

## Atmos Optimizer

### Optimizes pipeline operations by minimizing the cost of running while meeting the supply and demand schedule

#### The challenge

Running a pipeline can be extremely expensive and complicated. It is difficult for pipeline operators to calculate the cost of running a pipeline for a few days without the aid of an optimizer. Significant cost can be saved particularly for pipelines where spare capacity is available.

An optimization system should:

- **Reduce the cost of running a pipeline**
- **Determine minimum cost to transfer products**
- **Configure many different operating scenarios**
- **Assess whether the schedule will exceed operating limits**



#### Main features

- Planning of cost efficient operations
- Offers different operational scenarios
- User configurable
- Creates and modifies batch information such as name, product and volume
- Includes energy cost, drag reducing agent (DRA) cost and total cost in graphical reports or exports to XML files
- Provision of pump line up and station pressures
- Calculation of power consumption
- Availability of pump operating curves in the online optimizer
- Feasibility check of scheduled operations
- Interface with on-line systems e.g. batch tracking system

#### What is Atmos Optimizer?

Atmos Optimizer is a tool to help pipeline operators find the optimum means of running a pipeline, while meeting the supply and demand schedule. This tool uses “Dynamic Programming”. By breaking the schedule into a series of steady state scenarios, it applies an optimization algorithm to determine the minimum cost to transfer the products. This method works best for liquid pipelines. The system can run as a stand-alone offline optimizer using a configuration tool or as an online optimizer that uses real-time data from Atmos Batch.

There are three types of optimization available:

**1. Optimization only:** runs one optimization attempting to find the most efficient way to run the pipeline.

**2. Opt/Unopt comparison:** provides the pipeline operator with a comparison of energy use before and after the optimization has been applied. This calculates the savings made.

**3. DRA multiple runs:** a series of simulations are run with different amounts of DRA. The operator reviews the data and assesses the optimum amount of DRA for the schedule.

The system uses the following factors to determine the optimum configuration for running the pipeline:

- **Characteristics of the pipeline, such as length, diameter, wall roughness, elevation, ambient temperature**
- **Product characteristics, such as density and viscosity**
- **Pipeline operating limitations**
- **Supply pressure and temperature**
- **Linefill including multiple batches at the start of the optimization**

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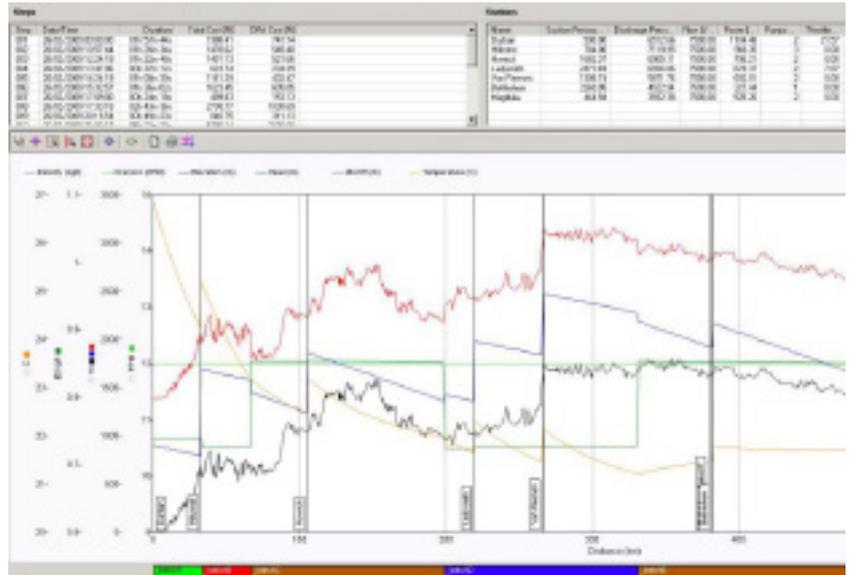
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Atmos Optimizer results viewer

- **Effectiveness of drag reducing agent**
- **Schedule to be optimized**
- **Energy cost per station per hour**

### System outputs

- **Headline cost: total energy and DRA cost for the optimization**
- **Cost saving: displayed when a comparison is run**
- **Step breakdown: time duration, energy cost and DRA cost for each step of the results**
- **Station breakdown: number of pumps running, energy use at each station per step**
- **Profiles: head, density, elevation, flow, pressure, temperature, lowest and maximum allowable operating pressure, lowest and maximum allowable operating head, DRA concentration**
- **Linefill graphic: graphical display of the linefill for the selected step**
- **Pump breakdown: displays the pump power and efficiency for the selected time step and station**

### Sensors used

The online Optimizer uses information from SCADA/DCS and Atmos Batch. Atmos Batch uses flow meters at inlet and outlet points of the segments and flow totalizers are used to summarize the volume entering the pipeline; density meters are used to determine a change in product.

### Data Source

SCADA and DCS data



### About Atmos International

Atmos International (Atmos) provides pipeline leak detection and simulation technology to the oil, gas, water and associated industries. The company was founded in 1995 in the UK by the inventor of the statistical pipeline leak detection system – Atmos Pipe, now one of a suite of leak and theft detection solutions from Atmos. These technologies are implemented on hundreds of pipelines in over 50 countries, including major oil and gas companies such as Shell, BP, ExxonMobil, and Total. With associated offices in the USA, China, Russia, Singapore and Costa Rica, and local agents in 28 countries, the multi-cultural and multilingual team can provide effective support all over the world.

