ATMOS
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Atmos Hydraulic Profiler

A robust hydraulic profiler for safer and more efficient pipeline operations

The challenge

Understanding the pressure along any pipeline is helpful in optimizing the efficiency and safety of operations. Pipelines with elevation changes have particular safety challenges. Any pipeline with elevation changes must operate at a pressure high enough to avoid or minimize vapor pocket formation without violating the pipeline's maximum allowable operating pressure. Excessively high pressure can cause a pipeline to rupture. If the operating pressure is too low, the collapse of a vapor pocket can cause a shock wave along the pipeline that can damage equipment.

To provide a visible indication that the pipeline is running safely and efficiently the profiler should:

- Calculate the pressure and hydraulic head profile along the length of the pipeline

- Monitor the MAOP*, LAOP, MAOH and LAOH for violations along the length of the pipeline

- Monitor the hydraulic head for slack conditions

- Raise alarms based on violations along the line

Main features

- Plots elevation, pressure, hydraulic head, density, and diameter against distance

- Distance is either volume or length from the start of the pipeline

- Connects to a batch tracking system (either Atmos' or third-party's)

- Works with bi-directional flow

- Monitors pressure and hydraulic head in real-time for pressure violations and slack conditions, raises alarms (OPC DA) upon detection

- Raises events for display in Atmos GUI (or other GUI's)

- Can calculate and display multiple hydraulic profiles on many screens

- Can display on multiple remote workstations

- Operator can review hydraulic conditions over the last few hours

- Runs as part of the Atmos SMT product suite

- Can operate in a redundant server setup

- Operator can select an offline mode and enter pressure values and batch positions and densities

System outputs

- Profile of elevation, head, pressure, and density
- MAOP, LAOP, MAOH, LAOH, and slack violations via OPC DA
- Events/Alarms for slack, pressure, and head limit violations

Sensors used

- Pressure transmitters at each end of the pipeline and at pump stations and block valve stations
- Density information from a batch tracker (if a multi-product pipeline)

Data source

- SCADA, DCS, or PLC/RTU
- Batch tracker (available protocols include OPC DA, text file or WCF)

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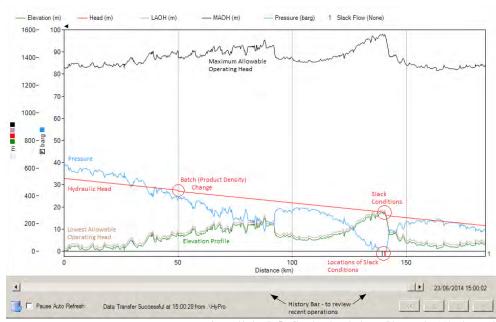Tel: +7 499 918 4140

What is Atmos Hydraulic Profiler?

The Atmos Hydraulic Profiler takes pressure measurements from the pressure transmitters installed on the pipeline and provides a real time representation of the pipeline hydraulic conditions. The hydraulic head is calculated based on the product density. The density can be a fixed value or taken from a batch tracking system.

The profiler assesses any violations of the MAOP, MAOH, LAOP, or LAOH from the pressure and head profile and highlights the locations of the violations.

The hydraulic head is the column height of the liquid above sea level. When the hydraulic head drops to the same value as the elevation of the pipeline, a vapor pocket forms and the pipeline becomes slack. The calculation will then reassess the hydraulic gradient based on the available head and again estimate the head and pressure at all points along the pipeline.

The operator can temporarily take the profile off-line and enter pressure settings and update batch locations and densities to test future operating conditions. The offline mode helps the operator run the pipeline more efficiently without violating any operating limits.

A single system works for multiple pipelines, with a separate display for each pipeline on a multi-headed display. Sub-sections of a single pipeline can also be displayed in separate forms. The output is also available for trending in Atmos Trend and can be embedded in the Atmos GUI.

Atmos Hydraulic Profiler showing slack conditions at the 140.5 km mark

*MAOP (Maximum Allowable Operating Pressure)
LAOP (Lowest Allowable Operating Pressure)
MAOH (Maximum Allowable Operating Head)
LAOH (Lowest Allowable Operating Head)

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.

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