



FE168: Pipeline Pigging, In Line Inspection and Integrity Assessment

Training Description:

Corrosion is a dominant contributing factor to failures and leaks in pipelines. The high cost of corrosion and corrosion control in multiphase (oil, gas, and brine) pipelines represents a significant operating expense for the field. Corrosion severely affects pipeline operations, leading to lost production, unscheduled downtime for maintenance or repair, and even catastrophic failure that impacts health, environment, and safety. Maintaining the ageing infrastructure such as underground pipelines is always a challenge to facility owners worldwide.

This intensive training course covers internal pipeline corrosion, inline inspection and assessment methodology, and pigging technology. A practical field guide for investigating internal corrosion of pipelines is also presented.

Training Designed for:

This course is intended for Engineers and technologists who are in charge of pipeline integrity, Technicians and maintenance personnel who deal with pipeline inspection and maintenance and Facility owners and users who are concerned with pipeline internal corrosion.

Successful completion of this corrosion course helps participants prepare for their NACE certification examinations at the Corrosion Technician, Corrosion Technologist and Senior Corrosion Technologist levels.

Training Requirement:

“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

FIVE DAYS:

- ❖ **Natural Gas Internal Pipeline Corrosion**
 - Definition
 - The threats and impacts of internal corrosion in the oil and gas transmission systems
 - Natural gas transmission systems vs. oil or mixed-phase transmission systems
 - Internal corrosion vs. external corrosion
- ❖ **Different forms of internal corrosion**
 - Uniform Corrosion
 - Localized Corrosion
 - Pitting
 - Crevice Corrosion
 - Mesa Corrosion
 - Weld Zone Corrosion
 - Environmentally Assisted Cracking (EAC)

- Flow-Assisted Damage
- ❖ **Internal Corrosion Mechanisms**
 - Galvanic Corrosion
 - Concentration Cells
 - Environmentally Assisted Cracking Mechanisms
 - Hydrogen Damage
 - Hydrogen Induced Cracking (HIC)
 - Hydrogen Embrittlement (HE)
 - Stress-Oriented Hydrogen Induced Cracking (SOHIC)
 - Sulfide Stress Cracking (SSC)
 - Stress Corrosion Cracking (SCC)
 - Liquid Metal Embrittlement (LME)
 - Flow-Assisted Damage Mechanisms
 - Erosion
 - Impingement
 - Erosion-Corrosion
 - Cavitation
- ❖ **Exercise/practical session**
- ❖ **The Corrosive Species and their effects on internal corrosion**
 - Carbon Dioxide (CO₂)
 - Hydrogen Sulfide (H₂S)
 - Oxygen
 - Microbiologically Influenced Corrosion
- ❖ **The type of pipelines affected by internal corrosion**
 - Upstream Petroleum Production Pipelines
 - Transmission Pipelines
 - Distribution Pipelines
 - Pipeline Facilities
 - Other Service Pipelines
 - Exercise/practical session
- ❖ **Internal corrosion inspection and assessment methodology**
 - Inspection methods
 - Direct Assessment Methodology
- ❖ **Internal corrosion monitoring**
 - Details of failure
 - Direct Intrusive Techniques
 - Direct Non-Intrusive Techniques
 - Indirect Methods
 - Monitoring techniques

- ❖ **Modeling and Prediction of Internal Corrosion in Pipelines**
 - Corrosion rate prediction flow chart
 - CO2 Corrosion prediction models
 - CO2 Corrosion model validation matrix and index score system
- ❖ **Exercise/practical**
- ❖ **Control and Treatment of Internal Corrosion**
 - Eliminating the Corrosive Environments
 - Altering Operating & Maintenance Procedures (e.g. Regular Cleaning by Pigging)
 - Chemical Treatment (Inhibitors & Biocides, pH stabilisation)
- ❖ **Design to Prevent Internal Corrosion**
 - Design and Operation
 - System Design
 - Gas Transmission Pipeline Drips
 - Dead Legs/Ends
 - Pipeline Fittings
 - Compressor Stations and Associated Piping
 - Water Removal
 - Removal of Potentially Corrosive Gases
 - Modifying Flow Characteristics
 - Physical Design Changes
 - Selecting and Implementing Appropriate Methods
 - Effectiveness of Mitigation Method
- ❖ **Optimization of Internal Corrosion management Program**
 - Risk management
 - Risk identification
 - Risk evaluation
 - Risk mitigation
 - Risk monitoring
 - Risk based decision making
- ❖ **NACE Standards on International Corrosion**
- ❖ **Field Guide for Investigating Internal Corrosion of Pipelines**
- ❖ **Introduction to Pigging Technology**
 - How pigs work
 - Pig functions and selection
 - Pipeline design for pigging
 - Pigging techniques
- ❖ **Pigging for Pipeline Integrity Assessment**
 - The needs for pigging
 - Overview of pipeline internal inspection and monitoring methods and capabilities

- Advanced ILI technologies: what methods are available for the pipeline industry?
- Capabilities and functions of ILI tools: what can they do?
- ❖ **What Pipeline Operators Need to Know About Pigging:**
 - Type of pigs available
 - How intelligent pigs work
 - Piggable vs unpiggable pipelines
 - Impact of pigging inspection on the operation of pipelines
 - When to use intelligent pigs
 - Budgeting for ILI inspection
 - Typical costs of ILI inspection
 - Selection of intelligent pig for pipeline internal inspection
 - Comparison between low resolution (1st Generation) and high resolution (2nd Generation) MFL pigs
 - Reliability of intelligent pigs
 - Accuracy of intelligent pigs
 - Comparison between UT pigs and high resolution MFL pigs
 - Detection of cracks in pipelines by intelligent pigs
 - Inspection by intelligent pigs vs. in-service hydrotest
 - Consideration of 'fingerprint' ('baseline') inspection
 - When, and How frequent, ILI tools should be used for pipeline internal inspection
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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