PASS/HYDROSYSTEM Webinar

What’s new in PASS/Hydrosystem 4.4

Sergey Lisin
PASS Support & QA Engineer

18 March 2021
PASS Suite

The PASS software tools provide smart simulation & sizing tools for every piping and equipment engineer / designer

Company Overview

- > 50 years history
- > 3,000 active users worldwide
- Best in class modern methods, algorithms and software libraries
- Embedded knowledge and support/training from industry experts
- User-friendly interface and flexible CAD integration
- Affordable price and flexible licensing
Hydrosystem

Diameter selection, heat and hydraulic analysis of steady state flow for real liquids, gases, and multiphase mixtures in piping systems of any complexity

Piping Hydraulic & Thermal Analysis

• Broad Applicability
• Unsurpassed Usability
• Powerful Capabilities
• Flexible Configurations
• Widely Used
PASS/Hydrosystem  |  Experience and popularity

- First introduced in 1977
- Blessed by piping hydraulic world-known “guru” Idelchik
- Used by more than 600 companies worldwide
- Ideal tool for “day-to-day” operations in designing of any piping systems
PASS/Hydrosystem | Calculation capabilities

- Heat and hydraulic calculation of steady-state flow for:
  - Liquids
  - Real gases
  - Gas-liquid mixtures
  - Gas-liquid-liquid mixtures
  - Liquid-solid mixtures (a.k.a. ‘slurry’ flow)
- Surge analysis of transient liquid flow – waterhammer calculation
- Suitable for piping systems of any complexity
PASS/HydroSystem | Calculation capabilities

Different calculation tasks:
- Both "upstream" and “downstream” pressure drop calculation
- Flow distribution calculation
- Pipeline nominal size selection

Customizable reports with calculation results:
- Fluid properties
- Fluid velocities
- Pressure losses (friction, minor losses, static pressure drop)
- Heat losses (considering heat insulation etc.)
- Flow pattern (for multiphase flow)
- Pressure and temperature in any point in the pipeline
PASS/Hydrosystem | Flexible 3D graphic

- Full-featured pipeline 3D model representation
- Different graphic modes (isometric “one-line” drawing, solid representation, “simplified” drawing etc.)
- Raster background image support
- Calculation results representation right on the pipeline model
PASS/Hydrosystem | Broad Applicability

- Process Industry pipelines
  - Oil refinery and gas industry
  - Chemical industry
  - Metallurgy
  - Food industry
  - Power industry
  - many more
- Oil and Gas pipelines
- Utility network pipelines (heat, water, natural gas networks)
PASS/Hydrosystem
Advantages
PASS/Hydrosystem

Very simple and easy-to-use, suitable even for entry-level engineers and designers

New users can begin performing piping hydraulic and thermal analysis in days
PASS/Hydrosystem | Advantages

No limitations for pipeline complexity and/or length - every pipeline (including pipelines with loops, recycles etc.) can be calculated very quickly and easily.
PASS/Hydrosystem | Integration capabilities

PASS/START-Prof

PCF (Isogen)
- SmartPlant 3D
- CADWorx
- AutoPlant
- PlantSpace
- OpenPlant
- Autodesk Plant3D
- CADISON
- etc.

XML files
(neutral format)

PASS/HYDROSYSTEM

AVEVA PDMS and E3D

Autodesk Revit

DXF files
(AutoCAD, Microstation etc.)
PASS/Hydrosystem  |  Fluid properties & equilibria

- **STARS library**
  properties and phase equilibria calculation for over 1600 substances and their mixtures

- **WaterSteamPro library**
  water and steam properties and equilibria calculation basing on IAPWS-IF97 equations

- **GERG-2008 library**
  natural gas properties and phase equilibria calculation

+ integration with Simulis Thermodynamics and PVTSim
PASS/Hydrosystem | Pumps selection in Spaix
PASS/Hydrosystem | Surge calculation & view
PASS/Hydrosystem | Two-phase flow pattern map
PASS/Hydrosystem Configurations & Licensing
PASS/Hydro
- Isothermal steady state flow calculation

