

DEEPWATER

OFFSHORE CATHODIC PROTECTION COMPREHENSIVE TRAINING COURSE

Deepwater offers a weeklong course providing a detailed look at offshore corrosion and the methods used to control it.

The class is composed of 16 modules of approximately 90 minutes each for non-English speakers with no CP experience, a total of 5 days. However, based on the level of knowledge and experience, the course can be shortened to 3 days. The modules are interspersed with hands-on demonstrations in a fish tank including empirical construction of the galvanic series, EFG measurements, permanent monitoring, mutual interference, etc. Additional modules are also available.

Modules:

1. Background

- a. What is Cathodic protection?
- b. Types of CP
- c. CP history and offshore technologies
- d. Categorization of corrosion
- e. Offshore corrosion zones (external)
- f. Corrosion control methods

2. Offshore corrosion morphology

- a. General corrosion
- b. Crevice corrosion
- c. Pitting corrosion
- d. Coating delamination
- e. Galvanically aggravated crevice
- f. Galvanic corrosion
- g. CRA corrosion
- h. Erosion corrosion
- i. MIC

3. Offshore Corrosion Theory

4. Cathodic Protection Theory

5. Cathodic Protection Theory II

6. CP Design for Offshore Structures I

- a. Corrosion rates in seawater
- b. Corrosion allowances
- c. Effect of velocity on corrosion rate
- d. Corrosion rate as function of depth
- e. Design for Offshore structures
- f. Cathodic protection of pipelines (DNV RP F103)

7. Design for offshore structures II

- a. General subsea cathodic protection design (DNV RP B401)
- b. Design procedures
- c. Example designs

8. Design for offshore structures III

- a. Computer simulation and modeling

9. Design for offshore structures IV

- a. Anode selection (SACP)
- b. Alloying
- c. Historical alloys
- d. Anode testing
- e. Anode incompatibilities
- f. Anode selection (ICCP)
- g. Anode resistance examples
- h. Anode lifetime examples

10. Monitoring I

- a. Anode inspection

- b. CP Measurement types
- c. Interpretation of CP readings
- d. Drop cells
- e. Contact probes

11. Monitoring II

- a. ROV survey techniques
- b. Electric Field Gradient
- c. Application of EFG to pipelines

12. Monitoring III

- a. Reference Electrodes
- b. Peterson's Nomogram
- c. Pipeline inspections – historical methods (close interval)
- d. Pipeline inspections – progressive
- e. Fundamental differences between onshore and offshore pipeline survey
- f. AUV methods
- g. In-line CP inspection methods

13. Monitoring IV

- a. Permanent monitoring for pipelines
- b. Permanent monitoring for platforms
- c. Long-term reference electrodes
- d. Current density monitoring
- e. Light activated monitoring
- f. Remote station monitoring

14. Retrofit options I

- a. Supplemental CP
- b. Pipeline retrofits
- c. Clamp-on anodes
- d. Mattress integrated anodes
- e. Sled anodes
- f. Vertical sleds (PODS)
- g. Surface-installable anodes

15. Retrofit Options II

- a. Pipeline corrosion failures
- b. Attenuation modeling
- c. Computational attenuation modeling

16. Retrofit Options III

- a. Example SACP platform CP design
- b. Retrofit Case studies – SPAR
- c. Retrofit Case Studies – FPSO
- d. Retrofit Case Studies: flow lines, subsea equipment
- e. Retrofit Case Studies – SCR

17. Retrofit Options IV

- a. Example ICCP FPSO CP design



TRANSPORTABLE

The course can be presented at your facilities anywhere in the world.



A GREAT RESOURCE

Deepwater's course is invaluable for asset integrity managers and technicians.

CREVICE CORROSION



Topside crevice with the destruction in the water trap. Corrosion process will deteriorate the metal to the electrode.

Most crevice corrosion equipment occurs on equipment is broad surface and not washed down.

DEEPWATER

LEARN FROM EXPERTS

The course is presented by Deepwater's corrosion engineers and scientists.

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