WebCorr Corrosion Consulting Services Presents

API 571 Damage Mechanisms Affecting Fixed Equipment in the Refining and Petrochemical Industries

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Course Overview

API RP 571-2011 is the latest edition that describes damage mechanisms affecting equipment in the refining and petrochemical industries. A key first step in managing equipment safety and reliability is the identification and understanding of the various damage mechanisms. Proper identification of damage mechanisms is also required when implementing the API Inspection Codes (API 510, API 570, API 653) and in carrying out risk based inspection (RBI) per API 580 and API 581. When performing a fitness-for-service (FFS) assessment using API 579, the damage mechanisms need to be understood and need to be considered when evaluating the remaining life.

This 5-day corrosion short course aims to provide the participants with a thorough understanding of the various damage mechanisms contained in the latest edition of API RP 571-2011 that can affect process equipment, the type and extent of damage that can be expected, and how this knowledge can be applied to the selection of effective inspection methods to detect size and characterize damage. A total of 66 damage mechanisms in API 571 to be discussed in this corrosion short course are common to a variety of industries including refining and petrochemical, pulp and paper, and fossil utility.

Who Should Attend

Designers, Inspection Engineers, Maintenance Engineers, Plant Inspectors, Mechanical Engineers, and Process Engineers in the refining and petrochemical industries.

Course Outline

1. Introduction to Corrosion
   1.1 Corrosion: Definition and Examples
   1.2 Basic Concepts in Electrochemistry
   1.3 Why Do Metals Corrode
   1.4 Kinetics: the Rate of Corrosion
   1.5 How Do Metals Corrode: Different Forms of Corrosion
   1.6 General Methods for Corrosion Control

2. Common Alloys Used in the Refining and Petrochemical Industries

3. Overview of API RP 571-2011

4. General Damage Mechanisms – All Industries
   Including Refining and Petrochemical, Pulp and Paper, and Fossil Utility
   4.1 General
   4.2 Mechanical and Metallurgical Failure Mechanisms
      4.2.1 Graphitization
      4.2.2 Softening (Spheroidization)
      4.2.3 Temper Embrittlement
      4.2.4 Strain Aging
      4.2.5 885oF Embrittlement
      4.2.6 Sigma Phase Embrittlement
      4.2.7 Brittle Fracture
      4.2.8 Creep / Stress Rupture
      4.2.9 Thermal Fatigue
      4.2.10 Short Term Overheating – Stress Rupture
      4.2.11 Steam Blanketing

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Corrosion Courses for In-House Training, Course-on-Demand, Online and Distance Learning.
## Course Outline

4.2.12 Dissimilar Metal Weld (DMW) Cracking  
4.2.13 Thermal Shock  
4.2.14 Erosion / Erosion-Corrosion  
4.2.15 Cavitation  
4.2.16 Mechanical Fatigue  
4.2.17 Vibration-Induced Fatigue  
4.2.18 Refractory Degradation  
4.2.19 Reheat Cracking  
4.2.20 Gaseous Oxygen-Enhanced Ignition and Combustion  

4.3 Uniform or Localized Loss of Thickness  
4.3.1 Galvanic Corrosion  
4.3.2 Atmospheric Corrosion  
4.3.3 Corrosion Under Insulation (CUI)  
4.3.4 Cooling Water Corrosion  
4.3.5 Boiler Water Condensate Corrosion  
4.3.6 CO2 Corrosion  
4.3.7 Flue Gas Dew Point Corrosion  
4.3.8 Microbiologically Induced Corrosion (MIC)  
4.3.9 Soil Corrosion  
4.3.10 Caustic Corrosion  
4.3.11 Dealloying  
4.3.12 Graphitic Corrosion  

4.4 High Temperature Corrosion [400°F (204°C)]  
4.4.1 Oxidation  
4.4.2 Sulfidation  
4.4.3 Carburization  
4.4.4 Decarburization  
4.4.5 Metal Dusting  
4.4.6 Fuel Ash Corrosion  
4.4.7 Nitriding  

4.5 Environment – Assisted Cracking  
4.5.1 Chloride Stress Corrosion Cracking (CI–SCC)  
4.5.2 Corrosion Fatigue  
4.5.3 Caustic Stress Corrosion Cracking (Caustic Embrittlement)  
4.5.4 Ammonia Stress Corrosion Cracking  
4.5.5 Liquid Metal Embrittlement (LME)  
4.5.6 Hydrogen Embrittlement (HE)  
4.5.7 Ethanol Stress Corrosion Cracking (SCC)  
4.5.8 Sulfate Stress Corrosion Cracking  

5 Refining Industry Damage Mechanisms  
5.1 General  
5.1.1 Uniform or Localized Loss in Thickness Phenomena  
5.1.2 Polythionic Acid Stress Corrosion Cracking (PASCC)  
5.1.3 Other Mechanisms  
5.1.3.1 High Temperature Hydrogen Attack (HTHA)  

5.2 Process Unit PFD’s  
5.2.1 Crude Unit / Vacuum  
5.2.2 Delayed Coker  
5.2.3 Fluid Catalytic Cracking  
5.2.4 FCC Light Ends Recovery  
5.2.5 Catalytic Reforming – CCR  
5.2.6 Catalytic Reforming – Fixed Bed  
5.2.7 Hydroprocessing Units – Hydrotreating, Hydrocracking  

5.3 Other Units  
5.3.1 Sulfuric Acid Alkylation  
5.3.2 HF Alkylation  
5.3.3 Amine Treating  
5.3.4 Sour Recovery  
5.3.5 Sour Water Stripper  
5.3.6 Isomerization  
5.3.7 Hydro Refining  

6. API 571 Course Examination
Course Registration

Please register online at www.corrosionclinic.com
Or use the form below (photocopies of this form may be used for multiple bookings).

Dr/Mr/Ms ________________________________
Organization ________________________________
Contact Person ________________________________
Contact Dept ________________________________
Telephone __________ Fax __________
Email ________________________________

Payment should be made by TT or online banking. Currencies in Australian Dollar, Canadian Dollar, US Dollar, Euro and Sterling Pound can be transferred directly without conversion. Our bank details can be found at the link below:

https://www.corrosionclinic.com/payment.html

Course Fee and Discount

Standard: $3,500  Discount: $3,150

The fee includes a hardcopy of course note, certificate, light lunch, coffee breaks each day during the course.

Discount applies to a group of 3 or more persons from the same organization registering at the same time, or early-birds making payment at least 8 weeks before the course commencing date.

Cancellation and Refunds

Cancellation or replacement should be conveyed to WebCorr in writing (email or fax). An administration charge of 50% of the course fee will be levied if the cancellation notice is received from 14 to 7 days before the course commencing date. No refund will be made for cancellation notice received 6 days and less. No refunds will be given for no-shows. Should WebCorr find it necessary to cancel a course, paid registrants will receive full refund. Refund of fees is the full extent of WebCorr’s liability in these circumstances.

WebCorr has NACE certified Corrosion Specialist (#5047) providing customized in-house training, online and distance learning corrosion courses, corrosion seminars and workshops on corrosion, materials, metallurgy, paints and metallic coatings. Our corrosion courses are developed and taught by NACE certified Corrosion Specialist with over 30 years of practical experience in the field. Our training success is measured by your learning outcome.