Cathodic Protection

Cathodic Protection for Pipelines, Storage Tanks and Process Industrial Plant Assets - 2 days

2018

Major Benefits of Attending

- **APPRECIATE** the fundamentals of Cathodic Protection design
- **BE MADE AWARE** of innovative technologies
- **UNDERSTAND** how to dramatically reduce the time required to engineer, design, install and commission Cathodic protection
- **CONSIDER** the types of cathodic Protection
- **ADDRESS** the decisions to be made when optimising your in-service life-cycle.
- **EVALUATE** the scope of corrosion related repairs
- **COMPARE** the value of upgrading your Cathodic Protection
- **LEARN** the major elements of benefits of Cathodic Protection

Why you Should Attend?

Cathodic protection can, in principle, be applied to any metallic structure in contact with a bulk electrolyte. In practice its main use is to protect steel structures buried in soil or immersed in water. It cannot be used to prevent atmospheric corrosion.

Therefore, Structures commonly protected are the exterior surfaces of pipelines, ships hulls, jetties, foundation piling, steel sheet-piling, and offshore platforms. Cathodic protection is also used on the interior surfaces of water-storage tanks and water-circulating systems.

This training course is provided for personnel who, for their work, need to understand some of the principles of cathodic protection.

Who Should Attend?

This training is highly recommended for Managers and Engineers involved in the following capacities:

- ✓ Oil, Gas, Fuels, Water and other products Pipelines
- ✓ Above-Ground Storage Tanks
- ✓ Health, Safety and Environment
- ✓ Inspection
- ✓ Loss Prevention
- ✓ Operations and Maintenance
- ✓ Technical and Mechanical
- ✓ Plant
- ✓ Production and Process
- ✓ Project Planning
- ✓ Pipeline, Storage Tank Design
- ✓ Pipeline, Storage Repair

It is also crucial for personnel involved in the operation and maintenance of pipeline and Assets within these industries:

- ✓ Chemical and Petrochemical
- ✓ Oil and Gas
- ✓ Refineries
- ✓ Steel Mills
- ✓ All Industrial Assets

Organized by:

WE SOLVE YOUR TRAINING NEEDS.

Workshop Overview

Anyone working on or associated with Industrial Assets - Plants – Cathodic protection systems, as the '**Aim'** of this course is to provide you with the knowledge and practical skills necessary to inspect, assess, trouble shoot and maintain the Cathodic Protection Systems. The '**Objectives'** by the end of the course you will be able to:

- Understand the fundamentals of Cathodic protection
- Have an understanding of Cathodic protection and Operating Conditions.
- Demonstrate good Inspection and Maintenance practices.
- Demonstrate fault finding through practical experience.

Outline

Day 1

SESSION 1 – CATHODIC PROTECTION

- **Principles of Cathodic Protection:** electric current, Anode, Cathode, materials.
- **Application of Cathodic Protection:** factors to be condidered – coatings, electrical continuity, isolation.
- **Practical Applications of Cathodic Protection:** Galvanic Anode Systems, Impressed Current Anode System.

SESSION 2 – CATHODIC PROTECTION DESIGN

- **Soil Surveys:** identification of factors governing the corrosion process, criteria for Cathodic protection of steel, current density, determining Cathodic Protection system type.
- **Galvanic Anode System Design:** determining **anode** parameters of type, weight and location.
- **Impressed Current Anode System Design:** soil resistivity, power supply, remoteness, ease of construction, land acquisition, groundbed type, anode type, backfill. Design calculations, current attenuation, transformer rectifiers, test posts, special considerations.

SESSION 3 – COATINGS (Part 1 of 2)

- **General:** application, adhesion, impact resistance, flexibility, resistance to soil stress / flow / water / growth / bacteria / cathodic disbondment, dielectric strength, chemical and physical stability.
- **Surface Preparation:** manual / abrasive blast cleaning, improving furnace efficiency.
- **Coal Tar Enamel Coatings:** description, advantages and disadvantages, field joints and coatings repairs.

SESSION 4 – COATINGS (Part 2 of 2)

- **Fusion Bonded Epoxy Coatings:** description, advantages and disadvantages, field joints and coatings repairs.
- **Polyethylene Coatings:** description, advantages and disadvantages, field joints and coatings repairs.
- **Tape Wrap and Other Joint Materials:** Self-Adhesive PVC Bituminous Laminate Tape, other tapes.
- **Epoxy and Urethane Liquid Applied Coatings:** description, advantages and disadvantages.
- **Weight Coatings**

Day 1 - CASE STUDIES:

West Africa – 1960's build Refinery Fuel, Oil Storage Tank Farm, original designed without Cathodic protection. Upgrade tank repairs and Cathodic Protection Design and instalation.

Outline

DAY 2

SESSION 5 – PIPELINE SURVEY TECHNIQUES.

