OpenFlows™ WaterGEMS®

Water Distribution Modeling and Management

OpenFlows WaterGEMS is a hydraulic modeling application for water distribution systems with advanced interoperability, geospatial model building, optimization, and asset management capabilities. From fire flow and water quality analyses to energy consumption and cost management, OpenFlows WaterGEMS provides an easy-to-use environment for engineers to analyze, design, and optimize water distribution systems.

SUPERIOR INTEROPERABILITY AND MODEL-BUILDING CAPABILITIES

With OpenFlows WaterGEMS, you can perform modeling inside of CAD or GIS, or by using stand-alone platform. All environments share a single project data source, so you can switch between them as preferred. Interoperable platforms include:

- Windows for ease of use, accessibility, and performance.
- ArcGIS Pro and ArcMap for GIS integration, thematic mapping, and publishing.
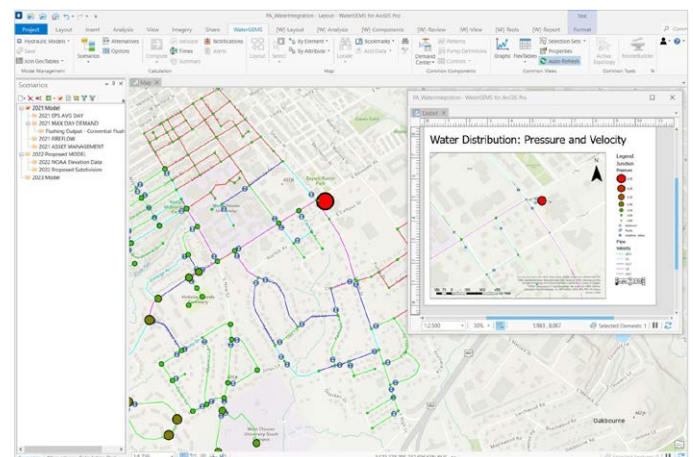- MicroStation and AutoCAD for CAD layout and drafting.

OpenFlows WaterGEMS enables you to leverage geospatial data, CAD drawings, databases, and spreadsheets to streamline the model-building process. Synchronized database connections, geospatial links, and advanced model-building tools connect with widely used digital data formats. The included LoadBuilder and TRex modules help you assign water demands and node elevations based on geospatial data found in shapefiles, geodatabases, various types of DEMs, and CAD drawings. Drawing and connectivity review tools help ensure a hydraulically coherent model. Skelebrator® automatically reduces network complexity while maintaining hydraulic equivalence. A newly streamlined Controls Editor provides a tabular format for simplified hydraulic control creation and management.

OPTIMIZED MODEL CALIBRATION, DESIGN, AND OPERATIONS

OpenFlows WaterGEMS includes state-of-the-art genetic algorithm optimization engines for automated calibration, leak detection, design, rehabilitation, and pump operations. Darwin® Calibrator evaluates millions of possible solutions to let you quickly find a calibration hypothesis that best matches measured flows, pressures, and on/off status, empowering you to make reliable decisions based on accurate hydraulic simulations of the real world. Leak detection capabilities can help to identify the most likely locations of leakage in the network. The SCADAConnect® module lets modelers automatically acquire supervisory control and data acquisition (SCADA) data, creating a real-time system simulator that accurately represents current system conditions. Results can be published to a utility's existing SCADA control room screens, helping to forecast operating conditions and potential issues. Darwin Designer automatically finds maximum benefit or minimum cost designs and rehabilitation strategies based on available budget, construction cost, and pressure and velocity constraints.

Users can analyze energy consumption to identify the most energy-efficient pump scheduling strategy. Darwin Scheduler optimizes the operations of fixed- and variable-speed pumps as well as tank storage to minimize energy usage or energy cost based on pressure, velocity, pump start, and tank level constraints. Energy costs can be aggregated across pumping stations and can factor in complex tariffs as well as nonmodel-related energy costs to perform net present value analyses of their operating scenarios.

OpenFlows WaterGEMS runs in its stand-alone platform, and can also integrate with ArcGIS Pro, ArcMap, MicroStation, and AutoCAD.

