BOSfluids®

Surge analysis tool of choice

DYNAFLOW RESEARCH GROUP.

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 non-linear, 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 offer 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, 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.

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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

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.

ABOUT DYNAFLOW RESEARCH GROUP

Dynaflow Research Group (DRG) specializes in the advanced end of the engineering spectrum around the themes of Flow, Vibrations/pulsations, and Mechanical and Fiberglass Engineering. In these fields, DRG provides engineering consulting services, software, and training courses.

The engineers in our team at DRG regularly work on projects across a multitude of technical disciplines. We have a flexible working structure, which means that we can help you immediately. At DRG we are creative thinkers and we work closely together with you, to develop practical and economical solutions.
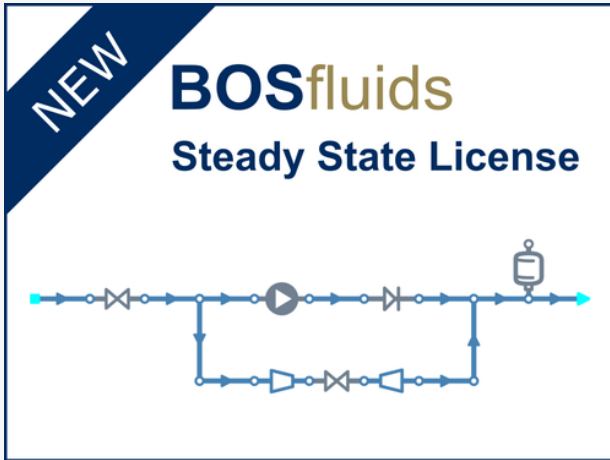
software@dynaflow.com
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LEARN MORE ABOUT BOSFLUIDS

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# BOSfluids®

LICENCE OPTIONS

The **steady-state license** gives access to the robust, fast, and accurate steady-state compressible flow solver that can handle systems filled with liquids or gases.

The full BOSfluids user interface is available, including the ability to build and view a piping model both as a 2-D network and as a 3-D model and the option to perform optimization runs using symbolic parameters.
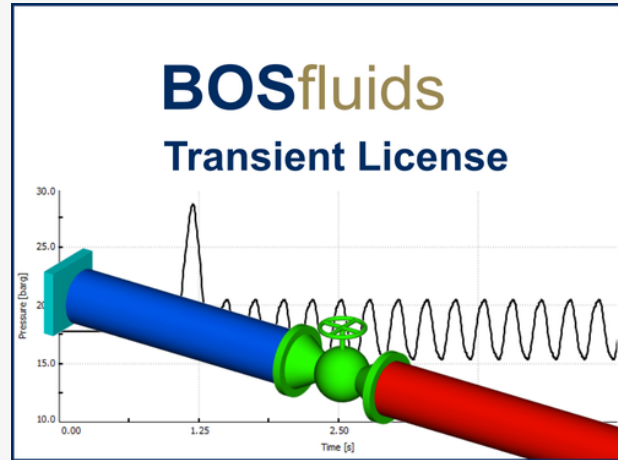
The **full transient license** continues to support all features of BOSfluids like pressure surge analyses, flood & drain, and fluid-structure interaction including the 2-D network viewer and the additional steady-state features.

Perform transient analysis with the fast transient flow solver and use the structural interface to analyze fluid-structure interaction using a third-party structural solver.

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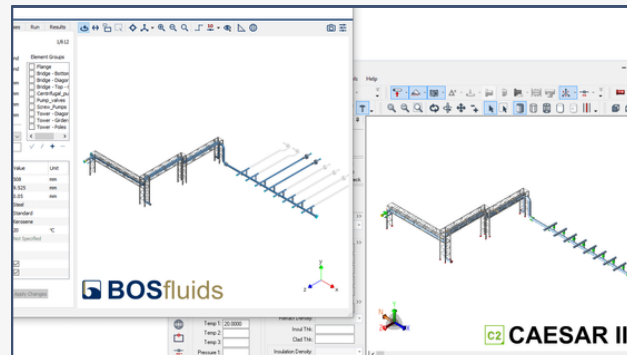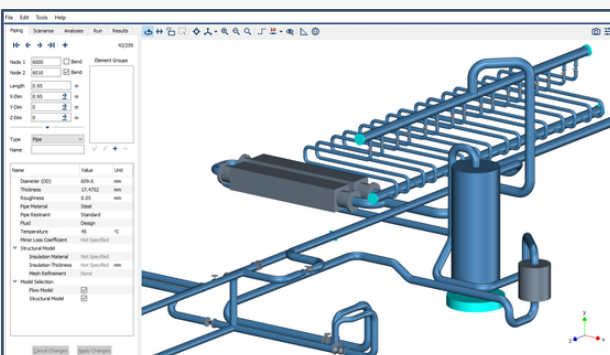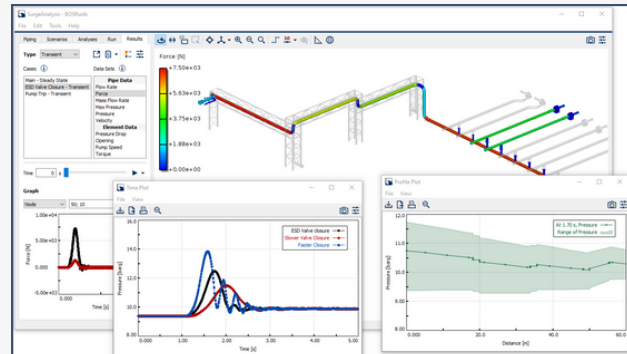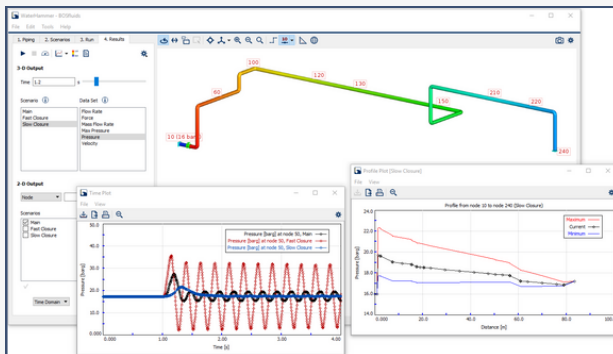
FEATURE OVERVIEW

Available Features	Steady	Transient
Model builder (number of items not limited)	✓	✓
Model importer (CII, Epanet, PCF, etc)	✓	✓
Scenario builder	✓	✓
2-D network viewer and modeler	✓	✓
3-D piping models and interface	✓	✓
Model properties viewer	✓	✓
Valves including valve operations	✓	✓
Water/gas hammer events	✗	✓
Pumps including operations	✓	✓
Pump Failure	✗	✓
Fluids, material and equipment database	✓	✓
Compressible fluids (gasses)	✓	✓
Incompressible fluids (liquids)	✓	✓
Run analyses on multiple cores	✓	✓
Control systems	✓	✓
Bill of Quantity report	✓	✓
Definition of custom data sets	✓	✓
Parametric analysis	✓	✓
Pressure and (quasi) steady flow analysis	✓	✓
Pressure surge analysis	✗	✓
Formation and collapse of vapor cavities	✗	✓
Cavitation Index prediction	✗	✓
Two phase flood and drain analysis	✗	✓
Combined fluid-structure analysis	✗	✓
Tube rupture analysis	✗	✓
Liquid flashing and choked flow	✗	✓
Hydrodynamic force calculation	✗	✓