Do more with less: high-performance fibre rope for efficient subsea hoisting

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Panellist documents

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Page 30: David Cannell, TechnipFMC UK
Fibre ropes in hoisting systems

Freedom in choice of solutions and materials for cost efficiency and performance in lifting operations

Vidar Åhjem
02 September 2020
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The standards are ready

**OFFSHORE STANDARDS**

DNVGL-OS-E303  Edition July 2018

Offshore fibre ropes

**STANDARD**


Rope based deployment and recovery systems for designated service
Functionality is essential – you have the freedom to choose the solutions

- Functionality for user
- Design philosophy for the system
- Components and parts
- Assurance of functions
Why the need for assurance of functions under E407?

- The purpose of lifting equipment is to provide “user functions” over prolonged periods of time.

- The same user functions can be provided by very different solutions.

- Different solutions and materials have different modes of failure.

- Therefore different equipment rely on different assurance methods and input data.

- Hence the E407 standard does not take a one-size-fits-all approach.
Key principles behind DNVGL-ST-E407 for rope-based hoisting systems

- In practice, the person responsible for lifting operations needs to decide if
  - the (well-used) system can (still) be used for the intended operations, or if
  - the system cannot be used for the intended operations (maintenance / change of rope required)

- The assurance of the functions shall provide the basis for making that decision.

- Innovation and development is taking place in the industry, and different technical solutions and types of rope and rope materials are available.

- Consequently the choice of design philosophy needs to remain open, so the E407 standard does not specify assurance methods, technical solutions or choice of materials.

- The design philosophy is expressed by the choice of methods for assuring the functions.

- The validity of methods chosen for assuring the functions is the focus of certification using E407.
Balancing acceptance criteria and limits depending on design philosophy

Focus on products

Focus on use

VS.
Design philosophy presented as argument

CLAIM

about functionality

METHOD

for supporting the claim

INFORMATION

needed by the method
Combined arguments for integrated systems
The E407 standard will be more modular in future versions
Thank you!
Hampiðjan Offshore
Hampidjan Warp

- Over 1,200 kilometers of Hampidjan’s DynIce Warp are now in use
- Most sold fiber rope for winches in the world
- Proven by Clausthal University in Germany to spool similar to steel wire, closest of any fiber rope tested
The perfect winch rope

- Low weight and high strength
- Good cycling bending performance
- Minimum temperature induced elongation
- Good spooling performance
- DNVGL-OS-E303 Certified
- Clear end-of-life and discard criteria
Construction and materials

Optimized rope properties:

- High lateral stiffness
- Steel-like properties
- High cross-sectional stiffness
- Strength member protected from particle ingestion and abrasion with tightly braided cover
Construction and materials

Optimized material selection:

- Good in bending fatigue
- Good abrasion resistance
- Limited heat induced irreversible elongation (creep)
- Can withstand long term loads at higher temperature
The engineered solution

Hampidjan **TechIce** meets today's demands for fibre winch ropes and solves operational challenges, safely and securely.
TechIce properties

- Lightweight
- High strength
- Great cyclic bending performance
- Heat resistant
- Limited irreversible elongation
- Real-time monitoring system developed
- End-of-life can be safely predicted
Next Generation Fiber Rope System

Ronny Hoff

September 2nd, 2020
Steel Wire Rope vs Fiber Rope

Steel wire rope

Fiber rope

6000 m

50 t  100 t  150 t  200 t  250 t
DO MORE WITH LESS
‘Traditional’ Crane

No extra components

Retrofitting
Multilayer winch

Rope requirements
<table>
<thead>
<tr>
<th>Fiber Rope Data Acquisition System</th>
<th>Wear</th>
<th>Twist</th>
<th>Temp.</th>
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<td>FRIDAS</td>
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Video feed

Position control

Powered hook
Key Takeaways

‘Traditional’ Crane
No extra components
Retrofitting
Monitoring system
New opportunities
High Performance Fiber Rope for Hoisting – Subsea Operations

David Cannell – Technical Manager
Rigid Pipeline & Installation Technologies
Without a rope, we cannot do our job
World beating wire ropes (nearly)

Skandi Africa – 4.7km x 135mm Ø rope
Deep Blue – 6.4km x 109mm Ø rope
Winch Types

- Seabed Worker – Drum winch
- Shell Perdido Spar – Double Capstan
- Parkburn DWC
- Kongsberg–CTCU
TechnipFMC direct replacement

Handling of rigging and abandonment wires in lay tower and over the reels
The challenges

- Perception
- Cost of entry
- Engineering Knowledge
- Experience