



The Department of Engineering & the Marine & Carbon Lab invite you to the talk:

Unexpected Failure of Subsea Critical Connector Bolts

Abstract

Offshore rigs, subsea equipment and, especially, subsea critical connectors are working under severe conditions. Usually, the failure of such critical connectors can prove environmentally catastrophic or could lead to the loss of human



lives. This study focuses on simulating the service conditions of a subsea application placing special attention on several parameters such as: the pre-load torque that was used to tighten the bolts, the subsea water current and the performance of the impressed current cathodic protection (ICCP) system that is commonly used to protect the subsea equipment. In order to determine the relationships between the different parameters, a new approach is presented that opens a window into the corrosion process that manifests during subsea applications.

A multi-facet approach was used to simulate the parameters tied to the subsea service conditions. In parallel, real-time monitoring and big data collection was used to generate new insights into the corrosion mechanism. The proposed experimental system is inexpensive and easy to run with a computer interface. “Arduino” was used as the microcontroller unit mainly because it is based on open source software that makes it very attractive in terms of cost, programming and operation. Eight ASTM A193 Grade B7 bolts were tested during the experiment. A finite element method (FEM) model was developed to predict the structurally vulnerable areas of the bolts. Results revealed a strong correlation between: 1) the reference electrode magnitude, 2) the electrical current and 3) the water temperature. While the temperature is rising, the performance of the cathodic protection diminishes. The impressed current cathodic protection activation liberates hydrogen gas which seems to be absorbed by the metal. Hydrogen embrittlement cracks were observed at the bolt cross-sections.

Speaker’s bio:

Mr. Ofer Medlinsky is currently a PhD candidate in Oil, Gas & Energy Engineering at the University of Nicosia. He holds a BSc and an MSc in Materials Engineering from the Ben-Gurion University, Israel, and an MBA from Herriot-Watt University-Israel campus at Ramat Gan. He worked as a lubricants department manager for Chevron Israel between 2007 to 2011 and as a Group Leader for Intel (fab28) between 2012 to 2016. Ever since 2017, Mr. Medlinsky is employed as an Adjunct Lecturer at the Mechanical Engineering Department at SCE - Sami Shamoon College of Engineering. Ofer research interests focus on materials science and metallic corrosion. In his spare time, Ofer likes camping with his family and friends and he is an avid table tennis player.

The talk to be delivered in English will be lived streamed via WebEx: www.webex.com;
Link: <https://bit.ly/3HMWpiK>; Meeting number: 27328058343; Meeting Pass: qxFcc4bSs25. For more info please visit the Marine & Carbon Lab: www.carbonlab.eu

Venue/Date: Online; Wed., 24th Nov., 2021.

Time: 10:00-11:00am