NACE International
Corrosion Training for
the US Department of Defense
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19 June 2007
Mission Statement:

To protect people, assets, and the environment from the effects of corrosion.

- Oldest and largest association of corrosion control professionals in the world.

- Approximately 17,000 members, sharing information on existing and future technologies used to fight corrosion.
What is Corrosion?

• You have seen rust on storage tanks, bridges, and maybe even the vessels you operate. The rust you see is the byproduct of corrosion.

• Corrosion is a process. The corrosion process involves the deterioration of a substance, usually a metal, because of a reaction with its environment.
What is Corrosion?

How does corrosion work?

Corrosion is an electrochemical process that begins with the formation of a corrosion cell.

• Corrosion cell requires 4 components
The Corrosion Cell

Required Components
1. Anode
2. Cathode
3. Metallic path
4. Electrolyte
A Useful Corrosion Cell
— A typical flashlight battery

[Diagram of a corrosion cell with labels for Battery, Cathode (Carbon), Electrolyte (Paste Inside), Anode (Zinc) - Corroding, Resistance, Conventional Current Flow, Volts, Return Path (Wires), Switch, and Bulb.]
Efforts to Prevent Corrosion

1. Select corrosion-resistant materials whenever possible
2. Use proper design technique
3. Use proper construction technique
1. Corrosion Resistant Materials for Construction

Examples for ships:

- Some Aluminum Alloys are especially resistant to selective leaching and impingement corrosion and are the major alloys used in the construction of propellers.

- Applications of Nickel Alloy cladding include the seating surfaces on propulsion shaft seals.
2. **Select Proper Design -- Examples**
   - Place drains at the lowest point in tanks.
   - Avoid sharp angles that are difficult to paint.
   - Avoid dead legs in piping where liquid can accumulate.

3. **Use Proper Construction Techniques -- Examples**
   - Avoid skip welds, use full penetration butt welding.
   - Insulate/seal fasteners that are composed of dissimilar metals.
Coating is considered the first line of defense against corrosion.

- A coating prevents the electrolyte (water) from contacting the surface needing protection from corrosion.
- Effective coating adherence requires proper surface preparation.
- NACE writes standards that are specific to surface preparation prior to coating.
Efforts to Control Corrosion

Cathodic Protection

- NACE International conducts Cathodic Protection Training with 4 certification levels from Tester to Specialist

- Cathodic Protection (CP) -- electrically converts the surface needing corrosion protection to a cathode

- 2 Basic Kinds of CP used by the US Navy and Industry
  - Sacrificial (galvanic) CP is used in ship ballast tanks, fuel tanks, and bilges
  - Impressed current Cathodic Protection (ICCP) is used to protect the hull of most Navy vessels
Chemical Inhibition

- The Navy uses special chemical additives in coatings to help prevent corrosion.
- Chemical inhibitors are commonly used in water treatment facilities including firewater sprinkler piping.
Efforts to Control Corrosion

Professional Inspection

- NACE International and NAVSEA both offer Coating Inspector Training
- NACE International courses
  - NACE Coating Inspector Level 1, 2 and 3
NACE Training
Developed for the DoD

- **Corrosion/101 for the DoD** (currently available from the DAU Web portal)
- **Shipboard Coatings Assessment Training (S-CAT)** (currently offered as classroom based course)
- **CP-2 Cathodic Protection Technician-Marine** (First offering this week at MegaRust) An intensive 6-day classroom based course with practical simulation equipment.
- **Corrosion in Water Facilities for the DoD** (A 3-day classroom survey course)
Upcoming Courses from NACE International

• A 3-tiered Coating Applicator Training program (under development in conjunction with NCCER)
• Marine coatings technology
• Coating Inspection Program for Marine Workforce
• Cathodic protection in conjunction with coatings
• Workshop on inspection tools
Find out more

• Grab a copy of the NACE Education Guide—fresh off of the presses
• Remember, DoD pays the registration fees for NACE training for DoD personnel.
• Go to www.nace.org
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