



OTC 19821

Performance Analysis of Mooring Hawser Prototypes Manufactured with Different Kinds of Constituent Materials

L. F. Haach, Cordoaria São Leopoldo S/A

Copyright 2009, Offshore Technology Conference

This paper was prepared for presentation at the 2009 Offshore Technology Conference held in Houston, Texas, USA, 4–7 May 2009.

This paper was selected for presentation by an OTC program committee following review of information contained in an abstract submitted by the author(s). Contents of the paper have not been reviewed by the Offshore Technology Conference and are subject to correction by the author(s). The material does not necessarily reflect any position of the Offshore Technology Conference, its officers, or members. Electronic reproduction, distribution, or storage of any part of this paper without the written consent of the Offshore Technology Conference is prohibited. Permission to reproduce in print is restricted to an abstract of not more than 300 words; illustrations may not be copied. The abstract must contain conspicuous acknowledgment of OTC copyright.

Abstract

This work aims to investigate the performance of double-braided hawsers manufactured with different kinds of raw material in order to achieve experimental results to confirm that hybrid ropes – a polyester jacket and a polyamide (nylon) core – may potentially present a service life time longer than 100% polyamide ropes and improved performance compared to 100% polyester ropes in mooring applications as well. This goal may be achieved by means of a construction which counterbalances the elongation between core and cover, combining the physical and mechanical properties of these two raw materials. Polyamide is a raw material with high mechanical shock absorption due to its quick elastic recovery. On the other hand, polyester has excellent resistance to ultra-violet radiation as well as abrasion and presents no water absorption. Polyester has excellent resistance to fatigue and to traction while exposed to high loads. Therefore, a balanced construction between these two materials may result in a product with distinct quality and performance.

1. Introduction

Based on our experience and preliminary studies, we have always supported the thesis that one of the factors which could extend the service life of mooring hawsers was the use of composite hawsers: a polyester jacket and a polyamide core. Our technical argument advocated the idea of a considerably balanced structure as regards elongation, for while the rope core has long pit length, the jacket has short pit length. This blend was assumed to ensure that the hawser has a better performance towards ultraviolet rays and greater traction resistance when wet, as well as higher abrasion resistance. However, we recommended that this suggestion be tested.

By means of laboratory tests carried out in compliance with the manufacturing, inspection and testing standards from the OCIMF guidelines, our study aims to compare the performance of mooring hawsers of the same double-braided structure (2-in-1) but with different constituent materials and some parameters. For that purpose, polyamide and polyester yarns were purchased especially to be used in this study by means of which the four hawser prototypes were tested, and are specified as follows in Figure 1, 2, 3 and 4.

Figure 1 – Double-braided polyamide (PA) 100% rope



Double braided rope with 100% polyamide rope and jacket, diameter 48 mm (6" circumference).
Material specification: nylon - PA 66.

Figure 2 – Double-braided high elongation polyester (PET) 100% rope



Double braided rope with 100% polyester rope and jacket, diameter 48 mm (6" circumference).
Material specification: polyester - PET 1high elongation. CSL development.