Bentley®

Product data sheet

AutoPIPE®

Design and pipe stress analysis application

Bentley AutoPIPE is a pipe stress analysis application for calculating piping stresses, loads, and deflections under static and dynamic conditions. The software features a user-friendly modeling environment that enables users to swiftly create a virtual model, analyze results, implement effective modifications, and generate project documentation. AutoPIPE offers specialized functionalities designed for the comprehensive analysis of buried pipelines., operational (hot) clash detection, wave loading, fluid transients, and nonmetallic piping, as well as time-saving integration with other Bentley applications and third-party applications, such as SmartPlant, Aveva E3D, Autodesk Plant 3D, and PDS. AutoPIPE employs a genetic algorithm powered by AI to optimally design a pipe support system. This approach ensures that design requirements are met while providing the most cost effective solution, without compromising on quality or safety.

Unique, object-based graphical user interface

The graphical user interface enables users to easily create and modify the pipe stress model. Users can simply point and click to insert, modify, or delete components. With AutoPIPE's graphical select options, users can modify parameters across an entire range of points with one command. Moreover, users can check, sort, or make changes to the input data quickly, using interactive grid spreadsheets to import Excel files, and display geometric and loading data in color plots for easier review and checking.

AutoPIPE features what-if analysis, quickly iterating through design scenarios. Once analyzed, users can click on the graphical model and instantly view stresses, deflections, forces, and moments. Color-coded results and pop-up windows enable users to identify and investigate critical areas without reviewing all the batch output data. View up to 1,000 load combinations with the on-screen results grid, which provides interactive filtering, column ordering, sorting, and grouping, as well as user-defined conditional formatting for better presentation and review of results.

Advanced analysis features

With AutoPIPE's Genetic Algorithm Support Optimizer feature, a significant amount of design time and thousands of dollars can be saved while achieving the most optimized support configuration without sacrificing safety and quality. The application quickly evaluates multiple design alternatives and provides you with optimal support configuration. AutoPIPE includes 25 international piping codes and built-in ASME B31J for more accurate flexibilities/SIF for tees. It also features advanced capabilities, such as pipe/structure interaction, fluid transient analysis, advanced nonlinear load sequencing with support gaps and friction, jacketed piping, and a flange analysis module (including ASME VIII Div 1 and 2 and EN1591). In addition, export the model to AutoPIPE Vessel for local stress calculations.

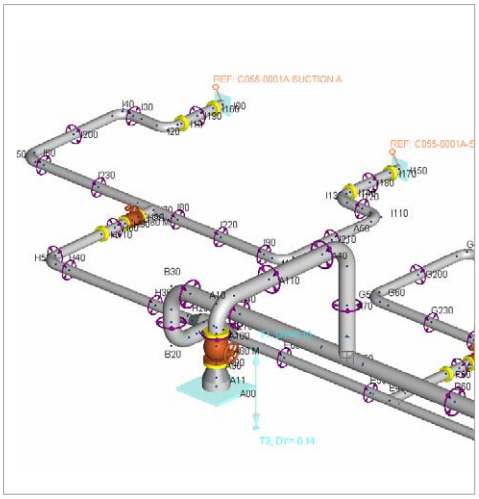
Interface with other Bentley applications

AutoPIPE provides integrated design between piping and structural analysis. It automatically transfers pipe support loads and imports complete structures to and from Bentley STAAD.Pro® and SACS™, saving design time and providing safer, more realistic engineered designs. AutoPIPE allows you to import 3D plant design CAD models from many other Bentley applications to save resource hours and ensure accurate pipe stress models.

Models and data can be read by Bentley MicroStation® alongside any CAD model to support early engineering decision-making, perform 3D hot-clash detection, and reduce design iterations. AutoPIPE also generates fully dimensioned stress isometrics with custom data and comments highlighting pipe stress changes. AutoPIPE is integrated with ProjectWise® for global collaboration of engineering and CAD data files on major projects.

Quality assurance

AutoPIPE undergoes the most demanding quality and testing regime. Our programs and procedures follow the requirements of 10CFR Part 50 Appendix B, 10CFR Part 21, and ASME NQA-1, qualifying AutoPIPE for use on the design of nuclear power installations.



Determining the optimal arrangement for pipe supports automatically using Support Optimizer.

System requirements

Minimum: Microsoft Windows 10 or 11 64-bit Professional, 8 GB RAM, 4 GB storage (not including Restore Point space requirements), any industry-standard video card that supports Open GL 3D graphics.
Recommended: Adobe Acrobat Reader 10.0 or higher.

