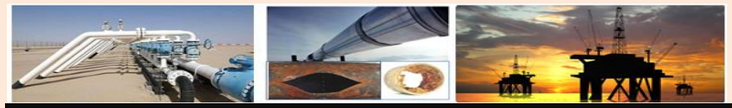
Integrated Mechanical Material Corrosion Consulting
Leaders in Structural Reliability

ESIS

WORKSHOP



INTEGRITY MANAGEMENT OF OIL & GAS ASSETS

Organized by

THE 6TH INTERNATIONAL CONFERENCE ON FRACTURE MECHANICS OF MATERIALS & STRUCTIRAL INTEGRITY

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TOPICS

HYDROGEN-INDUCED CRACKING IN STEEL & ENVIRONMENTAL CRACKING MECHANISMS

Hydrogen-Induced Cracking (HIC) is one of several related mechanisms whereby absorbed hydrogen atoms can compromise the integrity of components manufactured of low strength steels. This course principally addresses environmental embrittlement mechanisms active in sour gas production - i.e., occurrences in pipelines and pressure vessels handling sour gas and oil (upstream and downstream operations), gas transmission pipelines, etc.

Sulfide Stress Cracking (SSC) is one of numerous “environmental embrittlement” mechanisms whereby a metal or alloy exposed to an aqueous or moist gaseous environment containing hydrogen sulfide (H_2S) – a “sour environment” - can fail catastrophically.

The deleterious effects of hydrogen can be reduced or even eradicated through cautious selection of base metals, weld metals, and fabrication practices, as well as adherence to procedures.

HYDROGEN-INDUCED CRACKING IN LOW STRENGTH STEEL

- **Introduction and Definitions.**
- **Extent of the Problem: O**ccurrences in pipelines and pressure vessels handling sour gas and oil (upstream and downstream operations), gas transmission pipelines, etc.
- **Mechanisms: I**ncluding the metallurgical and environmental conditions affecting the likelihood of HIC development. The related mechanism “Stress-Oriented Hydrogen-Induced Cracking” will also be described.
- **Laboratory Testing Methods,** and HIC-resistant steel purchase, quality assurance testing and acceptance criteria; e.g. HIC-resistance tests and steel specification, quality ....etc.
- **Metallurgical Control:** New construction or replacement materials and specification of HIC-resistant steel.
- **Environmental Control Options:** Chemical inhibition, coatings, development of protective scales, etc.

Understanding these factors is of great importance to minimize and control corrosion and material failure in many industrial applications as well as pipeline.

PIPELINE STRESS CORROSION CRACKING (SCC) MANAGEMENT

Stress-corrosion cracking (SCC) is thought to be responsible for many pipeline failures each year, it continues to be a safety concern to pipeline operators and government regulatory agencies, and it must be addressed in integrity management plans. This course will provide a detailed description of what is known about the appearance and causes of SCC and it will discuss various approaches to mitigating and managing the problem.

The course will_provide an introduction to SCC and an overview of SCC risk management.

An overview will be given of high-pH and near-neutral-pH stress corrosion cracking (SCC), including factors related to SCC and susceptibility assessments. Goals:

- Identify the factors needed for SCC to occur on buried transmission pipelines
- Explain the life cycle of SCC initiation, growth, coalescence and (potential) failure
- Identify factors that affect SCC growth rates, including crack interaction and coalescence
- Describe how SCC management decisions are made

Free Takeaways!

Participants will receive as "take-away" a series of scientific publications published by the author ...

Instructor

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Dr. Mimoun Elboujdaini has gained extensive research experience in engineering materials, and their properties and performance in various service environments. He has led many pipeline projects dealing with materials selection in oil and gas service, including stress-corrosion cracking (SCC), sulfide stress cracking (SSC), hydrogen-induced cracking (HIC) in H_2S environments, hydrogen embrittlement, fatigue and corrosion fatigue.

He has held positions as Senior Research scientist at the Department of Natural Resources Canada (NRCan), Advisor on Materials & Corrosion Engineering / Petroleum Development Oman (PDO) and Senior Materials Engineering Advisor / Blade Energy Partners USA. He was elected Executive Chairman of the Twelfth International Conference on Fracture, ICF12 (2005–2009) and ICF Vice-president (www.icfweb.org).

For Further Details/Information
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