MOTION COMPENSATED CABLE LAY SYSTEM

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Motion compensation during full inter array cable lay process:
- Constant catenary tension during lay operations
- Stationary touch down point of cable
- No dragging of cable over the seabed, especially when cornering
- Limiting wave motion in cable, causing overbending of cable

TARGET LANE FOLLOWING MODE
Motion compensation system can be used in target lane following mode enabling:
- Straight cable trajectory within target lane
- Simplified cornering procedure

STATIONARY CATENARY
Motion compensation system limits shift of TDP during cornering preventing:
- Cable getting stuck behind rocks
- Cable being pulled out of trench or target lane

SPECIFICATIONS

General
- Maximum line pull including dynamics: 75 mt
- Minimum product OD: 50 mm
- Maximum product OD: 500 mm
- Minimum bending radius product (in tension): 5 m

Motion Compensation System
- Longitudinal stroke: 8 m
- Transverse stroke: 8 m
- Drive system: Electric Rack & Pinion

Product Storage
- Storage capacity: 2x 6000 mt

Dimensions
- Length: 58 m
- Width: 13 m
- Height: 6 m
FEATURES

EXTENDED WEATHER WINDOW
Motion compensated cable can extend the weather window far beyond the operational limits of conventional cable laying vessels. Relatively small motions of the overboarding chute in horizontal or vertical direction can result in large variations in the catenary to the seabed. The Touch Down Point (TDP) of the cable on the seabed can shift over a large distance, which can cause damage to the cable, especially when the lay trajectory is following a bend. In that case the cable is dragged laterally over a large distance and can kink around obstacles.

When the motions of the overboarding chute exceed a critical velocity, waves will start running along the catenary that can bend the cable beyond its minimal bending radius, causing damage. These effects limit the weather window of conventional cable laying vessels. Motion compensated cable lay mitigates these effects by keeping the catenary stationary, by adjusting the position of the overboarding chute.

Motion compensated cable lay provides the following advantages:

- Reduced risk of cable failure during installation
- Significantly larger weather window
- More accurate positioning cable along target lane

MOTION COMPENSATED QUADRANT WITH CURSOR SYSTEM
When terminating an array cable the cable is commonly lowered using a quadrant that supports the cable slack to the seabed when the cable termination is pulled into the turbine foundation. This operation is also hampered by catenary variations as the cable leaves the quadrant in two catenaries towards the seabed. The weather window is further limited by wave motions when it is lowered or retrieved through the splash zone. Huisman developed a quadrant handling system that is motion compensated and that is equipped with a cursor system, to efficiently guide the quadrant through the splash zone without causing catenary variations.

Motion compensated quadrant with cursor system provides the following advantages:

- Reduced risk of cable failure during installation
- Significantly larger weather window
- More accurate positioning cable in target box

SIMULTANEOUS OPERATIONS
Although the actual laying of the cable is relatively fast, preparing the cable terminations takes a lot of time. Huisman designed the lay system for simultaneous operations while laying a cable. To save valuable time the next cable can already be outfitted with cable protection and initiated. The Huisman cable lay system is a dual tensioner concept that can be configured for spooling two baskets or carousels simultaneously, saving time in port.

The adaptive quadrant shape provides the following advantages:

- Quadrant can be straightened for controlled landing of cable on the seabed reducing risk of damage to the cable
- The Huisman quadrant will require less slack in the cable

CABLE STORAGE SYSTEM
- Constant tensioning chute keeps cable pre-tension constant during compensation movements
- System can be utilized to buffer cable for reduced vessel transit during quadrant deployment

ADAPTIVE QUADRANT SHAPE
Just above the seabed the quadrant has to be removed from the cable loop so that the quadrant can be retrieved. This is achieved by conventional designs by flipping the quadrant so that the cable drops onto the seabed. The catenary is not controlled during this procedure and it cannot be guaranteed that the minimum bending radius is not exceeded. The Huisman quadrant is equipped with a mechanism that can adjust the radius from its curved MBR position up to perfectly straight. By straightening the quadrant it can be removed from the cable loop when the cable is virtually on the seabed mitigating the risk of damage.

FEATURES OVERVIEW
- Motion compensated cable lay system provides:
  - Reduced risk of cable failure due to:
    - Reduction of variation of TDP during lay operations
    - Reduction of cable shift when cornering (buckling risk)
  - Provides a larger workability window
  - Simultaneous operations reduce installation activities in critical time
  - Modularity of system enables fast mobilisation

OVERVIEW

1 2x 6000MT CAROUSEL
2 SPOOLING DEVICE
3 STATIC GUIDE CHUTE
4 SLACK CABLE STORAGE SYSTEM
5 ADAPTIVE QUADRANT SYSTEM
6 2x 37.5 MT TWO TRACK TENSIONER
7 WORK AREAS
8 DEPLOYMENT CHUTES
9 QUADRANT HANDLING SYSTEM
10 DECK SUPPORT RAIL