

Metal Corrosion Protection via Specialty Packaging

Dr. A. Zad

May 2019



AxiPolymer

Innovation Partner of Polymer Industry



What is the issue?



Any manufactured part that has bare metal parts are prone to surface oxidation (Corrosion or Rusting). So they mostly need to be protected during transport or storage or receive interstage protection prior to further assembly or processing.

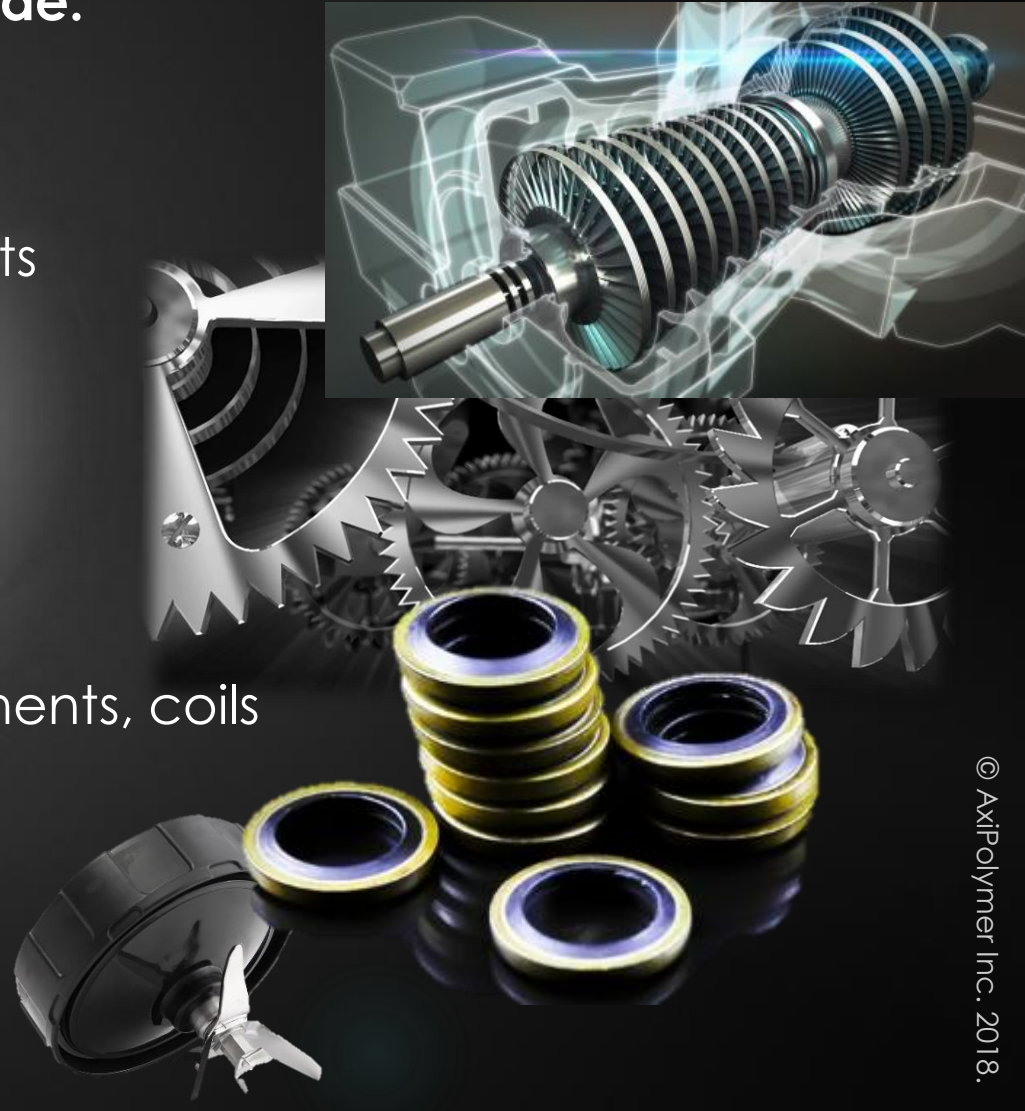


Where do we need corrosion protection?