SYSTEM REQUIREMENTS

MINIMUM: 800x600 resolution, Windows 10, 8 GB RAM

RECOMMENDED: 1920 x 1080 resolution, Windows 10, 16 GB RAM

PLATFORM REQUIREMENTS: Stand-alone application and runs within ArcGIS Pro, ArcMap, MicroStation, AutoCAD, See: Platform Compatibility

OpenFlows WaterGEMS At-A-Glance

INTEROPERABILITY, INTERFACE, AND GRAPHICAL EDITING

- Runs from within these compatible platforms:
  - Stand-alone Windows
  - ArcGIS Pro and ArcMap (Esri license required)
  - AutoCAD (AutoCAD license required)
  - MicroStation
- Streamlined Controls Editor in table format
- Unlimited undo and redo
- Element morphing, splitting, and reconnection
- Merge nodes in close proximity tool
- Automatic element labeling
- Scaled, schematic, and hybrid environments
- Element prototypes
- Aerial view and dynamic zooming
- Named views library
- Multiple background-layer support
- Bing Maps background support
- Seamless compatibility with OpenFlows WaterCAD® and OpenFlows HAMMER®

HYDRAULICS, OPERATIONS, AND WATER QUALITY

- Steady-state and extended-period simulations
- Constituent concentration analysis
- Multispecies water quality analysis
- Tank mixing analysis
- Water age analysis
- Water quality batch run
- Criticality analysis for pipes and valves
- Fireflow analysis
- Rule-based or logical controls
- Variable-speed pumping with option to use APEX (Automatic Parameter Estimation eXtension)
- NPSH analysis
- System head curves
- Leakage and sprinkler modeling
- Water loss analysis
- Pressure-dependent demands
- Conventional and unidirectional flushing simulations
- Source tracing
- Valve modeling
- Air release valve element
- Top fill tank element
- Combination pump curves
- Carbon emission calculation
- Optimization of pipe renewal with Pipe Renewal Planner
- Override of pump and valve controls using historical SCADA data
- Real-time modeling
- Emergency response simulations for pipe breaks, power outages, fires, and pipe shutdowns
- Pressure zone management
- Support for district metered areas (DMA) design

MODEL BUILDING AND DATA CONNECTION

- DGN, DXF, spreadsheet, database, and ODBC connections
- Shapefile, geodatabase,* Geometric Network,* and SDE* connections (*when running within ArcGIS)
- Oracle Spatial support
- GIS-ID property to maintain associations between records in the data source/GIS and elements in the model

- SCADAConnect unlimited signal pack for live data connections to and from SCADA systems
- Graphical SCADA element
- Customer meter element
- Lateral link (no need to split pipes)
- Automatic demand allocation from geospatial data
- Geospatial demand allocation from customer meters
- Demand allocation from lump-sum geospatial data
- Geospatial-based water consumption projection
- Daily, weekly, monthly, and superimposed patterns
- Unaccounted for water and leakage estimation
- Composite demands global editing
- Area, count, discharge, and population-based loading
- Pipe length-based demand loading
- Elevation extraction from DEM, TIN, and shapefiles
- Elevation extraction from CAD drawings and surfaces
- Series, parallel, branch-trimming, and multicriteria automated skeletonization of pipes
- Skeletonization support for isolation valves
- User data extension, including formula-based
- Model sync in/out, update a model or sync out to an external file

MODEL MANAGEMENT

- Unlimited scenarios and alternatives
- Comprehensive scenario management
- Global attribute tabular editing
- Automated model skeletonization
- Custom engineering libraries
- Sorting and persistent filtering on tabular reports
- Statistical analysis from tabular reports
- Dynamic and static selection sets
- Local and global engineering units management
- Sub-model management
- Drawing review tools for connectivity consistency
- Automatic topology review
- Orphaned node and dead-end pipe queries
- Change tracking

RESULTS PRESENTATION

- Thematic mapping with property-based color coding, symbology, and annotations
- Dynamic, multiparameter, and multiscenario graphing
- Scenario and element comparison
- Shapefile contouring
- Advance profiling
- Advanced tabular reporting with FlexTables
- Creation of Google Earth (KML) files
- Video recording of result animation
- Customizable reports

OPTIMIZATION (USING GENETIC ALGORITHM)

- Automated model calibration with Darwin Calibrator
- Identify leak locations with Darwin Calibrator
- Optimized design and rehabilitation with Darwin Designer
- Optimized pump scheduling with Darwin Scheduler

ENERGY AND CAPITAL-COST MANAGEMENT

- Energy cost analysis
- Capital cost analysis
- Pump and turbine energy analysis