WebCorr
CORROSION CONSULTING
SERVICES

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• Consulting • Training • Expert Witness • Failure Analysis • Design Review • Corrosion Test • Modeling • Coatings • Materials • Cathodic Protection

WebCorr Corrosion Consulting Services Presents

Corrosion, Metallurgy, Failure Analysis and Prevention

Date: As published on website Venue: As published on website

Course Overview

This corrosion short course aims to provide the participants with an understanding of why and how corrosion occurs, the metallurgical and environmental factors influencing corrosion, and practical methods of corrosion control and failure prevention. Participants will be able to grasp the basic concepts related to corrosion, metallurgy and failure analysis, and to apply the state of the art technology in their workplace.

This corrosion short course is available for in-house training, online and distance learning worldwide. It can also be customized to meet the specific needs of your organization.

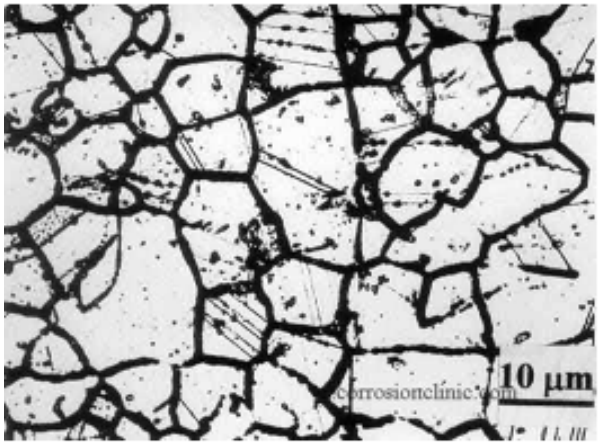
Who Should Attend

This 5-day course provides an excellent avenue for corrosion practitioners, failure analysis personnel, designers, technical managers, inspection and maintenance engineers, coatings and weld inspectors, quality control personnel and anyone who is interested in corrosion, metallurgy and materials failure analysis and its prevention.

Course Outline

1. Basic Concepts in Corrosion
   - 1.1 Introduction
   - 1.2 Corrosion & Society
     - 1.2.1 Corrosion: what it is
     - 1.2.2 Corrosion: its economic, social, political and environmental impacts
   - 1.3 How to avoid liabilities due to corrosion
   - 1.4 Lessons of history
   - 1.5 Basic concepts relevant to corrosion
     - 1.5.1 Terminology and convention
     - 1.5.2 Primer in chemistry and electrochemistry
     - 1.5.3 Potential-pH diagram
     - 1.5.4 Kinetics of corrosion
     - 1.5.5 High temperature oxidation

2. Metallurgy and Corrosion
   - 2.1 Introduction to Metallurgy
     - 2.1.1 Extractive metallurgy
     - 2.1.2 Mechanical metallurgy



     - 2.1.3 Physical metallurgy
   - 2.2 Metals in the melting pot
   - 2.3 Defects in metals
     - 2.3.1 Point defects
     - 2.3.2 Line defects
     - 2.3.3 Volume defects
   - 2.4 The iron-carbon phase diagram
   - 2.5 The microstructure of common metals/alloys
   - 2.6 Different Forms of Corrosion: Mechanisms, Recognition & Prevention
     - 2.6.1 Uniform corrosion
     - 2.6.2 Galvanic corrosion
     - 2.6.3 Dealloying and Graphitisation
     - 2.6.4 Crevice corrosion
     - 2.6.5 Pitting corrosion
     - 2.6.6 Intergranular corrosion and weld decay
     - 2.6.7 Exfoliation
     - 2.6.8 Filiform corrosion
     - 2.6.9 Microbiologically-influenced corrosion
     - 2.6.10 Environment-sensitive cracking
     - 2.6.11 Hydrogen damages
     - 2.6.12 Corrosion fatigue
     - 2.6.13 Fretting
     - 2.6.14 Erosion corrosion, impingement attack and cavitation damage
     - 2.6.15 Stray current corrosion

