



OptiLay: On-Board Touchdown Prediction and Fatigue Tracking

OptiLay technology has been deployed on a number of offshore pipeline installation projects to date. One such project was in the North Sea where the operator required an accurate estimation of the fatigue damage incurred by all pipeline welds during installation. This requirement for accuracy made **OptiLay** technology the ideal choice as it can realistically model the pipeline catenary under actual offshore lay conditions, accounting for true touchdown prediction and non-conservative dynamic loading.

Scope of Delivery

Project Summary:

- S-lay method in 200-300 m water depth
- Range of installation procedures:
 - Start-up
 - Normal lay with changes in cross section
 - In-line structure installation
 - Potential abandonment and recovery
 - Final lay down

OptiLay Solution Summary:

- **Pipeline Installation Monitor:**
 - Ran every few minutes and after every pipe pull
 - Used automatically generated detailed models of installation procedures
 - Applied real-time measurements as loadings
 - Calculated various parameters including:
 - Pipe stresses/strains
 - Support loads/separations
 - Touchdown point coordinates
- **Pipeline Fatigue Tracking Module:**
 - Same as above except:
 - Ran once a day
 - Primary output was weld fatigue damage

Benefits

- Operated in a relatively autonomous fashion with automatic vessel data acquisition, simulations and results storage
- Reliably performed over 3000 simulations
- Demonstrated that accurate touchdown predictions could be achieved - Within 2-3% of the water depth
- Such accuracy could limit the need for continuous ROV touchdown monitoring thus resulting in cost savings
- Effectively calculated and catalogued the fatigue damage for thousands of offshore welds
- Significantly reduced conservatism with the average weld damage estimate 70% lower than that from onshore office based analyses
- Less conservative fatigue predictions could also have a cost saving potential, for example they may negate the requirement for back filling certain pipe spans