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# Corrosion Control Techniques

## Course No. 320

**FOR WHOM INTENDED** Engineers, scientists, aides and technicians. Previous knowledge of corrosion or materials engineering is not required.

**OBJECTIVES** To provide basic understanding of the mechanisms of corrosion, and measures that can be used to control corrosion. The course also includes a brief overview of the properties of commonly used engineering materials and their resistance to deterioration.

**BRIEF COURSE DESCRIPTION** Corrosion is responsible for the failure of many systems and structures. Unchecked corrosion can result in excessive maintenance and repair as well as system downtime and product contamination.

This course will focus on the cause of corrosion of metals, the results of corrosive action and the measures that can be used to control corrosion.

The course will describe the basic electrochemical processes responsible for the corrosion of metals, the mechanisms of corrosion and the resulting effects of the various types of corrosion on the ability of the metals to perform their intended function. Particular emphasis will be placed on the identification and solution of practical corrosion problems in real engineering situations.

The performance of engineering materials, including both metals and non-metals in real service environments will be discussed including the application of basic materials science to the selection and application of materials.

**CERTIFICATE PROGRAMS** This course may be used as an elective for any [TTi Certificate Program](#).

**PREREQUISITES** There are no definite prerequisites. Supervisors are invited to telephone or e-mail TTI on prospective attendees' backgrounds and needs.

**RELATED COURSES** See [TTi Course 324, Corrosion Prevention Compliance for Defense Acquisition Requirements](#).

**TEXT** Each participant will receive a [course workbook](#), which contains most of the viewgraphs used during the presentation.

**COURSE HOURS, CERTIFICATE AND CEUs** Open courses meet seven hours per day. Upcoming presentation dates can be found on our current [open course schedule](#). Class hours/ days for on-site courses can vary from 14–35 hours over 2–5 days as requested by our clients. Upon successful course completion, each participant receives a certificate of completion and one Continuing Education Unit (CEU) for every ten class hours.

For [schedules](#), [general information](#) and a [registration form](#), see TTI's web site.

### Course Outline

- Introduction
  - Why is corrosion important?
  - Why do you need to know about corrosion?
  - What can you do to control corrosion?
- Definition and Mechanisms of Corrosion
  - Definition of corrosion
  - Mechanism of corrosion
  - The electrochemical cell
  - Components
  - Reactions • Reaction Rates
- Forms and mechanisms of corrosion
  - Immunity • Uniform attack • Galvanic corrosion
  - Pitting • Concentration Cell Corrosion
  - De-alloying • Inter granular corrosion
  - Stress corrosion cracking
  - Hydrogen embrittlement • Corrosion Fatigue
  - Erosion corrosion • Cavitation corrosion
  - Fretting corrosion • Stray current corrosion
- Methods for Corrosion Control
  - Materials selection
    - Methodologies
    - Information resources
    - Checklist
  - Corrosion tolerance • Protective coatings
  - Cathodic protection
    - Change of environment
    - Change in service
- Identification and Analysis of Corrosion Problems
  - Visual observation • Non-destructive inspection
  - Destructive evaluations
  - Distinction between causes and mechanisms of corrosion
  - Identification and validation of solutions to corrosion problems
  - Identification of potential solutions
  - Evaluation of alternative solutions
  - Accelerated corrosion testing
  - Field corrosion testing
- Properties and performance of metallic materials
  - Carbon and alloy steels
  - Cast irons • Aluminum alloys
  - Stainless Steels • Nickel alloys
  - Titanium alloys • Copper alloys
- Properties and performance of non-metallic materials
  - Plastics • Elastomers
  - Composite materials
- Summary and final exam
- Award of certificates for successful completion



## Technology Training, Inc.

(a tti group company)

Toll-free telephone:

866-884-4338 (866-TTi-4edu)

805/715-2638 • FAX 805/715-2650

E-mail: [Training@ttiedu.com](mailto:Training@ttiedu.com)

<http://www.ttiedu.com>