Synthetic rope termination for high-strength fiber ropes: Lightweight, durable and strong

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The novel rope termination for high-strength fiber ropes is a permanent, form-fitting connection which is both durable and strong. In addition, it allows for easy integration of sensor-based monitoring. The novel technology makes it possible to produce a tightly closed part from a castable, hardened material that is positively connected with the filaments of the rope through recasting or forming. Its geometry can be adjusted to meet the specific requirements of each application.

- High breaking strength and excellent tension threshold force performance
- Low inherent weight
- Stable connection even if the rope is often loaded and relieved
- Less space required, including installation space
- Sensor elements can be easily integrated
- Low production costs

Fields of application

- Bridge construction
- Lifting and conveying equipment
- Cranes
- Offshore applications
- Marine engineering

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Development Status
TRL9 - marketable

Patent Situation
DE 502011011643.8 granted
EP 2547929 B4 (GB, AT) granted
CN 102893056 B granted

Reference ID
09/094TLB

Service
Technologie-Lizenz-Büro GmbH is responsible for the exploitation of this technology and assists companies in obtaining licenses.

Background

Rope terminations are used to attach wire or fiber ropes to a holding device or anchorage. They must meet high standards as they have to transfer forces to the rope. The novel rope termination for high-strength fiber ropes is a permanent, form-fitting connection which is both durable and strong. In addition, it allows for easy integration of sensor-based monitoring. Be it bridge construction, lifting and conveying equipment or cranes, offshore applications and marine engineering – this solution can be used wherever steel cables are to be replaced by fiber ropes.

Problem

Due to the large variety of possible applications there is a wide range of state-of-the-art rope terminations on the market. The manufacturing processes of conventional permanent rope end connections are relatively costly and further additional construction parts are required which adds to the overall cost of the process. In order to shed light on the load condition of the rope termination and the rope itself, it has so far been necessary to use complex mechanical rope end connections. For example, a detachable rope termination (the rope lock) is used to measure the load condition. Sensor components are attached to the outside of the lock.

Solution

The fiber ends of the rope are cast under preloading so that they are spread over the entire structure of the final part or are condensed in certain areas depending on the required force transmission. Sensor elements for measuring various operating parameters can be cast directly in the end part when the rope termination is made. The novel technology makes it possible to produce a tightly closed part from a castable, hardened material that is positively connected with the filaments of the rope through recasting or forming. Its geometry can be adjusted to meet the specific requirements of each application. In previous tests, the rope termination produced in this way reached the minimum breaking load. They also showed an excellent tension threshold force performance.

Prototypes of the new rope end connection [Institute of Materials Handling and Logistics, University of Stuttgart]