

UniSim[®] Process Pipeline Modeler



The Challenge

Pipe is the most commonly used unit operation in a processing facility. It carries the flow of fluids and connects plant equipment from one to another. To truly understand the fluid behavior in the pipeline and optimize the pipeline design has a direct impact on the safety, efficiency, and productivity of any industrial process.

The Solution: UniSim Process Pipeline Modeler

UniSim Process Pipeline Modeler is a standalone simulation product within the UniSim Design Suite. It provides engineers an effective tool in the design and performance checking of un-branched pipeline systems carrying single-phase or two-phase (single or multi-component) fluids.

Benefits

UniSim Process Pipeline Modeler enables users to identify pressure losses and mass flow rates in un-branched pipeline systems, and optimize the pipeline size for available pumping power/pressure drop. The two-phase flow mapping offers engineers a means to quantify flow pattern and local conditions throughout a process pipeline taking account of overall configuration, and therefore verify the stability of flows regardless of pipe system topography. It ensures that the pipeline design and performance are best suited to the process needs for safety, efficiency, and maximized productivity.

Features

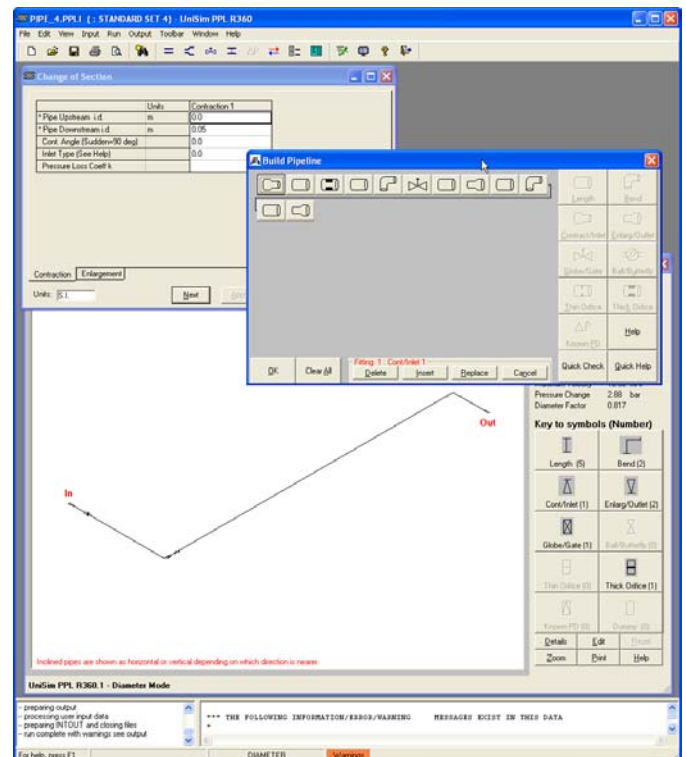
UniSim Process Pipeline Modeler can be used to simulate the behavior of single-phase and single or multi-component two-phase flashing fluids in pipeline systems. It can handle steady-state two-phase compressible flow for relief systems where fluid properties vary, including choking flow with single and multiple chokes. It allows users to

- Calculate pipe diameter with specified flow rate and allowable pressure drop
- Determine overall pressure drop for given mass flow rate and pipeline geometry

- Calculate pressure drop across each fitting and along the length of the pipe resulting in the sum pressure drop
- Estimate, at each calculation step, the flow regime for two phase flow
- Compute flow rate for specified pressure drop and pipe diameter, including critical mass flow rate for high velocity flow

Access multiple choke calculations applicable to safety valves and relief systems determining the number of choke locations which will occur and the resulting mass flow

UniSim Process Pipeline Modeler provides users a pipeline build interface which simplifies the entry of pipeline information. The order and number of fittings in the pipeline can be easily selected, assembled and changed as required.



A number of standard fittings are supported, including:

- Straight lengths of pipe
- Circular and mitre bends
- Contractions and inlets
- Enlargements and outlets
- Globe and gate valves
- Ball and Butterfly valves
- Thin orifice plates and nozzles
- Thick orifice plates
- Known pressure changes.

Flexible and User-Friendly Output Functionality

The calculation results are presented in both tabular and graphical formats. Users can choose to view specific information of interest, or the full results output which provides comprehensive information on the variation of pressure with length along the pipeline as well as a two-phase flow pattern map, process conditions at any point along the pipeline, physical properties, and as well as velocities. The built-in graphical feature enhances users' experience in visual interpretation of the output information.

UniSim PPL - Output

Table Options: Process Data Pressure Drop Velocity Data Liquid Properties Vapour Properties

| | Fitting | Distance | Pressure | Temperature | Specific Enthalpy | Quality | Void Fraction |
|----|---------------|----------|----------|-------------|-------------------|---------|---------------|
| | | m | bar | °C | kJ/kg | | |
| 0 | Start | 0.00 | 10.000 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 1 | Flush Inlet 1 | 0.00 | 9.986 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 2 | Pipe 1 | 0.60 | 9.985 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 3 | Thick Plate 1 | 0.90 | 9.827 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 4 | Pipe 2 | 4.70 | 9.817 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 5 | Mitre Bend 1 | 4.80 | 9.805 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 6 | Globe Valve 1 | 4.80 | 9.742 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 7 | Pipe 3 | 5.00 | 9.730 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 8 | Enlargement 1 | 5.00 | 9.735 | 179.9 | -1784.6 | 0.0000 | 0.0000 |
| 9 | Pipe 4 | 19.02 | 8.916 | 179.9 | -1784.7 | 0.0000 | 0.0000 |
| 10 | Bend 1 | 19.38 | 8.916 | 179.9 | -1784.7 | 0.0000 | 0.0000 |
| 11 | Pipe 5 | 20.68 | 8.915 | 179.9 | -1784.7 | 0.0000 | 0.0000 |

Units: SI

Clipboard Print Help

UniSim PPL - Output

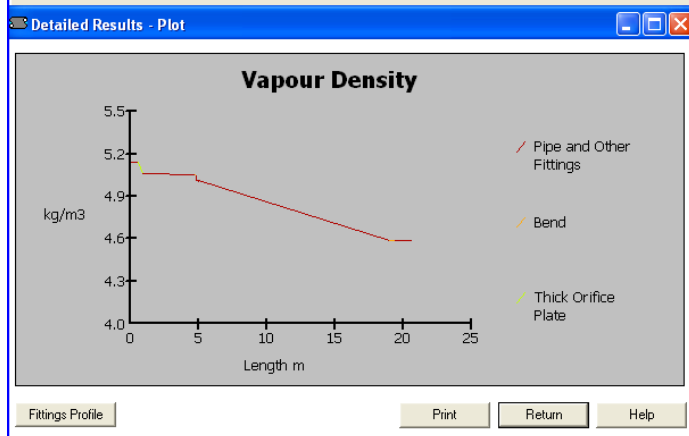
Select the profile from the options below

Velocity Vapour Density

Temperature Liquid Density

Absolute Pressure Vapour Viscosity

Quality Liquid Viscosity



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More Information

For more information on UniSim, visit www.honeywell.com/ps/UniSimDesign or contact your Honeywell account manager.

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