Equipment and parts requiring corrosion protection include:

- Airplane parts
- Automobile components and sub-assemblies
- Machinery spares, turbine blades, generators and parts
- Shafts, trunnions, turbine component parts
- Bores, gear boxes, fittings, seals
- Mechanical parts, ball and roller bearings
- Tools and component parts
- Steel pipes, tubes, strips, sections, structural members
- Aluminum sections, alloy sections and strips
- Electrical sub-assemblies and parts, electrical components, coils
- Agricultural machine parts
- Materials used for ship building

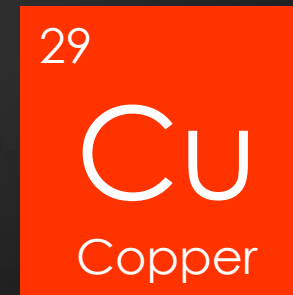
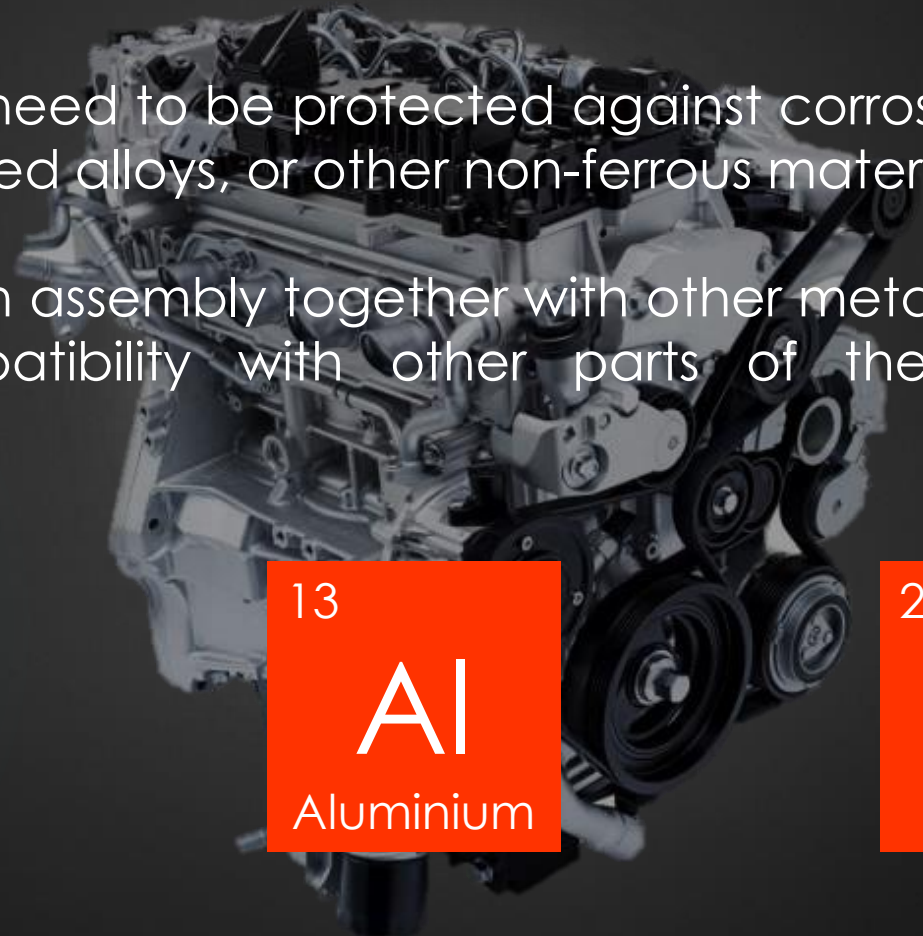




What type of metals get corroded fast?

