

AFT Fathom Slurry

Slurry & non-Newtonian Flow Modeling for AFT Fathom 7.0

Slurry systems present unique challenges in the world of hydraulic system design and simulation.

Failure to accurately account for slurry properties, changing concentrations and pump performance effects can lead to plugged pipes, misapplied pumps, increased energy usage, reduced system performance and increased operating and maintenance costs. The *AFT Fathom™* slurry modules address the challenges of slurry system design with flexibility and ease-of-use allowing you to expertly handle these challenges.

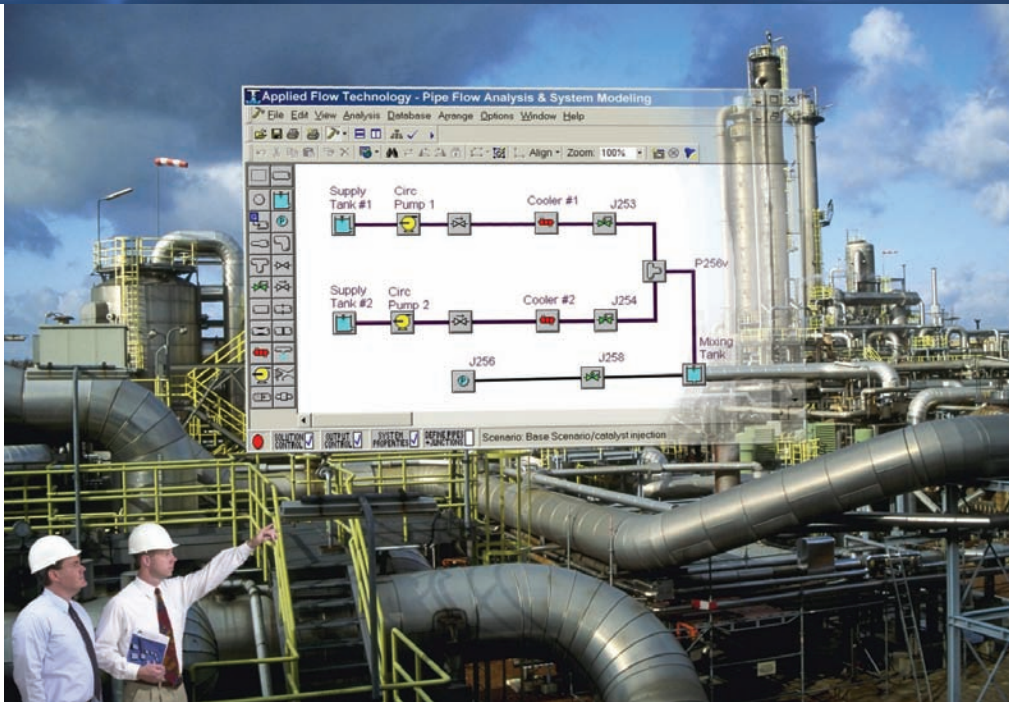
- **SSL – Settling Slurry** to model the effects of pumping fluids containing settling solids
- **NSL – Non-settling Slurry** to address the viscosity and frictional changes associated with pumping non-settling solids and a variety of other non-Newtonian fluids

Both of these modules have been designed specifically for *AFT Fathom* and can work with all your existing system models.

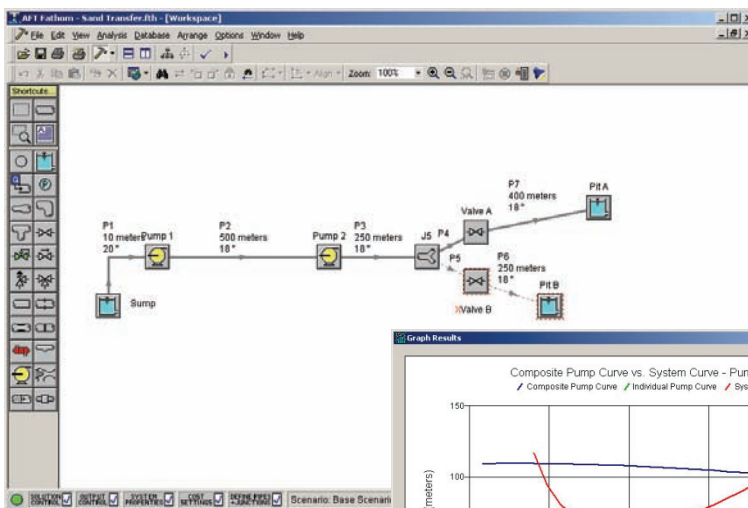
Settling Slurry Flow Modeling SSL Module

Specifying slurry properties can be complex and details are not always known. To address this the *AFT Fathom* SSL module provides multiple levels of specification detail. The Minimal method can be used in the preliminary design phase where only rough data are available. Where additional slurry detail are known the Simplified method can be used to provide increased accuracy. Using the Detailed method provides the most rigorous solution.

