

LIQUID SIMULATION TOOLS DESIGNED FOR EASY USE BY PIPELINE OPERATORS AND ENGINEERS



**INTUITIVE ENOUGH FOR THE
PERSONNEL WHO NEED THEM.
SPECIALIST SIMULATION
ENGINEERS NOT REQUIRED!**

In today's competitive market, optimization of pipeline networks is an ever green function; every day is another chance to seize advantage. Pipeline operators and engineers need intuitive modeling software they themselves can use in the control room to make rapid decisions on safety and on operations and scheduling tasks such as batch-tracking and station operation optimization. **Pipeline operator training and operator certification recording should be lifelike, automated and easy to use.** Unfortunately, most models still linger in the hallowed world of the Simulation Engineers where normal engineers and controllers fear to tread. This no longer needs to be the case.

“DRAG AND DROP” OBJECTS AND PRE-LOADED PULL-DOWN MENUS

Pipeline simulators should offer the convenience of a Windows environment with a generic structure that operators and engineers can use intuitively- *virtually as easy as writing a Word document.*

File formats should be tailored to facilitate the effortless creation and sharing of complex and extensive models between users.



A POWERFUL, STABLE ENGINE THAT DELIVERS RAPID AND ACCURATE RESULTS

A good simulation model should offer the entire range of equations of state and pipe-flow equations powered by a stable and accurate engine that can meet the toughest modelling assignments

SIMULATION OF STEADY STATE AND TRANSIENT CONDITIONS

These models should account for variable pipe friction and variations in pipe wall material and fluid properties at every point. The software should account for low pressure vapour cavities and model surge effects as a vapour pocket collapses.

SPEED AND FLEXIBILITY OF A MODERN SOFTWARE PLATFORM

There are few intuitive simulators on the market today, even less written in completely MS compatible software. Demand fully integrated software designed with the latest technology that does not crash or leak memory. Beware of modelling systems that comprise nothing more than software patches around ancient engines designed back in the seventies.

In today's competitive market place, Users need software designed to meet the Internet requirements of their company and their company's customers.

OPERATOR QUALIFICATION TRAINER

Simulator should offer a modular array of products that easily connect to SCADA, DCS or control systems and deliver a simple and intuitive training system that offers the “touch and feel” of your real pipeline for operator training and certification.

CUSTOMIZABLE TO YOUR NEEDS

Simulators for this new paradigm should have the flexibility to allow rapid customization for the specific needs of your company.

ADVANTAGES OF ATMOS™ LSIM LIQUIDS SIMULATION ONLINE & OFF-LINE SOFTWARE

- ✓ Simple Perfection of A Stable Engine with Remarkable Accuracy
ATMOS™ LSIM uses the latest MS Net platform using C#/Vb.net. The code has Automatic-Memory-Management to avoid memory leaks and crashes. The engine has demonstrated superb accuracy with on-site pressure traces, typically less than 1% disagreement with measured values.

- ✓ Extremely Easy to configure
“Drag and drop objects” and “drop-down” menus populated with all the properties to rapidly configure any pipeline. Pipeline operators and engineers can configure in hours a system that used to take specialist simulation engineers days to design.

Select Pipe types, product mixtures, pumps and other properties with a simple click of the mouse.

Comprehensive model tools include supply, demands, leak demand, pipe terminator, linking node, non-return valve, generic valve, pumps, resistance element, heater/coolers etc.

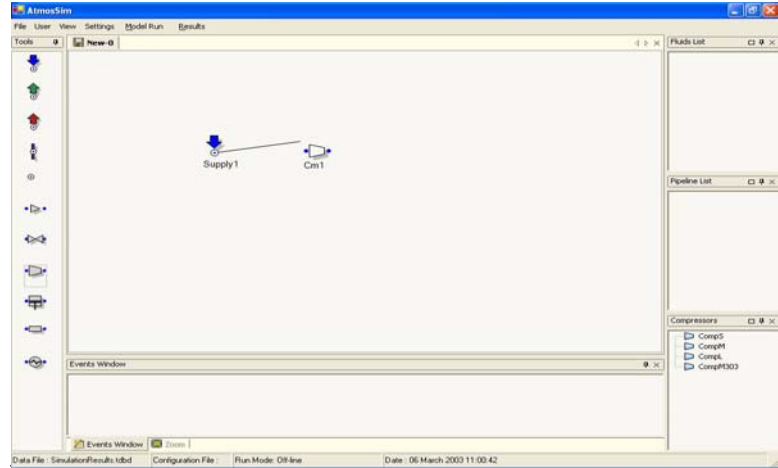


Figure 1. “Drag and Drop” objects on the template

- ✓ Comprehensive Enough For Specialist Simulation Engineers, Simple Enough for Pipeline Engineers and Operators

ATMOS™ LSIM is based on technology developed and tested over 30 years by Hydraulic Analysis Ltd.

