Diverless Bend Stiffener Connectors

FirstSubsea

Overview

The continuing drive to increase safety in deepwater projects has led First Subsea and Trelleborg Offshore to develop together a unique tool that speeds up the installation of flexible risers and umbilicals without the intervention of a diver.

The tool design is scalable to any load requirement for securing umbilical and risers inside a bell mouth, a receptacle or an I- or J-tube, and adds local stiffness to limit stresses and curvature to acceptable levels.

The First Subsea Diverless Bend Stiffener Connectors (DBSC) are fully self latching without the need of ROV intervention, hydraulics or any form of controls.

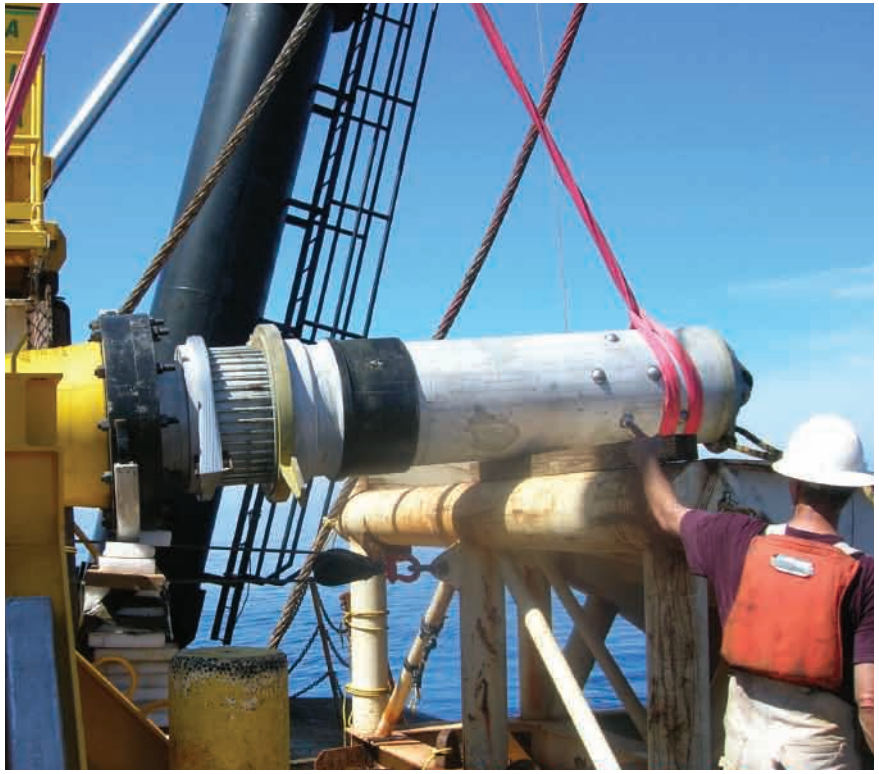
The pre-load is transferred into the mating interface as a result of pulling up on the termination head.

Detailed corrosion analysis has been undertaken to ensure that the tools last for the design life of the connector. Dynamic and fatigue testing has proven that they can withstand the specified fatigue load.

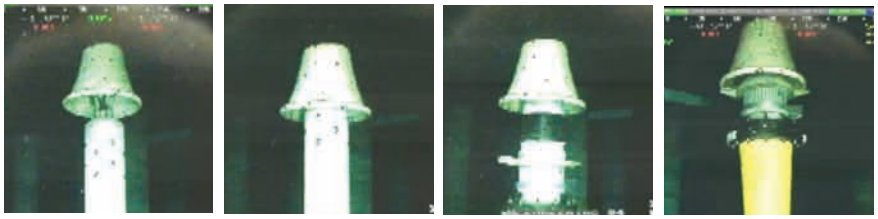
Benefits

- High load capabilities
- Subsea installation in all operating conditions
- Direct interface with existing I- or J-tube or with a receptacle
- Easy and fast make-up
- No diver intervention
- Minimal ROV intervention (mainly for visual checks)
- Complete bending and fatigue analysis
- Proven technology
- Fully approved by DNV

Images



24" DBSC - Deployment offshore



Subsea connection without diver intervention

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Bend stiffeners

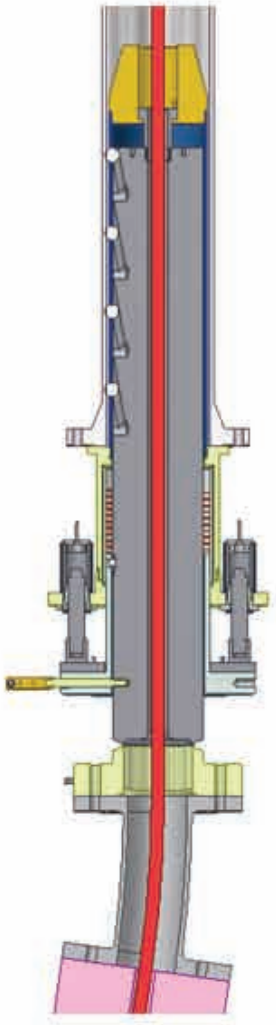
TRELLEBORG

A joint venture with Trelleborg Offshore.

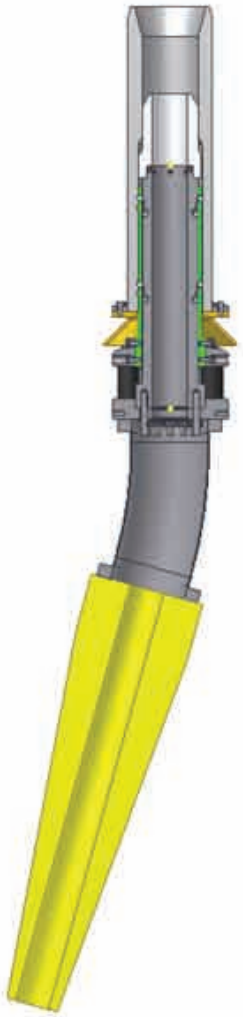
Trelleborg Offshore bend stiffeners have been in service for over 10 years, protecting and supporting all types of dynamic risers (umbilicals, power cables and flexible risers).

The cone-shaped polyurethane mouldings are individually engineered with Trelleborg Offshore proprietary software (FEA) and produced in Trelleborg Offshore's moulding facility, utilising state of the art polyurethane processing equipment, giant ovens within a highly controlled factory

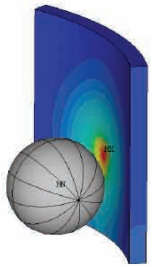
Interface Options



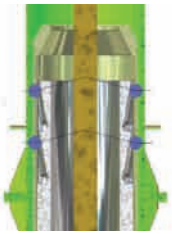
Type 1 DBSC, interfacing with a I-/J-tube



Type 2 DBSC, interfacing with a receptacle



Localised FEA studies



Bending moments and load-path analysis

Design Optimisation and Qualification

Using ball-and-taper technology, the Ballgrab connector design is optimised with bending moments and load-path analysis, system FEA and Fatigue Analysis. 3D modelling of the complete tool facilitates the production of bend and shear stress studies.

The high-grade steel connectors are manufactured from precision-machined forgings, coated with thermally sprayed aluminium (TSA) and use Super Duplex components.

To qualify the DBSC, a series of fatigue and pull-in tests were specified with DNV consultation and a test rig was designed and built in-house.

In-house test rig

Pull in test

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