pressures can cause catastrophic damage to pipes and equipment, risk the safety of operators, allow intrusion of dangerous contaminants into the system, and interrupt service to customers. Over time, increased wear and tear on pipes and pumps as a result of hydraulic transients can lead to premature failure.

Updated User Interface: The HAMMER graphical user interface provides greater flexibility and a better user experience.



Support for Multiple Platforms: HAMMER can run on any of 4 different platforms: MicroStation, ArcGIS, AutoCAD and Stand-Alone



Scenario Management: Store all of your different 'whatif' scenarios in one model file using the new Scenario Management feature.

The most cost-effective approach to control transients is to perform a transient analysis to locate trouble spots and determine appropriate surge control strategies. Used successfully on high-profile projects for more than 15 years, HAMMER® puts the power to perform this critical analysis in the hands of water system professionals.

Proven transient analysis algorithm

HAMMER uses the Method of Characteristics (MOC) - the benchmark standard and the most rigorous and robust algorithm for hydraulic transient flow analysis.

Unlike algorithms like the Wave Plan Method (a.k.a. the Wave Characteristic Method) that compromise the fidelity of solutions by computing results only at junctions, the MOC computes results at intermediate points along the pipeline, accurately capturing critical outcomes (such as mid-pipe negative pressures) that could otherwise be overlooked.

One product. One model file. Four supported platforms.

HAMMER users enjoy the power and versatility afforded by working across CAD, GIS, and stand-alone platforms while accessing a single, shared, project data source. With HAMMER, utilities and consultants posses built-in support for four interoperable platforms, all packaged together in a single product:

- Windows stand-alone for ease of use, accessibility, and performance
- ArcGIS for GIS integration, thematic mapping, and publishing
- MicroStation® for bridging geospatial planning and engineering design environments, and
- AutoCAD for convenient CAD layout and drafting

Model building and management made easier

With HAMMER you can build your network from scratch using simple drag-and-drop layout tools, or import your network data from EPANet.

Alternatively, engineers can leverage geospatial data, CAD drawings, databases, and spreadsheets to jumpstart the model building process. The included LoadBuilder and TRex modules help engineers allocate water demands and node elevations based on geospatial data helping them to avoid potential manual input mistakes and streamline the model building process. HAMMER also provides drawing and connectivity review tools to guarantee a hydraulically coherent model.

WaterCAD® or WaterGEMS® users can even open their WaterCAD or WaterGEMS models directly in HAMMER (or vice-versa), eliminating any import or conversion process.

HAMMER gives users the choice to use a built-in steadystate engine to automatically compute initial conditions, or enter steady-state data.

A wide range of hydraulic components

HAMMER allows you to precisely simulate the impact of a wide range of surge protection devices and rotating equipment.

The user can select from more than 20 devices and perform an unlimited number of operating scenarios to develop the most appropriate strategy for surge mitigation.

Result interpretation tools

The analysis and data visualization tools in HAMMER allow you to capture fast-moving transient phenomena, determine their impact on your system, and select the most appropriate surge protection equipment for the job.

Thematic mapping, interactive VCR-style animation, and contour plots, and a host of report-ready graph and profile options provide you with the information you require in a format that makes sense.

HAMMER SYSTEM REQUIREMENTS

Processor:
Pentium III at 1 GHz (recommended: Pentium IV or Athlon XP – 2+ GHz)

Operating System:
Windows Vista, Windows XP, and Windows Server 2003

Memory:
256 MB (512 MB recommended)

Hard Disk:
200 MB of free storage space, with additional room for data files (500 MB or more recommended)

Display:
1024 x 768 resolution, 256 colors

Platform pre-requirements:
Stand-alone: none; ArcGIS: 9.3; MicroStation: V8i; AutoCAD: 2009

WaterGEMS/WaterCAD integration requirements: WaterGEMS V3 or higher, WaterCAD V7 or higher

Support for older platform software versions is available if required. Contact your Bentley representative for details.

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

HAMMER AT-A-GLANCE

Interface and graphical editing

- Stand-alone Windows interface included
- ArcGIS-platform support included (ArcMap license required)
- AutoCAD-platform support included (AutoCAD license required)
- MicroStation-platform support included (MicroStation license required)
- Element morphing, splitting, and reconnection
- Scaled, schematic, and hybrid environments
- Automatic element labeling
- Unlimited undo, redo
- Element prototypes
- User data extension
- Aerial views and dynamic zooming
- Named views manager
- Image, CAD, and GIS background-layer support

Interoperability and model building

- Complete compatibility with WaterCAD/WaterGEMS
- Bentley Water import
- EPANet import/export
- Bi-directional synchronized connections: Spreadsheet, database, ODBC, Shapefile, Geodatabase, Geometric network, and SDE support
- Polyline-to-pipe conversions from DXF files
- SCADAConnect available (for an additional fee) for live data connections
- ProjectWise compatibility
- Automatic demand allocation from geospatial data
- Geospatial demand allocation from customer meters and lump-sum geospatial data
- Geospatial-based water-consumption projection
- Daily, weekly, monthly, and superimposed patterns
- Unaccounted-for water and leakage estimation
- Composite demands with global editing
- Area, count, discharge, and population-based loading
- Pipe-length-based demand loading
- Elevation extraction from DEM, TIN, shapefiles, CAD drawings, and surfaces

Model management

- Unlimited scenarios and alternatives
- Active topology
- Global attribute tabular editing
- Sorting and persistent filtering on tabular reports
- Dynamic and static selection sets
- Customizable engineering libraries
- Global engineering-units management
- Sub-model management
- Network Navigator for automatic topology review and connectivity consistency
- Automatic element validation
- Automated model skeletonization
- Complete flexibility for project options (pressure wave speed, liquid specific gravity and vapor pressure, and run duration)

Hydraulics

- Methods of Characteristics for transient analysis
- Wave speed calculator
- Built-in steady-state and extended period simulation engines
- Transient force computation
- Turbine Modeling: load acceptance and rejection
- Three types of friction methods (steady-state using Hazen-Williams or Darcy-Weisbach friction coefficients, quasi-steady, and unsteady friction methods)
- Rule-based or logical controls
- Variable-speed pumping

Results presentation

- Thematic mapping
- Advanced dynamic profiling
- Contour plots
- Profile plots along a path
- Time history graphs at a point
- Synchronized maps, profiles, and point histories visualization
- Advanced tabular reporting with FlexTables

Hydraulic elements

- Reservoir
- Pump: shut down after delay. constant speed (no curve), constant speed (with curve), variable speed
- Turbine
- Pressure regulating valve
- Flow sustaining valve
- Loss element (inc orifice)
- Sprinkler
- Check valves
- Gate valve
- Globe valve
- Butterfly valve
- Needle valve
- Ball valve
- User-defined Valve
- Air valve: single-acting, double-acting, slow-closing, triple-acting
- Discharge to atmosphere
- Dead end
- Constant flow draw-off
- Periodic head/flow

Transient sources

- Valve closure (including partial closure) & opening
- Pump, controlled shutdown, trips, startup
- Rapid demand change; Rapid pressure change
- Multiple transient sources supported simultaneously

Surge protection devices

- Surge tank: open, spilling, one way, variable area, differential, with orifice, with bladder.
- Hydropneumatic Tank (air chamber)
- Pressure relief valve
- Surge anticipation valve
- Rupture disk