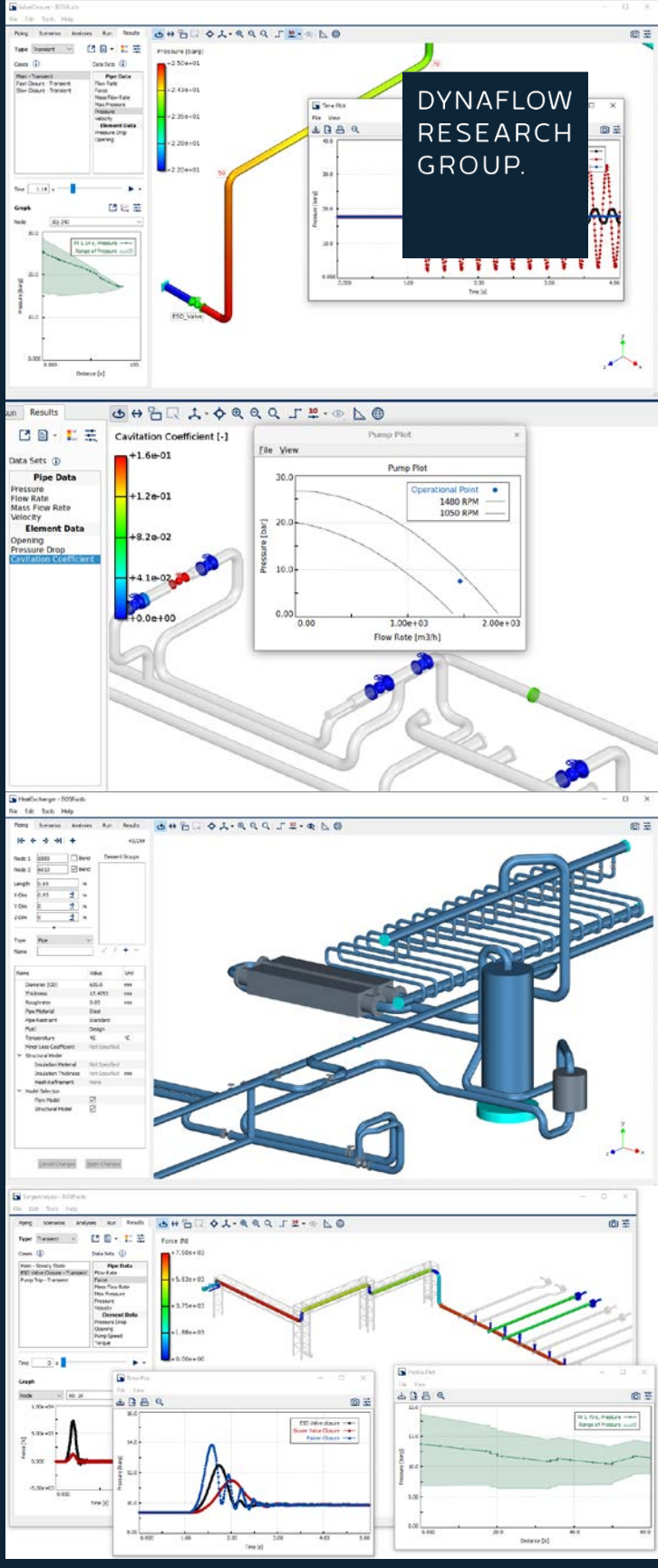
BOSfluids: Surge Analysis Simplified



Software Brochure | **2025**

BOSfluids is the **most intuitive and efficient tool** for the analysis of surge, water hammer, and general flow conditions within piping systems.

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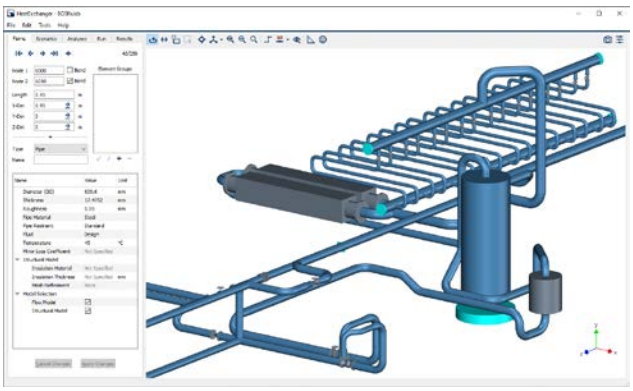
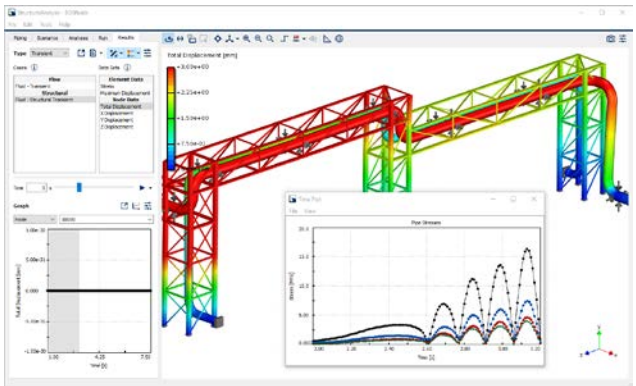
Surge Analysis Tool of Choice





BOSfluids® enables you to perform surge analyses in an interactive and visual way, giving you lots of opportunities to explore your problem space quickly and efficiently. BOSfluids® is more than a surge analysis tool as it can simulate general steady-state and transient flow conditions in liquid or gas-carrying piping systems. In addition, it enables you to assess the effects of fluid-induced forces acting on the piping system through a structural solver interface.

