



# Constrained Layer Dampening

Value Tracking Case Study



# Constrained Layer Dampening

## Background

The pipework at National Gas compressor facilities is susceptible to acoustic fatigue caused by the flow of gas and associated pressure drop through the valves. As this happens the internal acoustic energy is generated and transmitted to downstream piping and can lead to severe piping excitation. At junctions with small bore pipework, dynamic differential movements and high stress concentrations can lead to high frequency acoustic excitation (HFAE) failure.

The most effective solutions available at present are extremely costly and involve large-scale redesigns, focusing on either the flow itself or strengthening of the main pipe through increased wall thickness. Currently a failure, or anticipated failure, would have to be resolved by increasing the pipe wall thickness, or by reducing gas flows, both of which would require significant outages and re-design. It is intended to develop constrained-layer damping (CLD) as solution to HFAE that is both simple and low cost.

## What's new?

The project provided background research to existing solutions to develop a tailored solution for National Gas. Following the development of this approach a solution was created and tested onsite. Some further outputs have been identified to support this work further and ongoing discussions are being had with the business to close out. The appetite from stakeholders to progress this work was analysed as the issues from the test site were experienced at other locations therefore extra work to allow full benefits realisation is required. Procedure T/PR/PIP/5 (Installation and Integrity Management of Constrained Layer Dampening for

Mitigation of Vibration on Pipework) updated with project outputs.

## The benefits

CLD is intended to be a simple, low cost solution to acoustic fatigue failure. The failure of main pipe welds, pipe supports and impulse pipework can be classed as RIDDOR reportable (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations), a serious safety risk as well as potentially leading to large releases of natural gas into the environment. Fatigue failure is costly to remediate in terms of materials and manpower but there is an additional risk of a loss of network flexibility with compressor units on outage.

## Financial savings

Savings are estimated in the region of £90,000 per installation and to date there have been 2 installations of this equipment on site - £180,000. The total number of pipe work connections at risk are around 60, equalling a total saving in region of  $£90,000 \times 60 = £5.4m$ .

As highlighted, further outputs to be progressed with the business to fully recognise the estimated benefits across the business.

## Implementation

Outputs of the project have been shared with the business and additional implementation work identified to receive full benefits from this approach. Work to be agreed with Business Leads and benefits tracked from further implementation.

