

# Case Study

## Preventing Compressor Damage Through Direct Visibility of Liquid Carryover



### SECTOR:

Gas Processing

### MEDIUM:

Natural Gas



A separator believed to be operating correctly was found to have a flooded demister pad, exposing the compressor to liquid carryover. LineVu identified the root cause and enabled corrective action.

- Identified liquid carryover despite gas meeting specification
- Revealed separator limitations under actual operating conditions
- Enabled optimization of operating parameters
- Provided data used to redesign internals
- Reduced compressor risk and carryover potential

### THE CHALLENGE

Operators observed recurring liquid accumulation during compressor maintenance despite the gas meeting specification and the separator being designed using accepted engineering methods. The challenge was to determine the performance of the separation system running at 28 Bar (400psi) on the suction side of the compressor and to see whether liquid carryover was present at the metering station. Gas compressors are designed to run on dry gas. When liquids or solids enter the system, they can cause erosion, seal damage, and even catastrophic failure; events that can result in millions of dollars in repairs, downtime, and lost production.

### THE SOLUTION

Process Vision deployed two LineVu process cameras. One was installed directly on top of the vertical separator and one on a tapping point downstream of the separator. During the study, these systems were moved around the plant to different locations to gain further insight into their performance under varying operating conditions.

#### KEY FINDING

**LineVu revealed that the separator demister pad was flooded during normal operation, allowing liquid to bypass the separator and continue downstream.**

It became clear that the system design did not account for the higher condensate levels observed at the separators, and a third-party consultant was engaged to provide advice based on the study's findings. The aim was to provide Computational Fluid Dynamics (CFD) modelling of the internal inlet vane packs and demister pads under the conditions observed by the LineVu systems and to improve gas distribution and mist coalescing performance.

MORE INFORMATION

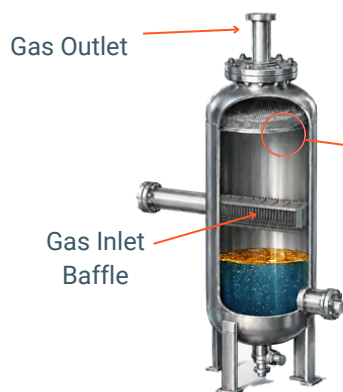
#### CONTACT US

 [www.processvision.com](http://www.processvision.com)

 +44 1256 883304

 [info@processvision.com](mailto:info@processvision.com)

## A VIEW FROM THE TOP



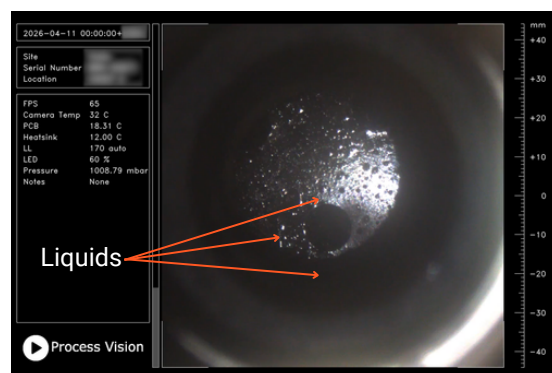
Vertical separator



1/2" holes in demister pad pressure plate

The pressure equalization plate and demister pad

During the study, a camera was mounted on top of the separator to view the top of the pressure equalization plate and the demister pad. Looking down onto the separator while in operation provided a clear view. The image to the right shows a view of the 1/2" holes in the plate and significant liquid droplets appearing, moving around and disappearing on the plate, revealing that the demister pad was flooded. Further investigations under a variety of process conditions were conducted to identify the optimal process conditions to minimize liquid carryover.



## IMPROVEMENTS

The data from the study was used to minimize liquid carryover with the existing separators by operating at the optimum pressure and flow rates. The data was used as inputs to model a new demister pad design to tackle the liquid carryover observed. The operator had performed the correct gas analysis to establish the design criteria for the separator system, and followed industry standards in its implementation.

### THE OPERATOR SAID:

**"For the first time we were able to see what was actually happening inside the separator under operating conditions. The findings fundamentally changed our understanding of the carryover mechanism."**

## COMMERCIAL IMPACT

The study demonstrated that:

- Separator performance differed significantly from design assumptions.
- Conventional monitoring techniques did not identify the carryover mechanism.
- Direct visualization enabled corrective action before compressor damage occurred.
- The cost of the study was negligible compared with the potential cost of compressor failure, unplanned downtime, or separator replacement.

Catching liquids early prevents compressor trips (often ~\$600k each), reduces downstream pigging costs (up to \$35k/mile), and extends dry-gas seal life from around 1 year to 3 years or more. This type of separator is often used to prevent liquids from entering other downstream equipment, such as molecular sieve or mercury absorber beds. The cost of LineVu and separator modifications is a fraction of the cost of compressor damage and downtime.