

Improving Flow Assurance

A collaboration project to improve gas network efficiency

Liquid Carryover

Liquid carryover into gas networks is a continuing problem around the world. Despite regulatory and commercial requirements dictating that gas at the entry point to a network should be free of liquids and solids, every year liquids cause significant damage to gas turbines and compressors on the network.

While water and hydrocarbon liquids are normally monitored; until LineVu, one of the most common problems, carryover of MEG or TEG from dehydrators, is not. These liquids (and compressor oil) pass through gas analysis systems at custody transfer points without tripping an alarm.

Figure 1 shows a typical result of pigging a “dry” gas network. Once in the network, low level liquid contamination moves along the pipewall and makes its way to the bottom of the pipe where it forms a small stream moving slowly through the pipeline until it reaches a low point in the network where it pools and accumulates. In order to maintain asset integrity, expensive pigging operations need to be regularly undertaken to avoid internal corrosion and ultimately pipeline rupture as in Figure 2.

Normal practice during pigging is to slow the flow to the pigs optimum flow rate of around 11 mph. On a 30” pipeline this results in a **loss in the region of \$5.9M per day** for gas suppliers connected to the network. Without effective monitoring and evidence, there is no accountability for suppliers who are contaminating the network.

LineVu can detect liquid contamination in dry gas flows. When this occurs at custody transfer points, flow computers should make an allowance for wet gas in the calculations to ensure accurate flows are reported. With Sarbanes Oxley requiring due diligence on fiscal measurements, it is important for flow assurance engineers to be certain of the state of the gas that is being measured which could be 1% to 5% in error if the gas is wet.

When a LineVu is installed at the gas entry to a network, pipeline engineers can make better decisions regarding the acceptability of a supply, and either avoid a contamination event, or have good evidence and accountability regarding clean-up and recovering costs.



Figure 1. Result of pigging a “dry” network



Figure 2. Pipeline rupture in New Mexico

Commercial

The commercial arrangements for the project are designed to lower client risk. At the start of the project, an eight-week Data as a Service (DaaS) contract is agreed.

A decision to return equipment or extend the contract is made at the end of the 8 week period. The project team has the option to extend the agreement from 6 months to 5 years at lower monthly fees. DaaS agreements include all software updates, support and warranty. If, at any time, the system uptime is less than 90% of any particular month (due to hardware, software or other issues within the control of Process Vision) the DaaS service is free for that month.

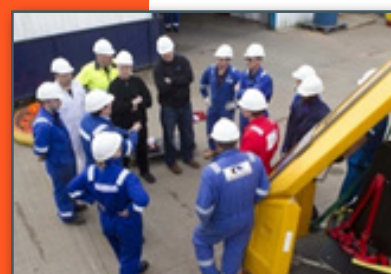
Project

AIM	To use the liquid detection alarm of a LineVu system as a warning to pipeline engineers that a gas supplier is contaminating the gas network. The live video stream from LineVu will help determine the severity of the contamination and play a key role in the decision to accept or reject the supply of gas. This enables operators to have better accountability when gas lines have been contaminated and to optimise pigging operations.	
CAUSES OF LIQUID CARRYOVER	The causes of liquid carryover can be divided into two categories:	
	Operational - temporary or occasional problem <ul style="list-style-type: none"> Coalescing filter cartridge failure: Fouling/flooding Coalescing filter cartridge failure: Mechanical damage Coalescing filter cartridge failure: Incorrect seating or sealing of filter cartridges Flow ramping: Start-up and shutdown 	Design - constant or frequent problem <ul style="list-style-type: none"> Gas flows higher than design capacity Liquid loading higher than design capacity Incorrect design: sizing, type, insufficient straight run prior to separator Gas flow lower than design specification (cyclone filters)
CLIENT BENEFIT	<p>Lowerrisk of process failure - Early detection of a liquid breakthrough lowers the impact of network contamination.</p> <p>Better accountability - With severe cases leading to a valve being slammed on a supplier, both parties can be provided with a live video stream of pipeline activity. A lower flow may resolve the situation until the filter system can be serviced. Better evidence lowers the risk of litigation.</p> <p>Better flow assurance - For the supplier, filter cartridge performance can be monitored to possibly extend cartridge life.</p> <p>Provides evidence to justify suppliers filter improvements if necessary.</p> <p>In-situ filter performance versus flow rate can be established.</p> <p>Video can be used to train operators.</p>	
DETAILS	<p>By installing a LineVu system at the custody transfer point, operators will be provided with an alarm and a live video stream of gas quality. With this additional information, prompt action can be taken to lower the impact of contamination. Improving on current practices of responding to a liquid carry-over event.</p> <p>Where liquid carryover is evident, flow tests can be performed to establish a link between liquid breakthrough and gas flow rate. Using this additional information, a lower flow rate can be agreed while filters are checked. Normal flow rates can be restored once the filter failure has been rectified.</p>	
DATA	The team will review historical data regarding level of use of MEG or TEG at the site and assess the impact of network contamination from the site to compare data with and without LineVu and determine the financial benefit for the site.	

Million Dollar Mission

This application qualifies as a Process Vision Million Dollar Mission.

A collaborative team of engineers from Process Vision and site engineers will be selected for the project with the aim of producing \$1M extra profit for the client. This can be achieved by a combination of increased production and decreased maintenance costs using a LineVu system to improve operational excellence.



At the project kick-off, areas are highlighted where potential improvements could be made if liquid carryover is monitored and managed better than with current practices. An implementation plan is agreed that encourages, team spirit, enthusiasm and commitment.

Baseline data is collected to ensure that project results are measurable and achievable.

All team members will receive a mission patch and badge, operational excellence certificate and commendation that may be added to their employment record.

For more information please call +44 (0)1256 883 304

t: +44 (0)1256 883 304 | e: info@processvision.com | w: www.processvision.com

Process Vision Ltd | 5 Beechwood | Lime Tree Way | Chineham Park | Basingstoke | Hampshire | RG24 8WA | UK

Twitter: @ProcessVision_

LinkedIn: Process Vision Ltd