It provides all the features needed by pipeline simulation engineers, yet is easy enough for pipeline operators to understand and run. Hence specialist simulation engineers are **NOT** required.

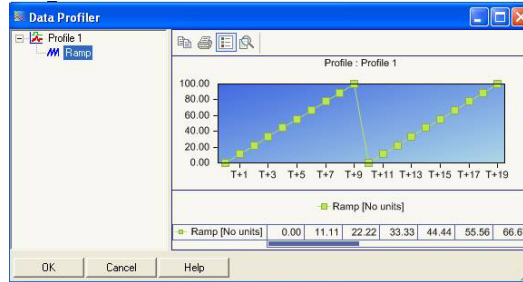
Unique Features include:

- Variable wave speed: The speed of sound is continuously calculated at every point in the model throughout the simulation, accounting for variations in pipe wall material and fluid properties, particularly those that vary with pressure.
 - Variable pipe friction: The friction factor is re-calculated throughout the simulation allowing accurate modeling of changing pressure losses as pressure waves travel through the piping system.
 - Vapor pocket formation: The model not only accounts for the formation and collapse of vapor cavities formed by low pressure, but the variable wave speed accurately models surge effects following collapse of such a vapor pocket.
 - Drained pipe work and air pockets: ATMOS™ LSIM can model the effects of drained pipe work and the subsequent effects of priming and movement of air pockets. These effects can be highly detrimental and damaging to a system if it is re-primed rapidly.
- ✓ Transient Real Time, Transient Look-ahead, Transient Predictive and Steady State
These modeling modes are captured in one fully integrated software package.

- ✓ **Model Constraints Can be Assigned from 3 Sources**
All constraints can be assigned from fixed, real-time (SCADA/DCS/PLC) or a profiled wave form.
- ✓ **Uses Same Software for Online and Off-line Applications**
ATMOS™ LSIM uses the same software for online and offline applications – SWITCH a configuration tested off line to on line at any time, as long as the online tag data exist.
- ✓ **Generic OPC Interface to DCS/SCADA or PLC Tag Data**
This assures quick and seamless interfacing with existing control systems.

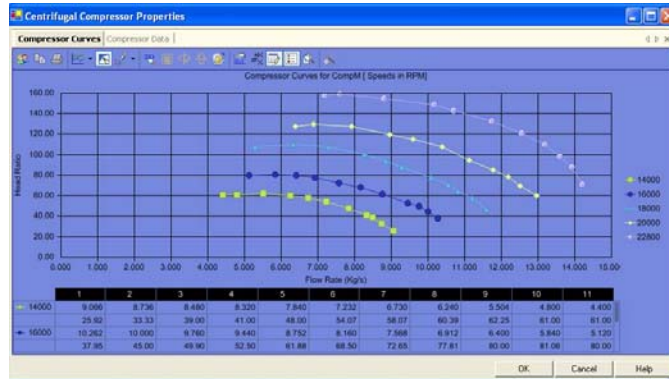
- ✓ **Graphical Representation of All Profile Sources.**

Figure 2. Loaded profiles include constant, square, ramp, sinusoidal, random, User drawn and data



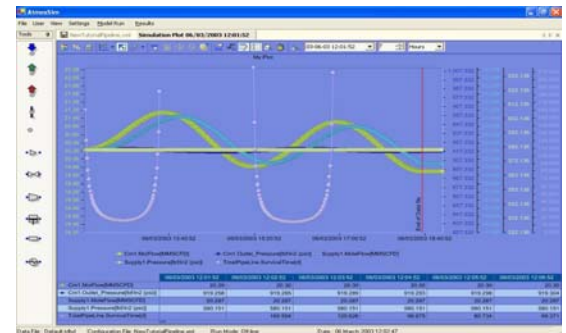
- ✓ **Powerful Centrifugal Pump or Compressor Curve Utility**
Create and save curves that represent any compressor. Adjust the curve from the tables or simply “drag and drop” it.

Figure 3. Completely interactive graphics allows you change the curves on the graphs



- ✓ **Comprehensive, Property Trending and Plotting is Fully Exportable**
Provides fully customizable property trending and plotting, and can export to csv files and bitmaps. Data migrates effortlessly to other Windows based programs. User can cut and paste plotted results directly into Excel tables, and can cut and paste bitmaps with all the functionality of a Microsoft application.

Figure 4. Results are graphed, real time in clear and comprehensive graphics.



- ✓ **Customizable To Your Needs**
ATMOS™ LSIM is written in house by RELI staff and can be customized with quick turn around time for customer specific requirements (i.e. specific customer equations of state).