Water Hammer And Pressure Surges

Common problems in the Oil & Gas, Chemical, Power, and Water industries involve water hammer and pressure surges that are caused by transient events like valve closure or pump failures. These phenomena often play a role when evaluating the integrity of jetty on- and off-loading systems, (deluge) fire water systems, cooling water systems, and oil transport lines. BOSfluids® uses a clear and detailed interface designed for strong interaction with frequently used pipe stress software packages. More than 35 years of experience with water hammer and surge problems has been incorporated in BOSfluids® and it is still being continuously updated to improve its simulation capabilities.

Fast Flow Solvers

BOSfluids® is equipped with very fast flow solvers with the capability to run multiple scenarios on multiple processor cores in parallel. The solvers run in the background, so you can start reviewing the analysis results from the finished scenarios while other scenarios are being executed. The steady-state flow solver is based on a nonlinear, implicit solution method that takes the compressibility of gases into account, and also applies automatic refinement to obtain higher accuracy for gas-filled systems.

The transient solver uses the method of characteristics to solve the time-dependent, non-linear flow equations robustly and efficiently. By applying a novel grid coarsening method, it can execute transient analyses of very large piping systems in a short time. It implements multiple cavitation models for simulating the formation and collapse of vapor cavities in piping systems.

Intuitive User Experience

The BOSfluids® user interface streamlines the procedure for input, analysis, and post-processing of 2-D and 3-D piping models. The model is created by defining nodes and elements that are displayed in the interactive 2-D or 3-D viewer. A collection of special flow elements enables you to build realistic models of actual piping systems. These flow elements include reducers, orifices, valves, check valves, air valves (vacuum breakers), safety relief valves and burst disks, regulator valves, pumps, surge vessels, and storage tanks. BOSfluids® also offers an element for simulating tube rupture in heat exchangers.

Digital Twin

With digital twin technology quickly advancing, BOSfluids® stands out by seamlessly integrating into this concept. Indeed, BOSfluids® is one of the only solutions on the market that is able to construct detailed 3-D piping models directly from the data stored in a digital twin. This not only saves time, but it also reduces the scope for modelling errors and helps you to correlate the predicted flow conditions with the actual piping system. BOSfluids® is therefore an efficient and future-proof software solution for simulating a wide range of flow conditions in sophisticated piping systems.

Extensive post-processing capabilities

Reviewing the fluid flow solution of a piping system can be rather complex. BOSfluids® helps you with this task by offering a wide collection of tools, including 2-D graphs of pressure and flow rates, 3-D visualization of various data sets, animation of time-dependent results, reports, and line graphs.

Import and Export Features

Because BOSfluids® piping models are 3-D models, exchanging models with pipe stress packages is relatively straightforward. In particular, BOSfluids® provides a bi-directional interface with Hexagon's pipe stress analysis software CAESAR II®, eliminating redundant work processes and thereby improving the quality of both pipe stress and fluid flow calculations. BOSfluids® can also import models from various file formats, including Piping Component Files (PCF) and EPANET model files. In addition, the geometry of a BOSfluids® model can be updated from an external model.

Structural Solver Interface

BOSfluids® includes a structural solver interface that makes it possible to perform a structural analysis and to review the resulting stresses and displacements without leaving the BOSfluids® interface. This requires the availability of a supported structural solver such as ANSYS. If such a solver is not available, you can export the fluid-induced forces and perform the structural analysis in a pipe stress package such as Hexagon's CAESAR II® and Bentley's AutoPIPE.