3. Weldment Metallurgy and Corrosion
   - 3.1 Weldment metallurgy and weldment corrosion
     - 3.1.1 Factors affecting weldment corrosion
     - 3.1.2 Methods of welding

Course Outline

- 3.1.3 Welding austenitic SS vs carbon steel
- 3.1.4 Residual stress and stress concentration
- 3.1.5 Weld defects
- 3.1.6 Weld metallurgy
- 3.1.7 Weld metal composition
- 3.1.8 Iron contamination: its effects & removal
- 3.1.9 Heat tint: its effects & removal
- 3.1.10 Summary of fabrication defects

3.2 Precipitation of intermetallics (sigma, chi & Laves phases) in stainless steels

- 3.2.1 Microstructural features in SS
- 3.2.2 Precipitation of delta ferrite and Schaeffler Diagram
- 3.2.3 Alpha prime phase and 475°C embrittlement
- 3.2.4 Precipitation of intermetallics: submicroscopic sigma, chi and Laves phases
- 3.2.5 Chemical compositions of various intermetallics and phases
- 3.2.6 Time-Temperature-Precipitation diagrams for sigma, chi and Laves phases and carbides
- 3.2.7 Effect of chemical composition on sigma precipitation
- 3.2.8 Effect of Nitrogen on sigma precipitation
- 3.2.9 Effect of cold working on sigma precipitation
- 3.2.10 Invisible (submicroscopic) sigma/chi phases and their effects on corrosion
- 3.2.11 Time-temperature-precipitation curves for various austenitic stainless steels: precipitation of carbides, sigma, chi and Laves phases

3.3 Intergranular corrosion, weld decay and knifeline attack

- 3.3.1 Sensitization of austenitic stainless steels
- 3.3.2 Cr profile along the grain boundaries
- 3.3.3 Effect of carbon, molybdenum and nitrogen on time-temperature- precipitation diagrams
- 3.3.4 Effect of cold working and applied stress
- 3.3.5 Sensitization of Ferritic Stainless Steels
- 3.3.6 Sensitization of Duplex Stainless Steels
- 3.3.7 Effect sulfide inclusions in stainless steels
- 3.3.8 Ferritic and duplex stainless steels
- 3.3.9 Nickel-chromium alloys
- 3.3.10 Aluminum alloys
- 3.3.11 Weld decay and knifeline attack on austenitic stainless steels

3.4 Why is weldment particularly susceptible to microbiologically influenced corrosion?

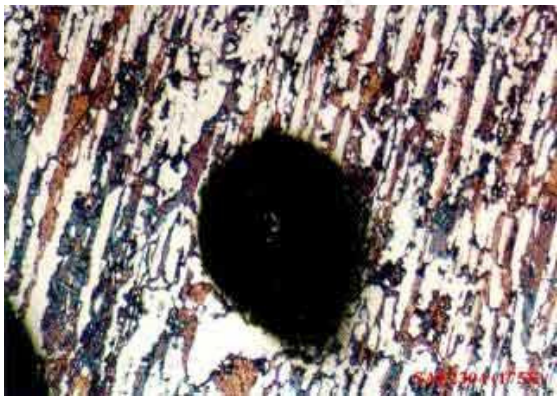
3.5 Weldment corrosion of various alloy systems

- 3.5.1 Austenitic stainless steels
- 3.5.2 Ferritic stainless steels
- 3.5.3 Nickel alloys
- 3.5.4 Duplex stainless steels
- 3.5.5 Carbon steels
- 3.5.6. Aluminum

3.6 Corrosion under insulation

3.7 Corrosion in atmosphere

4. Failure Analysis and Prevention
   - 4.1 General approach to failure analysis
   - 4.2 General methods of failure prevention
   - 4.3 Corrosion Resistant Coatings
   - 4.4 Cathodic & Anodic Protection
   - 4.5 Corrosion Inhibitors
   - 4.6 Corrosion Testing & Monitoring
   - 4.7 Corrosion Modeling & Prediction Software
5. End-of-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: $4,950 **Discount**: $4,455

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.