AutoPIPE at-a-glance

Modeling

- Single line, wire-frame, and solid render drawing modes
- CAD style single, double, or quad view ports
- Vertical axis (Y or Z) can be switched on the fly
- On-screen distance calculator for accurate coordinate checks
- Built-in valve actuator for accurate valve modeling
- Segment management: reverse, split, join, and re-order segments
- Pipe line class and line numbers
- Connectivity checker to avoid model disconnects
- English, metric, SI, and user-defined units
- Extensive ANSI/ASME, DIN, EN, JIS, GD, GB, GOST, and GRP/FRP standard piping component and material libraries
- iTwin® Design Review
- Structural steel modeling using structural databases for 17 countries
- Expansion joint modeling
- Color graphics for review of input load and geometry information
- Python scripted Data API for creation of Binary model files.
- Model import from AutoPLANT®, OpenPlant®, MicroStation, Excel, AutoCAD, Intergraph PDS, SmartPlant, Aveva E3D, CADWorx, SolidWorks, Inventor, Plant 3D, and CATIA
- Bidirectional integration with STAAD.Pro and SACS
- Machine learning support arrangement optimization
- Model geometry data export into OpenPlant, MicroStation, and AutoCAD
- Automated ring main wizard
- Automatic ASCE soil calculator
- Automatic stress isometric generation in DXF, DWG, or DGN formats with engineers' mark-ups

Dynamic analysis

- Time history dynamic analysis with ground motion
- Mode shapes, accelerations, and natural frequencies
- Harmonic load analysis
- Uniform and MSRS response spectrum and shock spectra
- Multiple spectrum enveloping
- NRC spectra and code case N411 (PVRC) damping and spectra
- Automatic mass discretization
- Missing mass and ZPA correction
- NUREG.CR-1677, CR-6441, and CR-6049 benchmarks

Piping codes

- ASME B31.1, B31.3, B31.4, and B31.8 (support for multiple years)
- ASME Sec III, NB, NC, and ND (multiple year from 1972)
- ASME B31.12 IP / PL Hydrogen
- European Standards EN13480 metallic (multiple years), EN14692 nonmetallic
- ASME B31.J (2017 and 2023) SIFs and Flexibilities
- CAN/CSA-Z662 (multiple years)
- ASME B31.4 Ch IX, B31.8 Ch VIII, DNVGL-ST-F101, CSA-Z622 offshore (multiple years)

Analysis

- ASME B31J calculations for improved SIF values
- Unlimited static analysis to examine different loading scenarios, including hot modulus for any combination of 100 thermal, 30 seismic, 10 wind, and 50 dynamic load cases
- Automatic generation of wind profiles per ASCE and UBC guidelines
- Wave loading and buoyancy for offshore applications
- Hydrotest analysis with locking spring hangers
- Linear and nonlinear hydrotest analysis
- Fluid transient utilities for water and steam hammer plus relief valve load analysis
- Automatic spring hanger sizing from 27 manufacturers
- Automatic flange analysis to ASME VIII Div 1 and Div 2, ASME III App XI, ANSI Check, and EN1591
- State-of-the-art nonlinear support gap, friction, yielding, and soil interaction with advanced features of seismic wave propagation, overburden and settlement loads, and stresses to ASCE, AWWA, and ASME
- Thermal stratification bowing analysis
- Thermal transient analysis (TTA), fatigue, and high energy/leakage design for ASME Class 1
- Seismic static and response spectra load generator to IBC, Euro, ASCE, Indian, Spanish, Mexican, and Chinese standards
- Ec/Eh ratio applied to expansion stresses for any piping code
- Nozzle flexibility analysis per API 650 App. P ASME Class 1, WRC 297, and Biljaard methods

Input and results

- Results saved to SQLite Results Database for post-processing
- Report Manager driven by SQLite Results Database
- Custom Microsoft Excel and Word reports and text reports
- Automatic or user-defined load combinations grid
- Search and filter with Google AI Edge's Model Explorer
- Automated batch processing
- Maximum intermediate stresses
- Reference point for manufacturer equipment loading reports
- Rotating equipment calculations to API 610, NEMA and API 617, and user-defined standards
- General purpose non nuclear fatigue available, using principle stresses
- Results can be filtered and sorted by stress, deflection, or load criteria
- Results grid with conditional formatting, filtering multiple columns, and grouping

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Find out more at **Bentley.com**
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