Project profile

Piping vibration screening and assessment

Managing piping vibration integrity risks is now much easier and more cost-effective due to new screening and assessment software.

Wood's software tool Veridian™ eliminated vibration-related production constraints and gave one LNG operator the confidence to increase plant throughput by over 20%,

Background

Oman LNG had been operating its plant at reduced production rates because of concerns around the integrity of the main process piping.

Operations personnel had reported the risk of vibration-induced fatigue failure and were worried about the ongoing condition of the piping systems.

A new gas field was also planned to come on stream to supplement the existing feed, so it was imperative that future production constraints were avoided.

Vibration screening

Using Veridian™, our risk-based vibration screening tool, we assessed all typical vibration sources, including flow-induced turbulence and pulsation, mechanical (machinery) excitation, pulsation due to reciprocating compressors, acoustic-induced vibration, and transient forces from fast-acting valves and rapidly changing fluid flows.

Of more than 2,000 process flowlines assessed, 400 were identified as having a potential vibration integrity concern and required more detailed investigation.

In addition, the customer identified specific flowlines of concern due to slugging and multiphase flow, liquid flashing and high flow velocity.

Customer:
Oman LNG LLC

Location:
Sur, Oman

Project scope:

- Vibration risk assessment
- Piping and small-bore connection vibration screening
- Small-bore tubing vibration assessment
- Field-based vibration and dynamic strain assessment
- Acoustic-induced vibration screening
- Advanced vibration analysis
- Vibration anomaly management
- Vibration mitigation design and implementation support
- Ongoing vibration support

Project duration:
18 months

Project phases:
Operations

Key objectives:

- Remove vibration-related production constraints
- Identify, assess and mitigate piping fatigue failure risks
- Provide effective means to track vibration anomalies
- Increase production throughput

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Main process flowlines assessed:

2,000

Vibration risk areas identified:

400

Design capacity increased by:

70%

Customer satisfaction:

100%

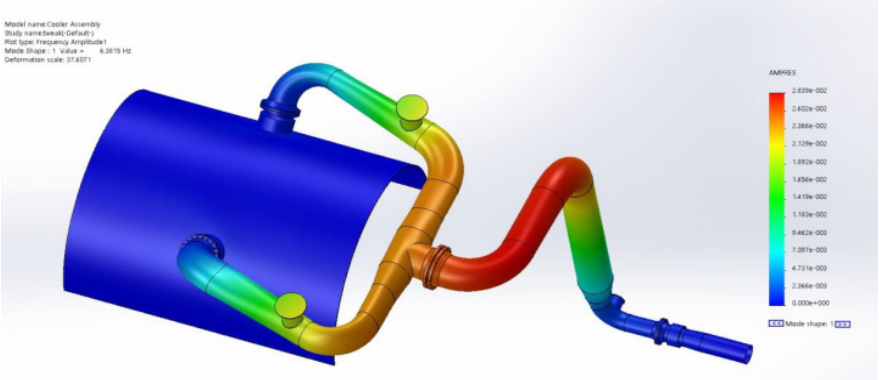
About Veridian:

- Veridian™ is Wood's software tool for **risk based piping vibration assessments**
- Veridian can quickly i**dentify risk areas** in process piping as conditions change
- The **vibration screening module** is **free to use** and can assess all typical vibration sources
- The **advanced anomaly manager** module enables reliable tracking and management of fatigue risks throughout the life cycle of your assets

Access and support

To discuss your piping vibration concerns with an expert or to start using Veridian for free, contact us at info.vdn@woodplc.com or visit our Veridian pages.

www.woodplc.com



Wood example of a finite element analysis model

Vibration risk assessment and advanced analysis

Onsite visual inspections incorporating vibration and dynamic strain measurements were conducted on high-risk lines identified in the screening study to more accurately quantify the vibration risk. The results were uploaded to the Veridian database, and any areas of concern were captured in its online anomaly tracker.

Vibration reduction measures had been included in the original plant design, however, based on latest industry best practice, specific design features were identified as being a long-term integrity risk.

LNG plant piping can be difficult to field strain gauge due to low piping temperatures. Where this was the case, novel methods incorporating detailed finite element analysis studies and field-collected vibration data were completed to determine whether piping stresses were acceptable for the main flowlines with significant vibration concern.

Implementation and resolution

Wood's vibration engineers worked to identify short and long-term control measures to mitigate vibration risks. We evaluated potential solutions using our computer models to optimise effectiveness and ease of manufacture by the local workforce.

Once a satisfactory solution had been agreed with the customer, we provided specialist engineering support to implement the change, with remaining (low-risk) anomalies ranked and tracked using Veridian's anomaly manager feature.

Takeaway for facility owners

This project is a great example of how Wood's cost-effective mitigation of vibration-related failures helped to avoid production and operational constraints, and in this case, increased the design capacity of our customer's LNG facility by 20%.

Our recommendations ensured the continued safety, integrity and commercial viability of the plant's piping systems and our approach was highly regarded by our customer.

Veridian will be used to predict and manage the integrity implications of future developments of this plant (such as modifications, debottlenecking or operational changes), providing cost-effective solutions to tackle flow-induced and acoustically induced vibration issues.