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Certificate number: FS 27277 Certificate number: EMS 518828

HOW MUCH DOES CORROSION COST?

- System Down Time
- Hardware Plus:
  - Cost of exposure
  - Cost of return of grade
- Damaged property
- Loss of life / serious injury
- Legal Liability

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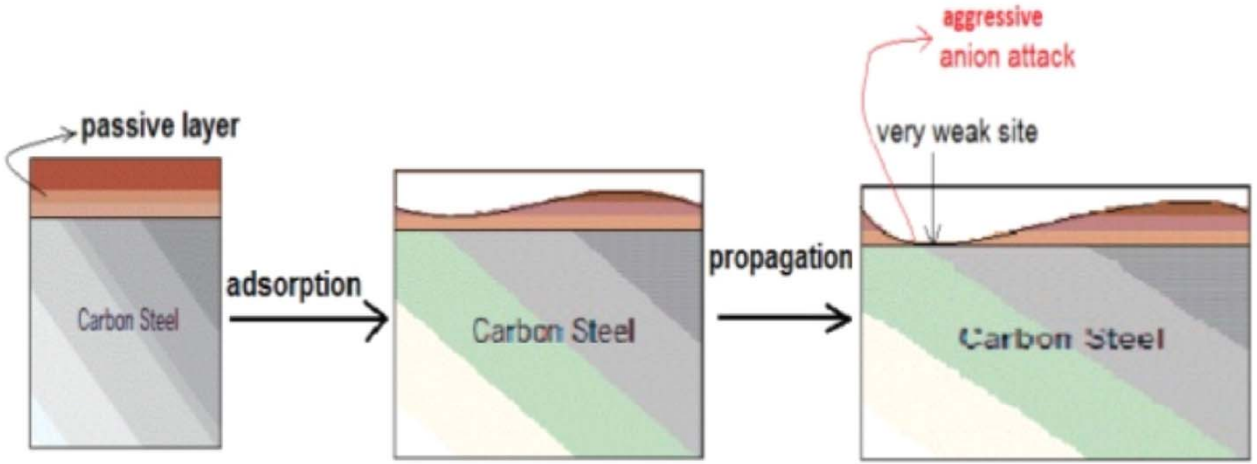
WHAT IS CORROSION?

- The gradual destruction of materials by chemical reaction with their environment
- Four Components Necessary:
  - Anode
  - Cathode
  - Electrical Connection
  - Electrolyte