Using state-of-the-art correlations to predict the flow, pressure drop and reduced pump performance when pumping solids, the *AFT Fathom* SSL module let's you –



- Enter properties of solids particles and optionally keep these in a reusable and sharable database.
- Include slurry pump de-rating using either the Warman or ANSI/HI methods.
- Display special output reports with i_m , j_m , settling velocity, slurry volume and mass flows and other slurry specific parameters.
- Quickly evaluate multiple design and operating cases using Scenario Manager.
- Generate special slurry system curves, critical to understanding important system velocity limits.



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Non-Settling Slurry Flow Modeling NSL Module

Unusual viscous behavior can occur in piping systems with both non-settling slurries and general non-Newtonian fluids. The *AFT Fathom* NSL module addresses the frictional effects of these fluids on pipes, valves and fittings when designing a system.

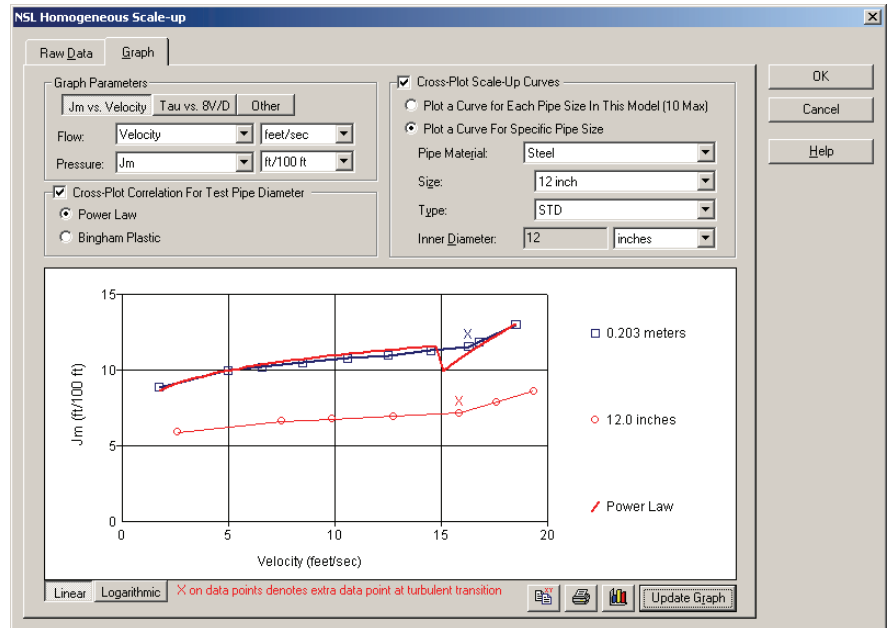
Using widely accepted methodologies, the NSL module automates the process of determining Power Law and Bingham Plastic constants, avoiding the pitfalls of manual calculations.

The NSL module accepts and manipulates raw, rheological test data to make it useful for full scale engineering designs, calculations, and simulations.

Many believe that pressure drop through valves, fittings, and equipment is not affected by non-Newtonian fluid behavior. Although valid for turbulent flow conditions, applying this assumption to laminar flow is uncertain. The NSL module offers a way to adjust the junction and fitting loss data in *AFT Fathom* to extend the turbulent data into the laminar region by calculating equivalent length in pipe diameters.

The *AFT Fathom* NSL module let's you –

- Enter and manipulate raw rheological data
- Convert rheological data into Power Law and Bingham Plastic models
- Scale-up rheological data to larger diameter pipes and accurately determine the pressure drop for alternate flows rates and pipe sizes
- Cross-plot the scaled data, Power Law or Bingham Plastic correlation for comparison purposes
- Calculate pressure drop across valves, fittings and equipment under laminar flow conditions



Fluid Characteristics	Solution
Any fluid with known Bingham Plastic or Power Law constants	AFT Fathom
Newtonian fluids containing solids that will settle based on slurry velocity	AFT Fathom with SSL Module
Non-settling slurries	AFT Fathom with NSL Module
Any fluid with raw rheological data which follows: 1) Bingham Plastic, 2) Power Law, or 3) Homogeneous Scale-Up laws	AFT Fathom with NSL Module
Fluids which operate in laminar conditions and require scaling of valve and fitting losses	AFT Fathom with NSL Module

System Requirements

- AFT Fathom 7.0
- Windows 98 and higher or Win 2000 and higher
- 64MB RAM
- 800 x 600 display minimum
- Stand-alone or network

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