

MSc Assignment

Fatigue model for Synthetic Fiber Ropes (SFR) on tugger-system



Huisman is a world leading designer and manufacturer of large equipment for the (offshore) renewables industry. For example, Leg Encircling Cranes (LEC's) for jack-up vessels are used for installation of windmill monopiles and turbines. The 'myHuisman data portal' records high-resolution data of our equipment in operation that is derived from controls- and sensor data with help of the latest time-series database and visualization technology. For the first time detailed historic insights are now available of usage and conditions during offshore operations in the wind industry.

A tugger winch is used to control the position of the load in the crane hook. A fatigue model for the SFR is desired to plan inspections and to predict the remaining lifetime of the rope. Different types of deterioration modes exist e.g., wear on the drum, bending over sheaves and heat due to repetitive bending might also play an important role. By analyzing the data, more insight can be gained in what the most relevant modes are.

Approach Investigate from the field what operational parameters play a decisive role in determining the lifetime of a SFR on a tugger winch from the help of operational data. By studying available lifetime theories, assumptions can be made which models are relevant. Proof the relevance of the assumed models with scale testing in Huisman Research laboratory in Schiedam.

**Research group & Company**

The **Surface Technology and Tribology (STT)** group will organize the research with a focus on surfaces and interfaces in an engineering context, as well as degradation mechanisms occurring at these surfaces and interfaces. The researcher will closely collaborate with **Huisman Equipment BV**, Schiedam, the Netherlands. Huisman will provide required support, knowledge, testing facility and materials for successful completion of this investigation as well as provide support for researcher's future career. In addition, company visits and occasional working at Huisman (Schiedam) is necessary.

Tasks:

- Perform literature review on synthetic fiber ropes.
- Study SFR fatigue models, academic test data and Huisman test data.
- Study Huisman cranes, applications and evaluate operational usage data and feedback.
- Conclude important parameters for SFR lifetime.
- Execute scale tests to show relationship of parameters and lifetime.
- Discussing the results and writing a scientific report.

Contact:

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