ANALOGOUS TO FIRE…

- Three Components Necessary:
  - Fuel Source
  - Ignition
  - Oxygen

Mechanism of corrosion



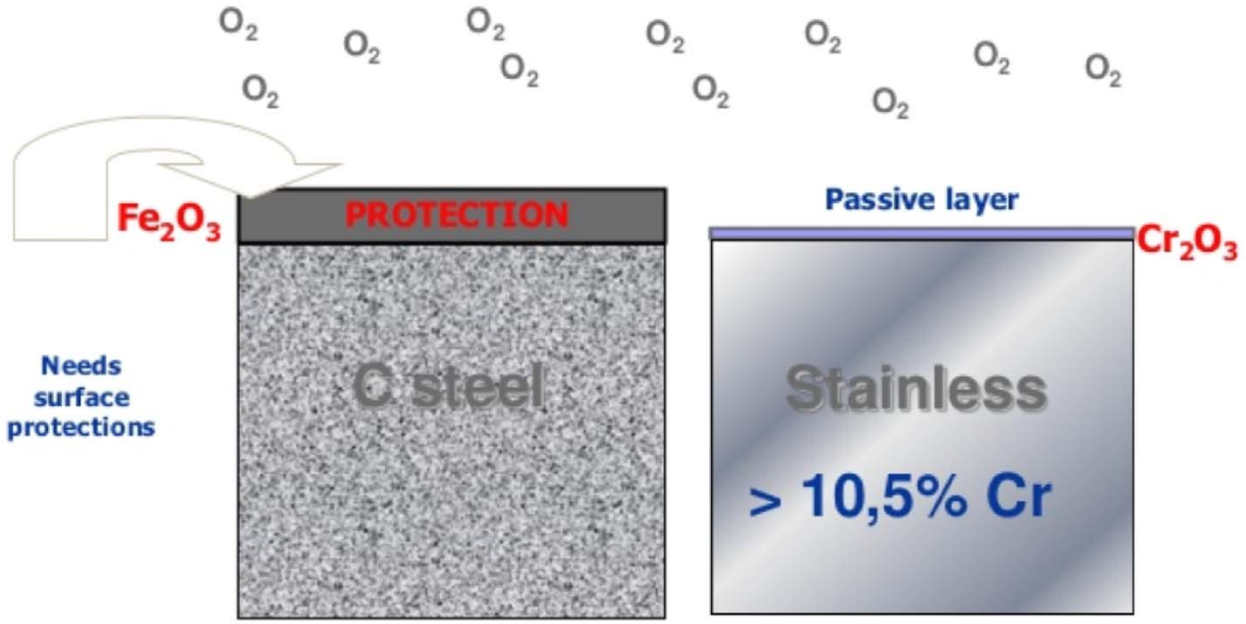
Steps of pitting

1. Adsorption on passive layer (weakness of passive layer)
2. Break down the passive layer
3. Migration of aggressive anion to the metal and pitting initiated.

GALVANIC SERIES

Active (More Electronegative) End
Magnesium
Zinc
Aluminum Alloys
Carbon Steel
Cast Iron
13% Cr (Type 410) Stainless Steel (Active)
18-8 (Type 304) Stainless Steel (Active)
Naval Brass
Yellow Brass
Copper
70-30 Copper-Nickel Alloy
13% Cr (Type 410) Stainless Steel (Passive)
Titanium
18-8 (Type 304) Stainless Steel (Passive)
Graphite
Gold
Platinum
Noble (More Electropositive) End

Corrosion resistance
How stainless steel works



- The passive layer avoids corrosion. Regular maintenance with water rinsing is sufficient to maintain this corrosion resistance

CORROSION MANAGEMENT STRATEGIES & SYSTEMS

- Cathodic Protection - a Sacrificial System
  - Anodes replenish the electrons being drained from the cathode (the metal being protected) and in doing so degrade themselves
- Barrier Protection
  - Epoxy Coating
    - A factory coating can protect the metal by shielding it from the moisture in the soil, air or water
  - Stainless Steel
    - Stainless steel is specially formulated to resist corrosion
  - Field Applied Coatings
    - Tape Coatings (including Petrolatum Systems)
    - Liquid Coatings

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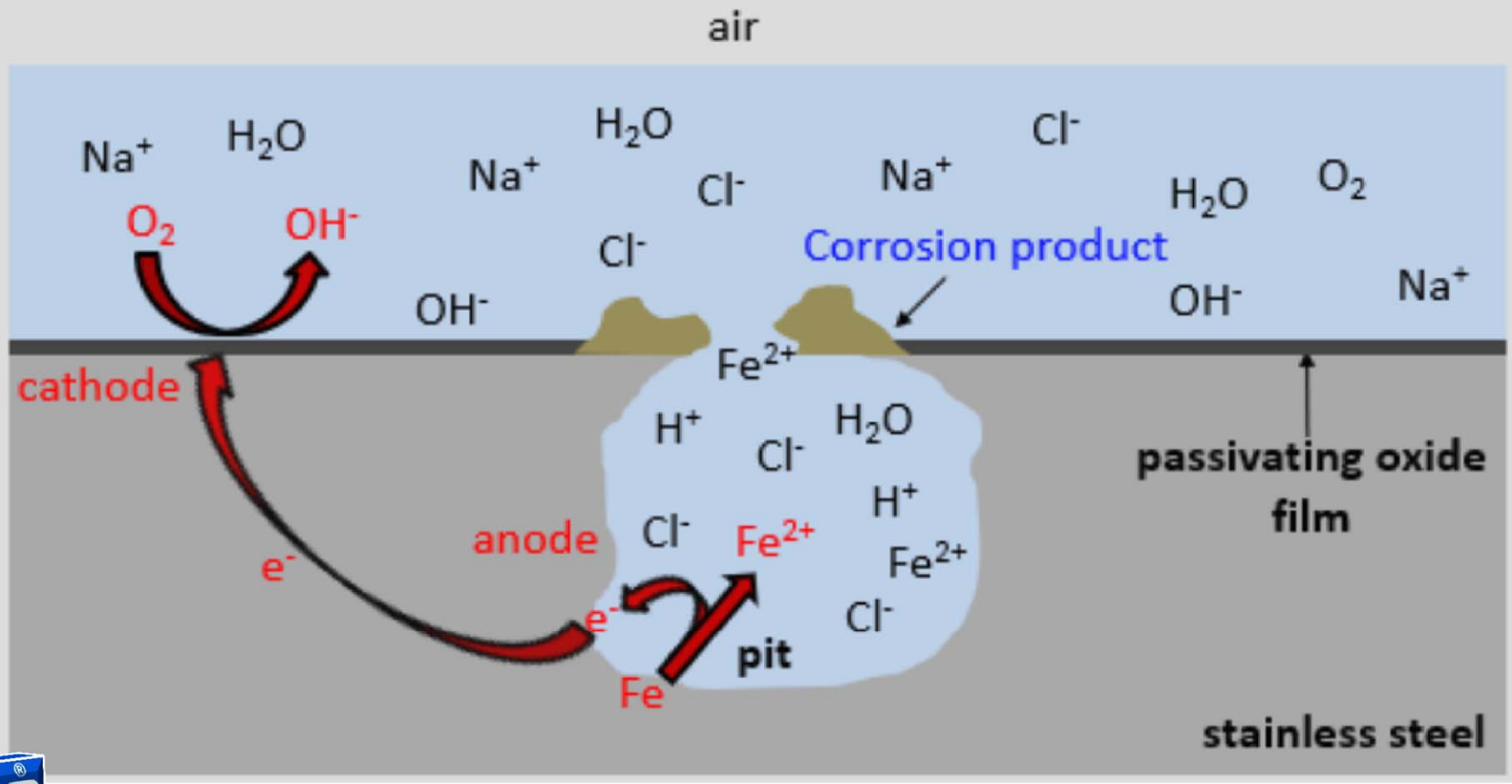
Pitting Corrosion in Stainless Steel



