

### Vessel motion based assessment of pipeline integrity during installation

If weather conditions become rough, vessel motions with an increased amplitude are excited due to the presence of waves. The sagbend region of a suspended pipeline catenary may experience high loads due to these motions. When the loads become too high, the pipeline integrity cannot be guaranteed. In such cases, the pipeline is lowered to the seabed to prevent buckling and excessive damages to the pipeline. The pipelay operation is to be resumed later on when pipelay conditions have been improved. This process is called *Abandonment & Recovery* (A&R). It is essential to lay pipe as efficiently as possible to reduce the time spent offshore.

This study investigates the influence of the vessel motions with regard to pipeline integrity. This results in two objectives that are intertwined with one another. The first objective is to investigate the influence of vessel motions on the dynamic pipeline behaviour and integrity during installation operations. The second objective is to develop a method that will define a vessel motion based criteria for pipeline *Abandonment & Recovery* operations with respect to pipeline integrity.

Two methods are proposed to create 'statistical prediction' curves to quickly assess the pipeline integrity. This requires the generation of multiple pipeline installation models during project preparation. These methods are applied to various combinations of water depths and pipe properties. The dynamic behaviour of the pipeline is very sensitive to changes of these parameters. A shallow water and a deep water case are used for the analyses of the results and for the validation of the methods. The pipeline integrity is assessed by predicting the maximum strain, the DNV buckling check and fatigue damage for a pipeline during installation based on stinger tip motions.

