

TUTORIAL PROPOSAL

1. Electrification of Subsea Process Plants, why and how

2. Abstract

Exploitation of Oil and Gas deposits from below sea surface is increasing and the production technology is moving from using fixed platforms/floating vessels towards locating all production and processing equipment on the seabed. Processing equipment such as pumps and compressors need a large amount of electric power, which has to be provided from shore, platforms or floating vessels. The Tutorial will touch on the challenges for oil and gas production and transportation and provide background for the need of pumps and compressors and the required electric power to meet the flow and process needs.

Different Electric Power Transmission and Distribution Systems will be presented and discussed related to the application and physical limitations. Critical components such as transformers, VSD's, Switchgears, cables and Connections will be presented including challenges and limitations seen from a subsea perspective.

Electrification of seabed electric consumers is challenging, not only because of all components being submerged in seawater at water depths down to 10000 feet/3000m, but also the required accessibility to repair/exchange the components by regular maintenance and /or in a "fault situation". This shall be taken into account in the modularization and the subsea lay-out in order to achieve the required availability of typical 98%.

Consequently all electric components has to undergo severe qualification testing prior to being installed subsea following agreed test schedules to meet required TRL (Technical Readiness Level). The TRL levels and requirements will be displayed and an example from electrical wet mate connector qualification will be briefly presented. As subsea electrification is a relatively new technology and application area, Subsea Standards are not very well developed. However, several Oil Companies are cooperating in developing common standards, with the intention to transfer these to IEEE/IEC standards. The first Standard following this path is on Connections, with more to come. The tutorial will inform briefly of the ongoing work.

Finally the Tutorial will look at future challenges and potential solutions for transmission on long distances, (DC) and taking components down to very deep waters. (Pressure Tolerant solutions)

3. Outline of Tutorial

1. General Introduction
2. Drivers for Subsea Electrification
3. Typical Electrical Power Systems
4. Critical components/products
5. Qualification and Standards
6. Future solutions
7. Summary

4. Lead Instructor

Svend Erik Rocke

Chief Consulting Engineer

Subsea Power

GE Oil & Gas

Phone +47 66985488

Mobile+47 95827297

E-mail svend.rocke@ge.com

5. Other Instructors

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6. Instructor Bios



Svend Rocke has been engaged in Oil and Gas, Subsea since 1985. Current position is Chief Consulting Engineer Subsea Electrical power, GE Oil & Gas Norway, responsible for subsea electrical technology in GE's local center of excellence. He has over 33 years of experience in the design of Subsea Power Products and Systems including Umbilical's, Electrical Connectors, VSD's, Transformers and Transmission & Distribution systems. He has held various positions in Engineering, R&D and most recently as Director of Subsea Power Functional Engineering. In recent years, he has been central in the start and growth of the GE Oil & Gas, Subsea Power section. As part of his dedication to Subsea Power he is holding four patents and has three pending on Subsea Products and Connections.

Academic background includes a B.Sc. in electronics with additional education in management and international operations He has been presenting at major conferences like DOT, OTC and several other conferences inside and outside Norway, Intsok, SPE, OG21, IFEA, SPC, Artic Conference, etc.