PETROLATUM SYSTEM

- Permanent solution to the issue of corrosion
- Isolate the metal from the surrounding environment
- Simple application – no special tools required
- Applied on-site (no concern for damage enroute)
- Cost effective protection (<20% of early maintenance cost)

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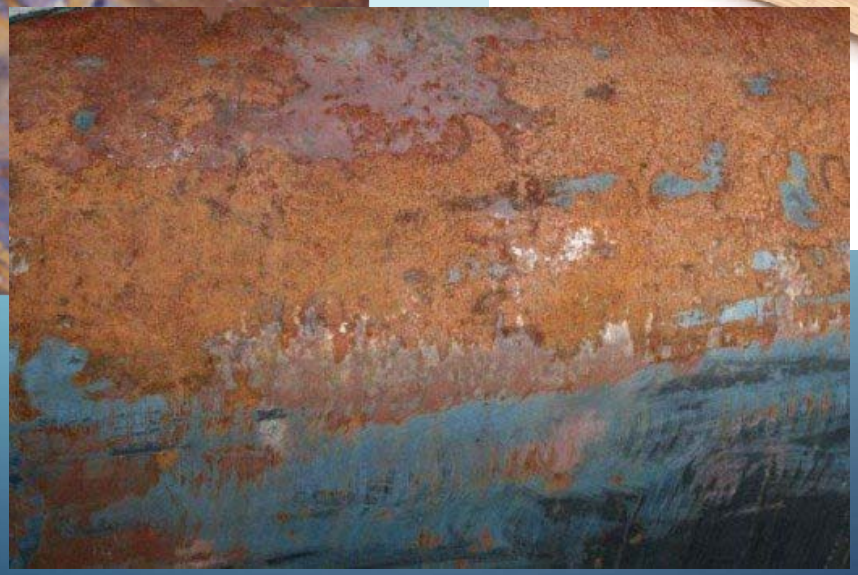
PETROLATUM & STAINLESS STEEL

Figure 3: Stainless Steel bolt after a year of ASTM B117 Salt spray plus 6 months of ASTM G85 cyclic corrosion exposure

After 18 months of combined exposure to a corrosive environment (ASTM B117 and ASTM G85), corrosion is not visible. Petrolatum paste covers the surface of the bolt and displaces water – which helps prevent corrosion.

SURFACE PREPARATION REQUIREMENTS: SSPC SP2 / SP3



FIELD APPLIED COATING: SURFACE TOLERANT (ST) EPOXY

Protal ST Epoxy Mastic

Surface tolerant liquid epoxy

A fast drying surface tolerant epoxy coating that can be hand or spray applied to wire brushed rusty steel surfaces. Used for above and below ground pipelines, structural steel, bridges, tanks, and other steel surfaces.

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FIELD APPLIED COATING: BITUMEN MASTIC

Denso Bitumen Mastic

Single component bitumen mastic coating

A high build single component cold applied liquid bituminous coating. Used for corrosion protection of buried pipe, flanges, valves and fittings.

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THANKS FOR YOUR ATTENTION!

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