



Asset Care Counts

Piping Vibration Analysis

Vibration induced fatigue failures of pipework are a major concern for a range of asset owners due the risks associated with:

- Safety (sudden release of hazardous or flammable pressurized fluids);
- Production down time;
- Corrective action cost;
- Environmental impacts (loss of containment);
- Statutory Risk.

Data quoted by the Energy Institute from the offshore industry have shown that piping vibration and fatigue account for over 20% of all hydrocarbon releases in the North Sea offshore industry. Data quoted for Western

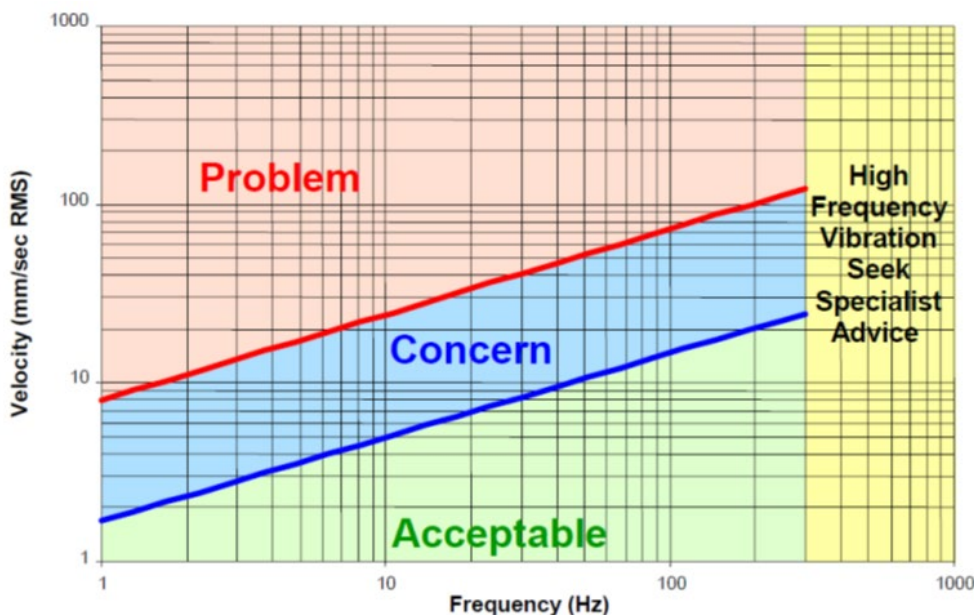
European plants indicate that 10-15% of pipework failures in these plants are caused by vibration induced fatigue.

Trends indicated increasing incidence of vibration related fatigue failures in piping systems both on offshore and petrochemical plants due to changes in plant design. The main change contributing to failures are:

- Increasing flow rates, higher flow velocities and the resulting flow turbulence, which drives vibration.
- Greater use of thin walled pipework (e.g. duplex stainless-steel alloys) resulting in more flexible pipework and higher stress concentrations, particularly in small bore connections.

Energy Institute Guidelines (EIG)

The EIG provides asset owners with a guide to VIF threat assessment and risk mitigation. The assessments in the EIG can be split into two assessment types. The first is Proactive Assessment, which provides a high-level screening method for qualitatively and quantitatively assessing the risk of VIF on new or existing plant. The second assessment type is Reactive Assessment, which provides guidelines for dealing with areas where there are known vibration problems. Each of the assessments draws on methods described in Technical Modules (TM) within the EIG.



The EIG recommends conducting basic piping vibration measurements (TM-07) as part of the Proactive Assessment process. The measurements are intended to be basic, so that non-specialist personnel may be employed to conduct these first pass assessments.

The results of the measurements are classified in one of four categories:

- Acceptable
- Concern
- Problem
- High Frequency Vibration – Seek Specialist Advice

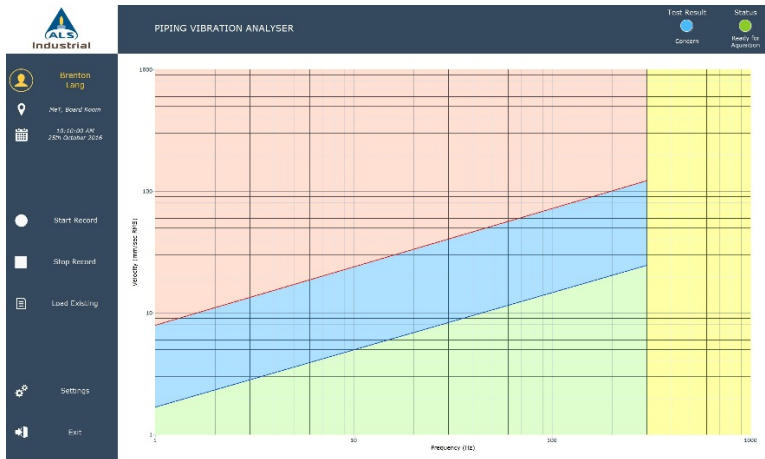


Basic measurement results in the Concern, Problem or “High Frequency Vibration” categories require further assessment using specialist techniques (TM-08 & TM-09) to assess their severity, root cause and likelihood of leading to VIF failure. These specialist techniques include Modal Analysis, Strain Measurement and Finite Element Analysis.

Solution - ALS Piping Vibration Analyser



In the past, plant operators and contractors used data logging instruments, combined with analysis software to perform the basic vibration measurements on piping systems. This method requires specialist personnel and substantial setup time to be able to conduct the TM-07 Basic Vibration Assessment. In plants where there are multiple measurement points (>10) and these measurement points are far apart (>30 m). Multiple setup locations are required which meant the process of collecting data was time consuming and not cost effective.



Upon understanding these inefficiencies ALS has designed and commercialised a handheld piping vibration.

The Analyser contains a customised Graphical User Interface (GUI) which allows non-specialist users to record and evaluate piping vibration data to the Energy Institute Guidelines (on the left).

The analyser allows non-specialist ALS personnel to conduct in-field piping vibration data collection and analysis on process piping to the requirements of EIG TM-07. The system also allows technicians to store data for further in-depth analysis by ALS Engineers utilising existing software platforms.

To date ALS has successfully deployed this new technology to a range of customers including a proactive assessment of vibration induced fatigue threats on a multi-national LNG producers small bore process pipework network. This initiative has produced significant cost savings associated with data collection and analysis. We believe this product is a vital tool to limit asset owner risk whilst reducing cost associated with vibration programs.

Our Engineering Team

ALS has a dedicated engineering team to provide reliability engineering and consulting services. These staff are supported by our extensive group of technicians, inspectors and engineers enable us to work proactively with our clients to ensure confidence in assets.

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