PASS/Surge
- Transient liquid flow (waterhammer) calculation

PASS/Multiphase
- Gas-liquid and gas-liquid-liquid flow calculation

PASS/Thermo
- Heat and hydraulic steady state flow calculation

PASS/NSS
- Pipeline optimal nominal sizes selection

PASS/Solid phase
- Settling “slurry” flow calculation

PCF
- Import of piping model from PCF files

Thermodynamic libraries
- Fluid properties and phase equilibria calculations (WSP, STARS, GERG-2008)

Spaix Quick&Easy
- Software for automatic pump selection (free for all Hydrosystem users)

Profile Plot
- Profile Plot in MS Excel
PASS/Hydrosystem | Flexible licensing

- **PASS/Hydrosystem Complete**
  For comprehensive hydraulic and thermal analysis and sizing (includes PASS/ADD Surge, PASS/ADD Multiphase & PASS/ADD Solid)

- **PASS/Hydrosystem Pressure & Heat**
  For single phase steady state flow hydraulic and thermal analysis

- **PASS/Hydrosystem Pressure**
  For single phase steady state flow hydraulic analysis

- **PASS/ADD Surge**
  For analysis of liquid transient flow

- **PASS/ADD Multiphase**
  For analysis of multi-phase gas-liquid flow

- **PASS/ADD Solid Phase**
  For analysis of settling slurry flow
What’s new in PASS/Hydrosystem 4.4
New improved model of centrifugal pumps trip and startup at surge analysis

- Based on famous ‘Suter curves’
- Considers all possible pump operation zones (pump mode, turbine mode, pump dissipation, turbine dissipation mode)
- Requires minimum data for simulation
New improved ‘Simulis Thermodynamics’ integration

- Simulis Thermodynamics calculator launching right from Hydrosystem
- More detailed thermodynamic model adjustment
- Automatic recalculation of pseudo-components from ‘STARS’ library to ‘Simulis Thermodynamics’
- Performance and stability improvements
Calculation of choked (and near choked) flow with phase transitions

- For pipes, pipe exits, reducers, sudden contractions/expansions etc.
- Allows more precise calculation of fluid inlet properties (P, T, x) at sonic velocities in pipeline
- Currently in ‘beta-testing’ mode but all types of phase transitions of ‘practical’ interest in pipelines are already implemented
PASS/Hydrosystem | What’s new version 4.4

Group operations with pipeline elements (branches, components)

• Allows to change piping geometry, location and other parameters for multiple components

• Works quickly even in large projects
New service for seeking and fixing user-made errors in piping geometry vertical projections

• Piping components vertical projections are very important at liquid, gas-liquid and slurry flow analysis (because of static pressure drop)
• Vertical mismatches in looped pipelines may cause significant inaccuracy of calculation or even convergence problems
• A new service tool is intended to solve this problem
A lot more improvements:

- The algorithm of elevation mismatches diagnostics in piping components elevation differences for looped pipelines has been changed – now the program shows a branch with mismatch instead of a circuit.
- Valves import from PCF files has been improved.
- Improvements have been made to the calculation of density for fluids containing oil fractions with high boiling point using ‘STARS’ library;
- The severe slugging two-phase flow prediction has been improved.
- Two-phase flow pattern diagram output has been improved.
- Flashing/condensing gas-liquid flow calculation (including ‘reverse’ analysis for unbranched pipelines) accuracy has been improved.
- Improvements have been made to the parameters selection service:
  - Added a dynamic view of the parameters selection progress (indicating the number of the current iteration and the current values of control parameters) which allows to evaluate the progress and convergence of the calculation more accurately;
  - Added the ability to interrupt the calculation with parameters selection.
- The diagnostic system of waterhammer analysis has been improved.
- Heat and hydraulic calculation algorithm for the rare case of laminar gas flow has been improved.
- Some minor errors and inaccuracies in the program have been fixed.
A new version is out in near days

- Don’t forget to download new version from our website [www.passuite.com/hydrosystem](http://www.passuite.com/hydrosystem)

- Turn on the automatic updates in Hydrosystem settings to get software updates

- If you’re not a PASS/Hydrosystem user, demand free trial on [www.passuite.com/trial](http://www.passuite.com/trial)
Thank YOU!

P: +7 495 225 94 32
F: +7 495 368 50 65
E: sales@passuite.com
W: www.passuite.com
Q&A

support@passsuite.com