

Special Research Study Title	Analysis of Pipeline Tension during Offshore Pipeline Installation with S-LAY Technique
Special Research Study Credits	6
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#### Abstract

The objective of this special research study is to analyse of offshore pipeline tension at a touchdown point with S-LAY technique. The pipe diameters used in this analysis range from 6 to 20 in., this information is obtained from the pipeline industry in the Gulf of Thailand. Two analysis methods are used to investigate the pipeline tension, namely, finite element analysis (FEA) and catenary equation, and calculation results from both methods are compared. The 3D finite element model, which consists of stinger, pipeline and seabed, is simulated by using ABAQUS software. The stinger is the structure used for controlling the curvature of the pipeline on the over-bend portion. The stinger and seabed are modeled as a rigid surface with frictionless hard contact. The pipeline is modeled by using linear elastic beam elements. The results indicate that the pipeline tension on the stinger obtained by FEA is 4% to 12% higher than the tension on the seabed. The increase in pipe diameter from 6 to 12 in. increases the tension at a touchdown point. The bending of the pipeline occurs in two opposite directions between the overbend portion on the stinger and the sag bend portion. The highest moment magnitude is at the top of the stinger. Inflection points are mostly found close to the lift-off point. The sag bend profiles obtained from both analysis methods are also compared. The sag bend profiles obtained from the catenary equation correspond to those obtained from FEM for the pipe with the diameters between 6 and 12 in. However, the profiles of the pipe with the diameters of 16 and 20 in. clearly diverge from each other. The tension difference at a

touchdown point calculated from both methods is within 5%. This study reveals that the catenary equation is applicable for analyzing tension and sag bend profile for the pipeline with the diameter less than 12 in. used in the Gulf of Thailand.

Keywords : ABAQUS/Catenary equation/Finite Element Analysis/Gulf of Thailand / Pipeline tension at a touch downpoint/S-Lay