- **Close Interval Potential (CIP) Survey:** Principle of Survey, equipment, procedure, data, manpower, advantages, disadvantages.
- **Pearson Survey:** Principle of Survey, equipment, procedure, data, manpower, advantages, disadvantages.
- **Signal Attenuation Coating (SAC) Survey:** Principle of Survey, equipment, procedure, data, manpower, advantages, disadvantages.
- **DC Voltage Gradient (DCVG) Survey:** Principle of Survey, equipment, procedure, data, manpower, advantages, disadvantages.
- **Information to be Provided by Pipeline Operator**.
- **Information to be Provided by the Survey Contractor.**
- **Summary.**

SESSION 6 – SAFE WORKING PROCEDURES

- **Introduction.**
- **General.**
- **Electrical Dangers:** Transformer Rectifiers, Buried Groundbeds, Induced Alternating Voltages and Currents,
- **Favourable Weather Conditions.**
- **Installations in Hazardous Atmospheres:** General, Disconnection of Piping, Bonds, Insulated Flanges / Isolating Joints, Electrical Equipment, Test Instruments,

SESSION 7 – OPERATING PROCEDURES

- **General.**
- **Routine Monitoring:** Monthly, Six Monthly – Yearly, Two Yearly.
- **Routine Maintenance:** Transformer Rectifiers, Test Post and Pillars, Groundbeds, Isolating Joints/Insulated Flanges.
- **Fault Finding:** Sacrificial Systems, Impressed current System.
- **Instrumentation:** Volt meters, Ammeters, Resistance Meters, Instrument Calibration, Reference Electrodes.

SESSION 8 – RELATED STANDARDS SPECIFICATIONS AND CODES OF PRACTICE

Day 2 - CASE STUDIES: U.K. Field pipelines cathodic Protection upgrades – Engineering papers of intent, upgrade evaluations for scoping and preparing ITT proposal BOQ (Bill of Quantities), proposal upgrade methodology. Technical upgrade bid evaluations, planning and scheduling the upgrade, contractor mobilisation, upgrade Cathodic protection workforce and supervision.

CLOSE OUT

- Methods
- Troubleshooting
- Start-up

program schedule

08:30	Registration
09:00	Morning Session Begins
10:40 - 11:00	Refreshments & Networking Break
12:45	Luncheon
14:00	Afternoon Session begins
15:30 - 15:50	Refreshments & Networking Break
17:00	Course Ends

► Workshop facilitator

Robin Dargavel
Key Expert – Engineering, Construction and Maintenance Training
DARGAVEL ENGINEERING LIMITED

Robin Dargavel is a versatile and highly skilled, BEng (Hons) Degree Qualified Engineer - Project Manager, Senior Facilities Engineer, Chief Surveyor, Consulting Engineer and founder at Dargavel Engineering Ltd. Robin has over 25 year's experience in Oil & Gas, Petrochemical, Process and Nuclear Power Generation industries. That experience includes Engineering, Project Management, Independent Expert Witness/ Adviser on Engineering Issues, positions with responsibility for the engineering, design, procurement, construction, commissioning, and start-up of a variety of projects both in the UK and worldwide. In recent years, Robin has been working extensively in Aberdeen, Scotland on North Sea offshore and associated onshore assets as a consulting Senior Facilities Engineer for major oil and gas operators, since returning to the U.K. after twenty years of working overseas for oil companies in mechanical/ process disciplines in Yemen, Kazakhstan, Vietnam, most of West Africa, Libya, Israel, Qatar, U.S.A. (and others). Robin is an active member of an assortment of Engineering Institutes within the U.K.

Experienced in Cathodic protection;

- Pipeline Engineering and Design
- Pipeline Construction
- Pipeline Operations and Maintenance.
- Storage Tank Engineering and Design
- Storage Tank Construction
- Storage Tank Operations and Maintenance.
- Coatings Applications
- Start-up and shutdown
- Soil Surveys
- Pipeline Surveys

Industry Sectors Experience:

✓ Oil & Gas
✓ Fuel Storage and Distribution
✓ Chemical & Petrochemical
✓ Renewable Energy
✓ Environmental
✓ Power Generation & Utilities
✓ Pipelines and Facilities

► Professional Memberships: MIPlantE, MIET, MWeldI, MInstNDT, SOE, EWI

Industry	Action	Results
Oil and Gas - LNG Plant	Developed a more efficient system to renew LNG Storage Tank Bund Pearlite.	Highly effective reduction in Plant Shutdown durations.
Oil and Gas – Offshore Production	Established a Maintenance Project Costs Control Procedure.	Improved project efficiencies for offshore production projects.
Oil and Gas - Pipelines	Established an Evaluation system for Technical Bid Proposals.	Highly effective Technical Bid Evaluations.
Oil and Gas – Refinery	Developed Oil Storage Tank Repair Engineering Procedures and Method Statements.	Improved repair efficiencies, reduced production shutdown.

► Partial List of Clients

- √ BP
- √ Dietsmann
- √ DUSUP
- √ ENI
- √ Jacobs
- √ Lloyd's Register
- √ Parsons Brinkerhoff
- √ Penspen
- √ Qatar Petroleum
- √ Saipem
- √ TOTAL
- √ Yemen LNG Company
- √ Zuetina Oil Company

► Testimonials

"Robin's training on Pipeline Maintenance was extremely appreciated by my team, very knowledgeable. **"Andy Band, Director, Band Consulting Ltd.**

"Robin's method of training is from hands-on experience, specifically regarding Oil and Gas Flow Fiscal metering." **Daniel Delahaye, Consultant Pipeline Engineer, Delahaye Engineering Ltd.**