

USE OF LIMIT ANALYSIS TO ASSESS HIGH STRAIN CONDITIONS DURING INSTALLATION OF TEES IN DEEPWATER PIPELINES

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ABSTRACT

With trends for installing subsea pipelines and flowlines in deeper water conditions, designers and contractors are being forced to address the potential for high strain conditions during pipelay operations. Conventional analysis methods, even those based on strain, are often difficult to implement because questions arise regarding acceptable design strain conditions. To address this particular shortcoming, limit analysis methods can be applied. Limit analysis involves loading a structure, either through analysis or testing, to the point where unbounded displacements occur. The load at which this occurs is defined as the lower bound collapse load (LBCL). Using the LBCL, designers can determine appropriate design loads based on a specified safety design margin.

This paper provides discussions using limit analysis methods and applications for deepwater pipelay activities. Of particular interest are a series of analyses and full-scale tests performed on a tee assembly prior to installation in the Independence Hub field using a stinger. The intent is to provide industry with an alternative analysis methodology to properly size and design piping and components subjected to high strain loading during installation.

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