Enabling the use of Nylon in Permanent Offshore Mooring

Stein Are Anderson – Business Development Director
Who We Are

• Bekaert are a global leader in material science of steel wire transformation & coating technologies

• Widely known via our brands Bridon® & WRI® we supply mission critical ropes across a broad range of industry sectors

• We have extensive experience of deep-water mooring within the O&G sector, including pioneering synthetic ropes with polyester

• Offer a portfolio of stiffness characteristics, but believe nylon will be key to a cost-effective method of mooring offshore wind farms
Why Nylon?

• Nylon was the first man-made synthetic fibre & has been used in various applications.

• Nylon ropes tend to be specified for harsh applications such as single point mooring due to the elongation properties of the material.

• While these properties are desirable for absorbing high load impacts this typically results in more frequent rope replacements.

• It should be noted that the operating conditions of SPM differ to that of permanent offshore mooring.

• The combination of the right fibre, coating & rope construction will enable a rope lifetime for that is in line with market expectations.
Low Dynamic Stiffness is a Key Opportunity for Nylon

- Peak Load Reduction due to Higher Elastic Behaviour
- Reduction of Fatigue in Steel Components
- Overall Reduction of Component Sizes
- Cost Effective Solution in Shallow Waters (50-100m)
Tension Amplitude Impacts Dynamic Stiffness

- This also effects the tension response and therefore the fatigue life of the mooring line.
- While both nylon & polyester show distinct behaviours to the same tension and tension variations, nylon has shown to reduce the peak loads that then enables a reduced level of fatigue in the steel components.
Nylon is the Ideal Choice for Shallow Water Mooring

- Enabler for shallow water, especially where difficult environmental conditions exists

- Reduced Mooring Footprint / Shorter Ropes / Spread
- Higher Density of Turbines within Farm Area
Simulation Comparison

Exposed Site 50m Tension vs Excursion

Exposure Site 50m Rope Diameter vs Line Length

Floating Wind Solutions

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MoorLine Nylon

- High Tenacity Load Bearing Nylon Fibres & Abrasion Reducing Coating
- Core of Multiple Parallel Laid Load-Bearing Sub-Ropes
- High Performance Fabric Filter Layer Compatible with Nylon Elongation
- Polyester Braided Jacket with Other Material Options Available

Unlocking the advantages of synthetic mooring systems
Qualification of Nylon for Permanent Mooring Applications

• It is a Risk based approach for evidencing that the technology will function within specific limits with an acceptable level of confidence.

• In the case of MoorLine Nylon, it aims to demonstrate the suitability of the product for the intended application (permanent mooring), covering the full lifetime of the product (30 years).

• Technology qualification is an iterative and systematic process: MoorLine Nylon TQ process is currently in the Execution of the Qualification Plan.

Key Challenges & Considerations

Qualification Basis
Technology Assessment
Threat Assessment
Qualification Plan
Qualification Execution
Performance Assessment
Targets Met?
Technology Qualified
MoorLine Nylon TQ at Qualification Execution

- Statement of Feasibility – Passed
- Endorsement Qualification Plan – Passed

- Focus on previously identified knowledge gaps including long term characterization of key properties / testing of yarn, sub-rope & full rope
  - Example: Parameters influencing rope Cyclic Endurance
    - Mean Tension
    - Temperature
    - Cycle count
    - Tension Amplitude
    - Cycle frequency
    - Others...

- Expected conclusion date: End of 2024
Bekaert Synthetic Mooring – Our Offer

FLINTSTONE
CHALLENGE  IMPROVE  DELIVER

TFI Marine

Applied Fiber

Floating Wind Solutions
Thank You

Questions

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