

# Oceaneering Solution Mitigates the Risk of Vibration Induced Fatigue During a Major Process Change

## Project Overview

In 2017, a major UK operator started a project with the aim of increasing field production by reducing wellhead pressure on one of the field's wells. The planned pressure reduction was to be achieved by changing the configuration of the export compressors on the platform's topsides, a major brownfield modification project.

As part of the process, the engineering, procurement, and construction (EPC) contractor managing the modification project requested a vibration assessment of the process pipework to determine the suitability and capability of the plant to operate at the new conditions, enforced by increased production from the wells.

Prior to the operational pressure changes, Oceaneering identified piping systems that were at risk of being affected by the process changes and developed a vibration measurement test program that was executed by our team during the pressure reduction trials.



The vibration assessment identified a vibration issue on the triethylene glycol (TEG) pump pipework as the pressure decreased, leading to a high risk of eventual failure of the system.

## Issues

During the pressure reduction exercise, a significant increase in vibration was noted on the TEG pump pipework. As the topside pressure reduced (from approximately 30 bar to 15 bar), the operating pressure at the discharge of the TEG pumps also reduced (at inter-stage pressure, approx. 60 bar – 45 bar). The change in operating pressure lessened the effectiveness of pulsation dampers and produced increased vibration.



The increased vibration was identified by our specialist vibration experts early in the process, and the pipework was monitored closely at each stage of the pressure reduction tests. The level of vibration on the pipework was controlled by pre-charged pulsation dampener devices. These were originally set to a fixed value that was no longer appropriate based on the operating pressure of the system. Guidance for pre-charge is 70 – 80% of the line pressure, and should be varied depending on the operating pressure of the system. This detail had not been previously considered.

## The Oceaneering Solution

The Oceaneering team identified the optimum pre-charge pressure for the system's dampers, taking into consideration all possible future operating scenarios. We also modified the mechanical maintenance procedure to include guidance on adjusted damper pre-charge levels.

We designed, supplied, and installed anti-vibration clamps to vulnerable small bore connections on the piping system to further mitigate the risk to the pipework system and to ensure the connectors were suitably protected in the event dampers were to become ineffective during future operations.

## Project Execution

The initial project test work lasted for two weeks. This included a dimensional survey and design work that was required to meet the client's required six-week turnaround. Manufactured components were put through a fast-track fabrication process to enable the delivery of a complete solution within the six week window.

## Benefits

Our solutions considerably reduced vibration on the asset and mitigated the risk of future vibration induced fatigue that had the potential to present during the process change and under the new operating conditions.

The overall vibration assessment gave the operator assurance of continued safe operation following a large process change. The identification of an issue on the TEG pumps and implementation of an appropriate solution to minimize the risk of fatigue on this critical system not only provided significant operational benefits but also provided the operator with safer, more efficient equipment.