FEATURES

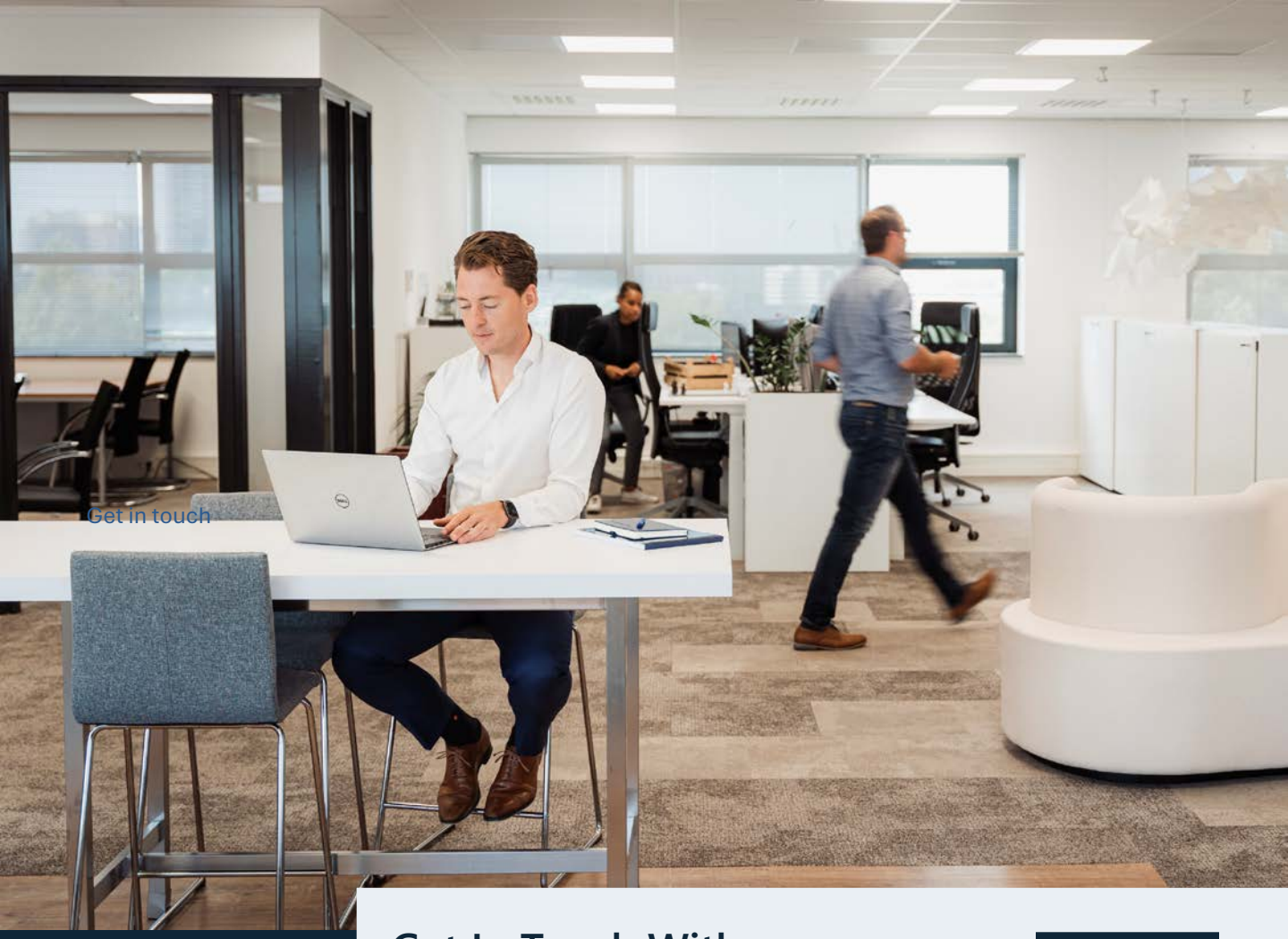
- ✓ Steady-state analyses
- ✓ Transient flow analyses
- ✓ Cavitation and vapor models
- ✓ Tube rupture model
- ✓ Component database for materials, liquids, gases, equipment, and pipe schedules
- ✓ Transient upset scenarios for pumps and (relief) valves
- ✓ Intuitive user interface
- ✓ 3-D piping models
- ✓ Interactive 3-D viewer
- ✓ Structural solver interface
- ✓ CAESAR II® import & export
- ✓ Extensive post-processing capabilities
- ✓ Versatile and powerful scenario management

APPLICATIONS

- ✓ Water hammer events
- ✓ Cooling water systems
- ✓ Firewater systems
- ✓ Deluge systems
- ✓ Potable drinking water systems
- ✓ Buried and above ground piping
- ✓ Process and plant design
- ✓ Offshore systems Gas and LNG

Available Capabilities

Available Features	Steady	Transient
Model builder (number of items not limited)	Yes	Yes
Model importer (CII, Epanet, PCF, etc)	Yes	Yes
Scenario builder	Yes	Yes
2-D network viewer and modeler	Yes	Yes
3-D piping models and interface	Yes	Yes
Model properties viewer	Yes	Yes
Valves including valve operations	Yes	Yes
Water/gas hammer events	No	Yes
Pumps including operations	Yes	Yes
Pump Failure	No	Yes
Fluids, material and equipment database	Yes	Yes
Compressible fluids (gasses)	Yes	Yes
Incompressible fluids (liquids)	Yes	Yes
Run analyses on multiple cores	Yes	Yes
Control systems	Yes	Yes
Bill of Quantity report	Yes	Yes
Definition of custom data sets	Yes	Yes
Parametric analysis	Yes	Yes
Pressure and (quasi) steady flow analysis	Yes	Yes
Pressure surge analysis	No	Yes
Formation and collapse of vapor cavities	No	Yes
Cavitation Index prediction	No	Yes
Two phase flood and drain analysis	No	Yes
Combined fluid-structure analysis	No	Yes
Tube rupture analysis	No	Yes
Liquid flashing and choked flow	No	Yes
Hydrodynamic force calculation	No	Yes



Get In Touch With Our Expert Team Of Engineers

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