



# TACITE®

## Simulates Transient Conditions in Pipeline Networks

Developed by IFP, in partnership with SimSci-Esscor, TACITE is a transient multicomponent, multiphase flow simulator for the design and control of oil and gas pipelines and production wells. Predict the propagation of liquid slugs during transient flow conditions in multiphase pipelines, such as those created during flow rate changes, pipeline depressurization, start-up/shut-down, or variations in pipeline topography. Using a rigorous, multi-component, compositional tracking method, phenomena such as the accumulation of heavier components at the low points in the pipeline profile can also be predicted.



TACITE is a unique tool for economical pipeline design or defining safe operations guidelines due to its ability to predict slug flow characteristics during transient flow conditions. It is tightly integrated with SimSci-Esscor's PIPEPHASE™ multiphase network simulator under a common GUI, enabling users to select a particular section of a steady-state network model as the initial state for subsequent transient analysis.

### INDUSTRIES

- Petroleum Exploration and Production
- Natural Gas Transmission
- Engineering and Construction

### BENEFITS

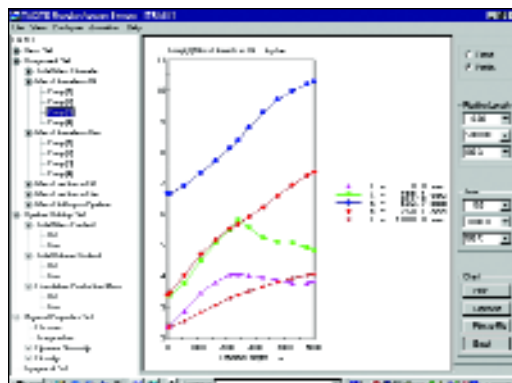
- Improved Pipeline System Design
- Reduced Facilities Capital Expenditures
- Improved Flow Assurance
- Increased Oil Well Production

### APPLICATIONS

- Design of Production Networks
- Severe Slugging in Pipeline Risers
- Terrain Induced Slugging
- Well Shut-down and Re-start
- Pipeline Start-up and Shut-down
- Production Allocation
- Pigging Analysis
- Component Tracking
- Production Allocation
- Multiphase Pumping
- Insulation Design
- Hydrate Formation Prediction
- Flow Assurance Studies

### FEATURES

- Compositional, Empirical, Tabular Properties
- Hydrates Module
- Heat Transfer
- Equipment: Multiphase Pump, Separator, Valve, Relief Valve, Injector, Pigging, PID
- Well Module
- Hydrodynamic Model: Rigorously solve the mass conservation laws for each fluid component along with momentum and energy balances for the multiphase mixture. Hydrodynamic closure is achieved through a mechanistic-flow, pattern-dependent slip model that has been extensively validated with field and experimental data. This approach tracks variations in the fluid composition and phase behavior along the pipeline for changing elevation and inlet fluid conditions during unsteady-state flow.
- Fluid Thermodynamic Properties: For rigorous compositional analysis, TACITE is integrated with an optimized thermodynamic flash package that computes three-phase vapor/water/water equilibrium and associated fluid properties. It can also interpolate internally-generated or external third-party fluid property tables and support traditional empirical property prediction methods.



- **Component Lumping:** Lump the full component slate to a reduced set of pseudo-components for optimizing computational efficiency while retaining a high level of accuracy in phase equilibrium and fluid property predictions. Components may also be clustered into pre-defined groups.
- **Pigging Model:** Accounts for the effects of pipe wall shear and leakage along with the weight of the pig. In addition to the size and characteristics of the leading liquid slug, the model predicts the changing pressure profile while the pig is in the line as well as the subsequent period while the pipeline stabilizes to steady-state.
- **Severe Slugging:** A periodic phenomenon that generally occurs in pipeline risers due to a temporary blockage of flow. Liquid in the pipe accumulates at the base until the entrance to the riser is blocked. The subsequent build-up in pressure eventually forces the growing liquid slug out of the riser and into the platform processing facilities. TACITE rigorously models the various stages of this cyclic process, including the effect of counter-current flow (liquid fall-back in the riser) during slug build-up.

## UPSTREAM OPTIMIZATION SUITE

The Upstream Optimization Suite (UOS) is a set of integrated, technically-superior, decision-support tools designed to provide sandface to surface facility asset management. UOS unites the needs of the oil and gas production industry, current software standards, and SimSci-Esscor's technical expertise to deliver best-in-class solutions to real world problems.



**PIPEPHASE** A steady-state, multiphase, fluid flow simulator that rigorously models gathering and transportation networks.

**TACITE** A multiphase simulator for analyzing complex transient flow phenomena in multicomponent pipeline systems.

**NETOPT™** Optimizes production operations by integrating a non-linear SQP algorithm with PIPEPHASE, then links to a reservoir simulator for integrated full-field modeling.

## ABOUT SIMSCI-ESSCOR

SimSci-Esscor is a leader in the development and deployment of industrial process simulation software and complete performance solutions for a wide variety of industries, including oil and gas production, petroleum refining, petrochemical and chemical manufacturing, electrical power generation, mining, and engineering and construction. Supporting more than 750 companies in over 70 countries, SimSci-Esscor products and services enable clients to minimize capital expenditure, optimize facility performance, and maximize return on investment. SimSci-Esscor is brand of InvenSys Process Systems, owned by InvenSys, plc. [www.simsci-esscor.com](http://www.simsci-esscor.com)

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