

Corrosion Studies by TCR Arabia

Understanding Corrosion Damage Mechanisms

The objective of this course is to Build upon the basics of metallurgy, understand the relationship between various corrosion mechanisms and associated metallurgy as well as to Understand inspection techniques for the different metallurgies and corrosion mechanisms. During this course students will be taught the following modules:

Module 1: Materials of Construction

Part I (Introduction)

1. Steel
2. Carbon Steel
3. Cast Iron
4. C-MoSteel
5. Cr-Mo Steels
6. Killed Steel
7. Stainless Steels

Part II

8. How Steel and Cast Iron Differ
9. Stress Relieving
10. Annealing and normalizing
11. Dehydrogenation

Corrosion Studies by TCR Arabia

Understanding Corrosion Damage Mechanisms

Module 2: Stress Corrosion Cracking (SCC), Environmental - Assisted Cracking

1. Chloride SCC
2. Corrosion Fatigue
3. Caustic SCC (Caustic Embrittlement)
4. Ammonia Stress Corrosion Cracking
5. Liquid Metal Embrittlement (LME)
6. Hydrogen Embrittlement
7. Polythionic Acid SCC
8. Amine SCC
9. Wet H₂S Cracking
 - a. Hydrogen Induced Cracking (HIC), b. Stress Orientated HIC (SOHIC), c. Sulfide SCC (SCC)
10. Hydrogen Stress Cracking – HF
11. Carbonate SCC

Module 3: High Temperature Corrosion (400+ F)

1. Sulfidation
2. Carburization
3. Decarburization
4. Metal Dusting
5. Oxidation
6. Fuel Ash Corrosion
7. Nitriding
8. Graphitization

Corrosion Studies by TCR Arabia

Understanding Corrosion Damage Mechanisms

9. Softening (Spheroidization)
10. Temper Embrittlement
11. Strain Aging
12. 885 F Embrittlement
13. Sigma Phase Embrittlement
14. Brittle Fracture
15. Creep / Stress Rupture
16. Thermal Fatigue
17. Short Term Overheating – Stress Rupture

Module 4: General Damage Mechanisms (All Industries)

1. Steam Blanketing
2. Dissimilar Metal Weld Cracking
3. Thermal Shock
4. Erosion / Erosion – Corrosion
5. Cavitation
6. Mechanical Fatigue
7. Vibration – Induced Corrosion
8. Refractory Degradation
9. Reheat Cracking
10. The mechanics of corrosion mechanisms

Module 5: Uniform or Localized Loss of Thickness

1. Galvanic Corrosion
2. Atmospheric Corrosion

Corrosion Studies by TCR Arabia

Understanding Corrosion Damage Mechanisms

3. Corrosion Under Insulation (CUI)
4. Cooling Water Corrosion
5. Microbiologically Induced Corrosion (MIC)
6. Dealloying
7. Graphitic Corrosion
8. Boiler Water condensate Corrosion
9. CO₂ Corrosion
10. Flue Gas Dew. Point Corrosion
11. Soil Corrosion
12. Caustic Corrosion

Module 6: General Damage Mechanisms - Refining Industries

1. Amie Corrosion
2. Ammonium Bisulfide Corrosion (Alkaline Sour Water)
3. Ammonium Chloride Corrosion
4. Hydrochloric Acid (HCl) Corrosion
5. High Temp H₂/H₂S Corrosion
6. Hydroflouric (HF) Corrosion
7. Naphthenic Acid Corrosion
8. Phenol (Carbonic Acid) Corrosion
9. Phosphoric Acid Corrosion
10. Sour Water Corrosion (Acidic)
11. Sulfuric Acid Corrosion

Corrosion Studies by TCR Arabia

Understanding Corrosion Damage Mechanisms

Module 7: General Damage Mechanisms - Process Units

1. Crude Unit / Vacuum
2. Delayed Coker
3. Fluid Catalytic Cracking (FCC)
4. FCC Light Ends Recovery
5. Catalytic Reforming (CCR)
6. Hydroprocessing Units – Hydrotreating / Hydrocracking
7. Sulfuric Acid Alkylation
8. HF Alkylation
9. Amine Treating
10. Sulfur Recovery
11. Sour Water Stripper
12. Isomerization
13. Hydrogen Reforming

The duration of this course is for 10 days and it is conducted by a Senior Metallurgist. Students will be given a course completion certificate at the end of this course.

All courses, unless specified in advanced with the client, will be conducted at the training facility located at: **TCR Arabia Limited | Gas Gardens, King Abdulaziz Seaport, Dammam, Saudi Arabia**