

# The Management of Oil and Gas Assets: Materials Selection in the Oil & Gas Industries

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## Overview

This course gives a comprehensive review of materials failure and corrosion problems in industrial and strategic sectors. It also provides a review of the causes of degradation of materials and the methods for identification, monitoring and control of various types of corrosion/stress corrosion. An understanding of materials failures and its control is vital for any industrial activity seeking to avoid the high costs.

The metallurgical factor is the milestone of the right way for minimizing corrosion of components in application under the most corrosive environment. There are many metallurgical factors that affect corrosion, such as, chemical composition, material structure, alloying elements, mechanical properties, heat treatment, surface coating, welding and manufacturing conditions and stresses (residual or applied) which will be duly attended during the deliberations in the course. Understanding these factors is of great importance to minimize and control corrosion problem in many industrial applications. Since the environment plays an important role in materials corrosion, it will be made revealed that many corrosion problems viz. localized corrosion, corrosion fatigue, stress corrosion cracking (SCC), hydrogen embrittlement /sulfide stress cracking (SSC), intergranular corrosion etc. are of major concern for insurance of structural integrity of engineering components. That many of these corrosion failure problems can be prevented by a proper attention from the early stage of material manufacturing, processing, treatment and machining shall also be demonstrated during the proposed course.

The failure mechanisms will be examined for various types of corrosion and stress corrosion in process and allied petroleum industries. Factors affecting each of the various forms of materials degradation will also be presented. Ways of mitigating this degradation threat will be critically examined. The causative factors leading to corrosion failures will be given to be understood by the attendees in order that they can effectively select materials and design, fabricate, as well as utilize structures for optimum economic life of facilities and safety in harsh industrial operations. There are several methods for corrosion control: (i) proper material selection and design, (ii) metal coating, (iii) cathodic protection, (iv) corrosion inhibitors, (v) using non-metallic materials, etc. Special training will be provided to the participants such that they become capable of identifying the right solution to a particular corrosion/stress corrosion problem.

## Course Objectives

1. To enable participants to gain understanding about the Driving Force for corrosion of materials, vis-a-vis the concepts of electrochemistry, oxidation and reduction reactions, thermodynamics, kinetics, and passivity.
2. To impart knowledge of different forms of corrosion; specific mechanisms that result in each form of corrosion. Recognition and Prevention.
3. To develop specific skill to identify the definite form of corrosion and the possible methods for its prevention.
4. To infuse capability of participants for recognizing different types of corrosive environments that leads to corrosion and stress corrosion.
5. To discuss the strategy for analyses of corrosion failure and describe the testing methods for corrosion measurements.
6. Giving examples of how to control corrosion through design, material selection, modification of environment, protective coatings, and cathodic and anodic protection.
7. The goal is to show the attendees not only what they are learning has practical applications, but more importantly, how to apply their understanding of the basic principles to real problems.
8. To communicate structural health monitoring aspects of components under corrosive environment.
9. To empower senior students of host institution to design and implement state of the art research project of commercial importance.

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| <b>Dates</b>                   | <b>May 21-25, 2018</b>  |                  |
| <b>Host Institute</b>          | <b>Malaviya National Institute of Technology-Jaipur</b>   |                  |
| <b>Number of Credits</b>       | 25 hours Lecture and 10 hours Tutorials   |                  |
| <b>Participants</b>            | <b>Limited to 50</b>  |                  |
| <b>Who Should Attend</b>       | <b>Undergraduate, Post-graduate or Research Students of both Science and Engineering streams as well as from Industry</b>   |                  |
| <b>Course Registration Fee</b> | <b>Participants from MNIT Jaipur or other approved Institutes of GIAN</b>   |                  |
|                                | <b>Participants</b>   | <b>Fee</b>       |
|                                | <b>Students</b>   | <b>Rs. 2,000</b> |
|                                | <b>Faculty</b>  | <b>Rs. 5,000</b> |
|                                | <b>Government Research Organization Participants</b>  | <b>Rs. 8,000</b> |
|                                | <b>Industry Participants</b>  | <b>Rs. 8,000</b> |
|                                | <b>Participants from Abroad</b>   | <b>US \$ 100</b> |
| <b>Mode of Payment</b>         | <b>Demand draft in favour of <u>Registrar, MNIT Jaipur</u></b><br><b>Payable at Jaipur</b> <i>(The participants are required to send the Demand Draft for the registration fee to the Course Coordinator)</i> |                  |
| <b>Accommodation</b>           | The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for Hostel Accommodation may be confirmed through email.                                 |                  |

## Course Faculty

### Dr. Mimoun Elboujdaini,



Scientist with over 24 years of extensive experience in material R&D and management and coordinator of projects on engineering materials, in particular their properties and performance in various service environments. The projects covered pipeline steels, copper base alloys, and stainless steels for rock-bolts in mining industry, aerospace and nuclear materials, aluminium and magnesium alloys. Sound experience in scientific research project practices and leading the interaction with a wide range of international and international companies and research organizations and identifying new R&D initiatives that were performed by Materials Technology Laboratory (MTL) in the areas of proposal writing, contracting, managing and coordinating projects with several major companies e.g.: ExxonMobil, GE Energy/PII Pipeline, GRI (Gas Research Institute), Sumitomo, AECL (Atomic Energy of Canada), Orenda/Magellan Aerospace, ILZRO (International Lead Zinc Organization), etc. he was Sr. Research Scientist from 1990 to 2013. He was also Executive Chairman of ICF from 2005 to 2009. Now he is ICF Vice President & IQ-ICF Chairman & Director since 2009. He was the advisor Materials & Corrosion Engineering / Petroleum Development Oman (PDO) from 2013 to 2014. Sound international scientific leadership as the elected Executive Chairman of the twelfth International Conference on Fracture, ICF12 (2005– 2009). Elected Vice-President (2009-2013) of The International Congress on Fracture: The World Academy of Structural Integrity –ICF-WASI. Website ([www.icfweb.org](http://www.icfweb.org)). He is presently holding post of Senior Materials Engineering Advisor in Blade Energy Partners, Houston, USA.

### Prof. M.K.Banerjee

**Professor Banerjee** is the Ministry of Steel Chair Professor, MNIT Jaipur since May, 2012. He has great research experience in Nonlinear Mathematical Models, Neural Networks, Modelling and Simulation, Material Science and technology, Materials Science: Atom Transport Studies, Mechanical Metallurgy. He also published a large number of research papers in the related research field. He is Visiting Professor at University of New South Wales, Australia during May-June, 2011. He is edited three books. He has many awards and honors.



### Dr. R. K. Duchaniya

**Dr. R. K. Duchaniya** is Assistant Professor in the Department of Metallurgical and Materials Engineering, MNIT Jaipur. He has research experience in Engineering Materials, Nanomaterials & Surface Engineering. He has published about 100 research papers in reputed journals. Dr. Duchaniya completed four research project on 'Surface Engineering & Corrosion', Nanomaterials, Nanofluids from Bhabha Atomic Research Centre, Department of Science & Technology, and IEA, respectively. He has two ongoing research project on "melt coolability" and "Nano coating" funded by Bhabha Atomic Research Centre, Mumbai, & Department of Science and Technology, Govt. of Rajasthan, respectively. He has been delivered keynote in various reputed International Conference & short term course. He has successfully organized various activities i.e. Short term course, Workshop, Faculty development program and chair one International Conference on recent trends in Mechanical Engineering & Materials Engineering.



## Course Coordinator

Dr. R. K. Duchaniya  
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Department of Metallurgical and  
Materials Engineering  
Malaviya National Institute of  
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## Co-coordinator

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