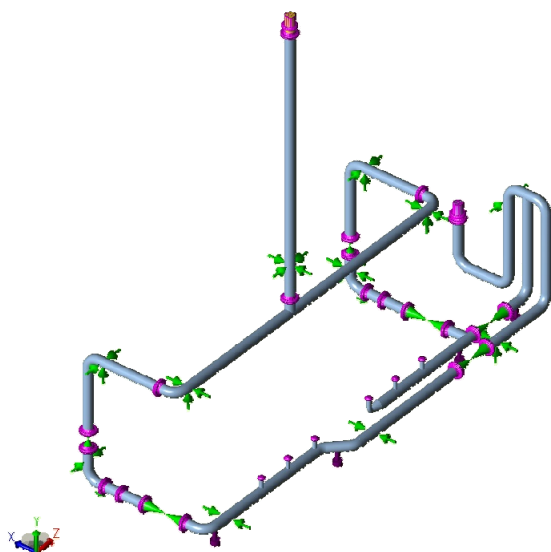


PIPING ANALYSIS OF METHANOL SKID ATOP FPSO

During the extraction of oil and gas, particularly from offshore sources, methanol is used for dehydration and de-icing. It prevents the formation of hydrates and lowers the freezing point of water during oil and gas transport. Often methanol is injected into the system via topside facilities. Finglow Consultants Limited (FCL) was recently engaged to perform a full piping analysis for just such a methanol injection skid deployed atop a Floating Production Storage and Offloading (FPSO) unit.

The primary objective of the work was to determine restraint type and location so as to adequately support the pipework. However, a combination of very low allowable nozzle loads for the pumps employed on the skid and a number of complex loading scenarios (including blast loads and combinations of wind and accelerations due to FPSO motions) meant that from the outset the piping presented some interesting challenges. Additionally, due to the lack of available space within the skid and the constrained nature of the piping, the nozzle loads were extremely sensitive to restraint type and location adding an extra layer of complexity.



Detailed analysis of the piping was carried out using CAESAR II piping design software. Site visits enabled FCL to carefully select specific locations for pipe supports and hydraulic shock

arrestors (snubbers), as well as plan the routing of suitable expansion loops which the client was able to accommodate in the already constrained layout. FCL were able to demonstrate that their proposed changes to the pipe routing, the carefully selected locations for restraints, and the addition of 'snubbers' would reduce nozzle loads to within acceptable limits while minimising costs associated with restraint and spool fabrication. Additionally the system was shown to be in accordance with piping code B31.3 and satisfied fatigue criteria associated with FPSO motions as required by DNV-RP-C203.

During performance testing of the system, undesirable vibration was experienced in a specific location. FCL were called upon to provide a solution and began their work with a series of modal analyses. FCL were able to identify the offending modes and determine that the stiffness of a key pipe support was not sufficient under test conditions. The offending pipe support was analysed using a structural model in CAESAR II. Using the results of the analyses FCL were able to mitigate the vibration in the piping by modifying the design of the pipe support.

