

Abstract

Topic: Exploring the Benefits of Wellhead Fatigue Monitoring

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This paper examines the benefits achieved through fatigue monitoring of wellheads. As an introduction, conservatism in analytical predictions of wellhead fatigue life are cited. In addition, considerations for increasing wellhead fatigue resistance are reviewed along with recent wellhead fatigue monitoring developments.

The architecture of both stand-alone, battery-powered monitoring systems and real-time monitoring systems are examined. The capabilities and limitations of each respective system are discussed and the overall value-added to drilling and production systems is summarized.

Wellhead monitoring systems have been deployed in several drilling and production operations with high fatigue demand, where loading from waves, rig motions or VIV is particularly intense. As a case study, results are examined from a wellhead monitoring campaign in an environment characterized by deep water and high-currents, where fatigue was driven by VIV. The measured vibration and current data are illustrated and the correlation is investigated. Important features of the wellhead fatigue damage rate trend are discussed. Fatigue life consumption tracking demonstrated that operations could safely continue, despite the arduous current conditions.

The wellhead monitoring methods discussed herein result in real-time or rapid turn-around of valuable fatigue life consumption information, enabling informed decisions to be made in adverse conditions. In a larger sense, measured data also serves as a benchmark for analytical model calibration activities, reducing the known conservatism in stress and fatigue in future deployments.