

Pipe fatigue from acoustic and flow induced vibration

Data published by the UK's Health and Safety Executive for offshore Industry have shown that in the UK Sector of the North Sea piping vibration and fatigue accounts for over 20% of all hydrocarbon releases. Although overall statistics are not available for onshore facilities, data are available for individual plants which indicate that in Western Europe between 10 and 15% of pipework failures are caused by vibration induced fatigue (ref. AVIFF).

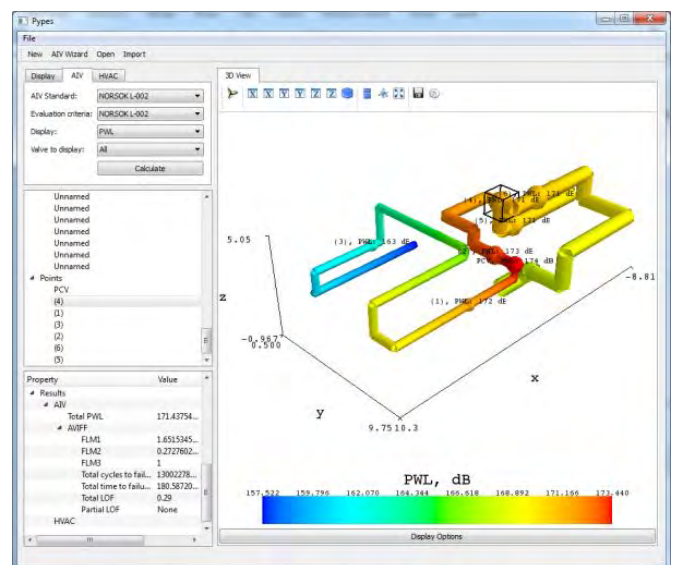
Vysus Group has condensed our experience and analytical skills into dedicated software for handling acoustically and flow induced fatigue in pipe systems into dedicated software. This enables us to deliver both cost effective desk top studies and field measurements in order to avoid failures in pipe systems.

In gas systems, high levels of high frequency acoustic energy can be generated by pressure reducing devices such as a relief valves, Pressure Safety Valves (PSV), control valves or orifice plates. Fatigue due to acoustically induced vibrations (AIV) is of particular concern as it tends to affect safety related systems (e.g. relief and blow-down systems). The time to failure is short (typically a few minutes or hours) due to the high frequency nature of the generated sound pressure inside the pipes.

Our Services

Vysus Group has the experience and expertise to perform all kinds of both desktop and field surveys on acoustic and flow induced vibration. At the design stage we can perform both screening type studies, as described in the standards NORSOK L-002 Acoustic Induced Vibration (AIV) and the UK Energy Institute "Guidelines for the Avoidance of Vibration Induced Fatigue Failures in Process Pipework" (AVIFF).

Vysus Group can perform all kinds of measurement needed for the field evaluation and troubleshooting.



In case excessive levels are detected we can give recommendations on mitigation measures. As the screening methods have a conservative approach to the problem, more detailed investigations can often be beneficial. In these situations we can offer to do detailed finite element calculations of the relevant pipe sections, which enable us to give more detailed and cost effective recommendations compared to recommendations based on the screening results.

Calculations

Pypes is software custom built by Vysus Group to make pipe calculations in order to assess piping systems to commonly found risks. 3D piping geometry is imported and can then be rapidly evaluated for its acceptance to several different industry standards. Piping system modifications can be implemented and recalculated in order to evaluate possible solutions where unacceptable risk is found.

Calculation standards:

- NORSOK L-002 Acoustic Induced Vibration (AIV)
- UK Energy Institute Guideline AVIFF, Acoustic Induced Vibration (AIV), Flow Induced Vibration (FIV)
- CONCAWE Pipe Noise
- VDI 3733 Geräusche bei Rohrleitungen
- EN/IEC 60534 "Noise Considerations – Control valve aerodynamic noise prediction methods"

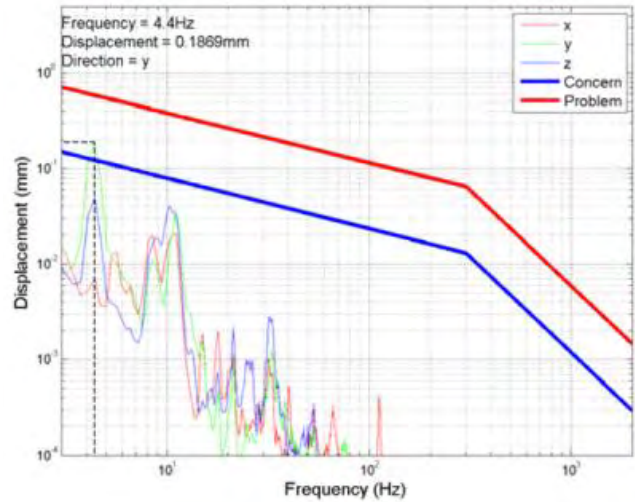
Relevant equivalent Company standards can be incorporated on request. Other standards indirectly included in the predictions are API 521 / ISO 23251 for pressure relief to the atmosphere.

Field Measurements

For existing installations we can perform on-site measurement campaigns for comparison with the limit levels given in the NORSOK L-002 or AVIFF. In Vysus Group have we developed our own dedicated measurement system for this type of measurements, which enable us to give on the spot results of the measurements.

Vysus Group can perform all kinds of measurement needed for the field evaluation and troubleshooting, including measurements according to:

- UK Energy Institute Guideline AVIFF
- ISO 10816 on Machinery Vibrations



Why Vysus Group

- World-leading discipline expertise and personnel
- Global presence and fast response time
- More than 30 years of experience
- Resources and personnel to manage your asset through design, commissioning, and operation
- Commercial independence from vendors and contractors
- State-of-the-art numerical and analytical tools
- Purpose built methods
- Worldwide technical network of universities and other knowledge providers.

We reinvest a substantial portion of our turnover in research and development to ensure that our customers receive the best value for their investments in our services.