

Improving Condensate Recovery in Gas Treatment

A collaboration project to improve gas treatment plant performance

Liquid Carry-over

Failure to remove all liquids at the exit of a gas treatment plant (the gas contactor) results in contamination of the gas exiting the treatment plant. Even though the gas has been dehydrated and is therefore “dry”, entrained glycol, used to remove water vapour (MEG or TEG), can impact on condensate recovery.

In a gas contactor used to dehydrate gas, liquids and gas are arranged in a counter flow configuration, with either bubble trays (shown in Figure 1) or packing, to increase the surface area of the gas/liquid interface and contact time. Before the gas exits the contactor at the top of the tower, entrained liquids are removed by a demister pad designed to coalesce liquid mist. In some cases, additional filters are installed to remove liquids. The effectiveness of these filters can now be monitored in real time by a LineVu system.

Over time, fouling can build up in the demister, concentrating the gas flow into a smaller area than the original design. This increases the flow rate of the gas and, therefore, decreases the effectiveness of the demister pad. In some cases, the differential pressure between the lower and upper surfaces of the demister is sufficient to damage the structure allowing gas to track through the demister.

Before leaving the treatment plant, high value condensate is normally removed by reducing the gas temperature to -20°C or below. At this temperature, heavier components of natural gas condense and should be removed from the gas stream prior to leaving the gas plant via the export gas line.

Carryover of MEG or TEG causes problems for the recovery of condensate. Glycol freezes at a temperature between -6°C and -12°C (depending on its water content) resulting in blockages and temperature control problems in the dewpointing equipment. This leads to disruptions in temperature control allowing a combination of glycol and condensate through to the export gas pipeline.

Now, LineVu, a new detection system from Process Vision Ltd, can be used to provide an alarm when liquid carry-over is seen in the gas exiting a gas treatment plant. The alarm output from a LineVu system can be used as a warning to improve on current practices.

With a series of flow tests, an optimum flow rate/operating pressure can be determined that reflects the current state of fouling and filter efficiencies to maximise condensate recovery.

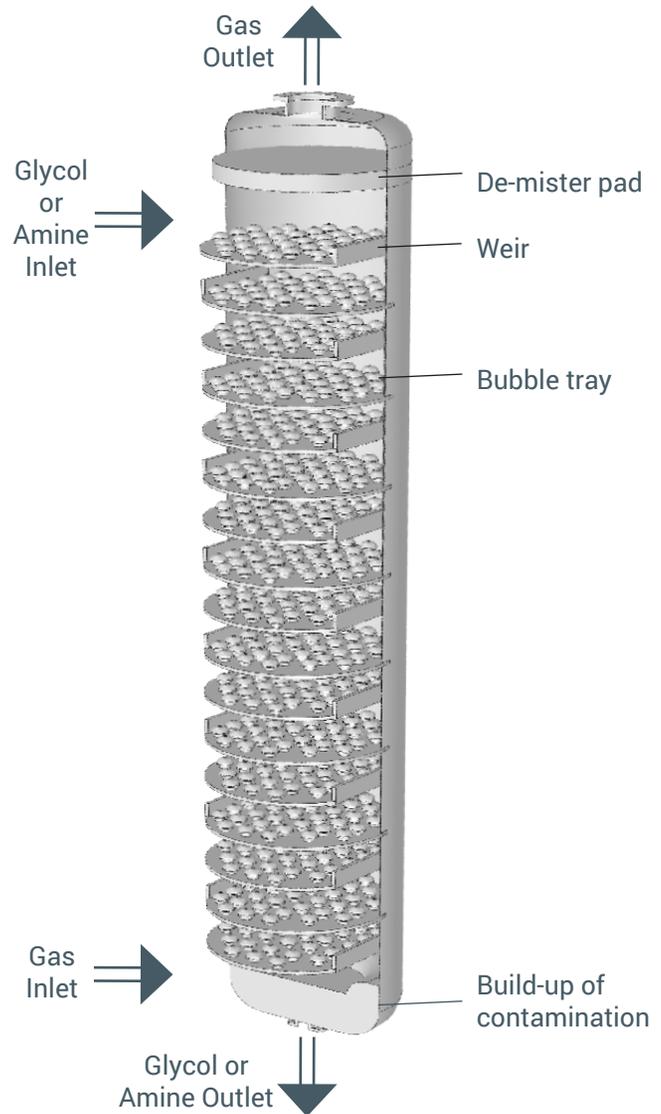


Figure 1. Gas Contactor

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 alert operators of a potential loss of condensate. This enables operators to highlight liquid carry-over events to limit condensate loss by improving maintenance of liquid filters more effectively than by using current methods.	
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	Lower risk of process failure - Early detection of, and response to, a liquid breakthrough lowers the impact of loss of condensate. Increased production - Gas flow can be optimised to maximum flow through the filter system. Lower maintenance cost - Filter cartridge performance can be monitored to extend cartridge life. Provides evidence - Justification for filter improvements. Optimisation - In-situ filter performance versus flow rate can be established. Operator training - Video provides a greater insight and can be used to train operators.	
DETAILS	<p>By installing a LineVu system at the exit of a gas treatment plant, operators will be provided with an alarm and a live video stream of separator performance. With this additional information, prompt action can be taken to lower the impact of a foaming event, improving on current practices of responding to a liquid carry-over event.</p> <p>The first stage of the project is to monitor and establish the level and nature of liquid carry-over and, if possible, establish a link between a liquid event and flow rate. Then using the additional information from LineVu, checking the condition of existing liquid filtration and performing a series of flow & pressure tests to establish the optimum performance of the system.</p>	
DATA	The team will review historical data regarding the level of condensate recovery versus flow and pressure to assess the impact of condensate foaming at the site then compare data with LineVu to 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.

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