Generally most metal parts need to be protected against corrosion. This includes ferrous, aluminum alloy, copper-based alloys, or other non-ferrous materials.

The metal may be part of an assembly together with other metals, with plastics or rubber seals, and contact compatibility with other parts of the assembly will require consideration.



Corrosion Protection Types



There are two types of corrosion protection: Permanent and Temporary.

Permanent examples include methods such as galvanizing, paint coating, anodic or cathodic protections.

But,

Temporary Corrosion Protection is by definition *“a material that can be easily removed from the metal surface after treatment. It is not designed to be permanent, or difficult to remove in the same way as a paint system or plastic coating.” **

*“During its protective period, it needs to give adequate freedom from corrosion of bare metal surfaces for a predetermined length of time in manufacture, assembly, storage or distribution. The term of protection will need to be determined for each application, in line with other requirements, and the type of protective selected to suit.”**

* National Corrosion Service, NPL, 2003.

Temporary Corrosion Protection



Different classes of temporary corrosion protection have been listed in section 6.2 of BS1133: 1991, Protection of Metal against Corrosion during Transport and Shipment, Temporary Protectives and their Application. The USA has similar classification under Mil Specification Number. Every method has its applications, advantages and disadvantages.

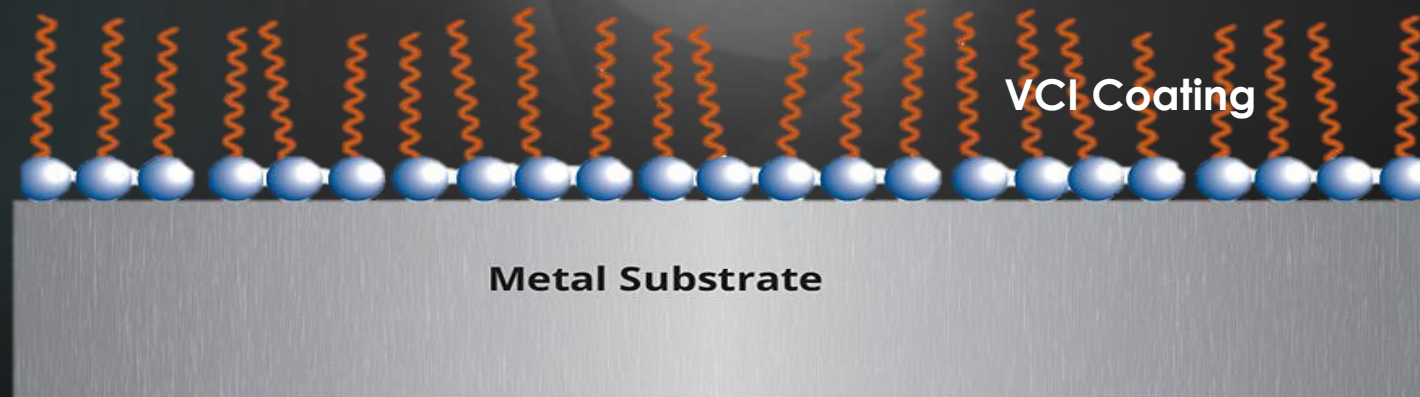
- A. Solvent based fluids: Coatings deposited on surfaces by the evaporation of solvents.
- B. Soft Film, Grease-like, Non-solvent
- C. Protective oils, Soft film type, Non-solvent
- D. Strippable coatings
- E. Volatile Corrosion Inhibitors**
- F. Contact Inhibitors
- G. Water Based and Emulsifiable Protectives
- H. Desiccators and Dehumidifiers.
- I. Inert Atmosphere
- J. Barrier Foil

Volatile Corrosion Inhibitors (VCI)



This method was developed in the 1990's and due to its numerous advantages over other methods, its market was developed widely in late 90's and early 2000. Initially they were developed to protect steel products but now there are new grades for multi metal applications.

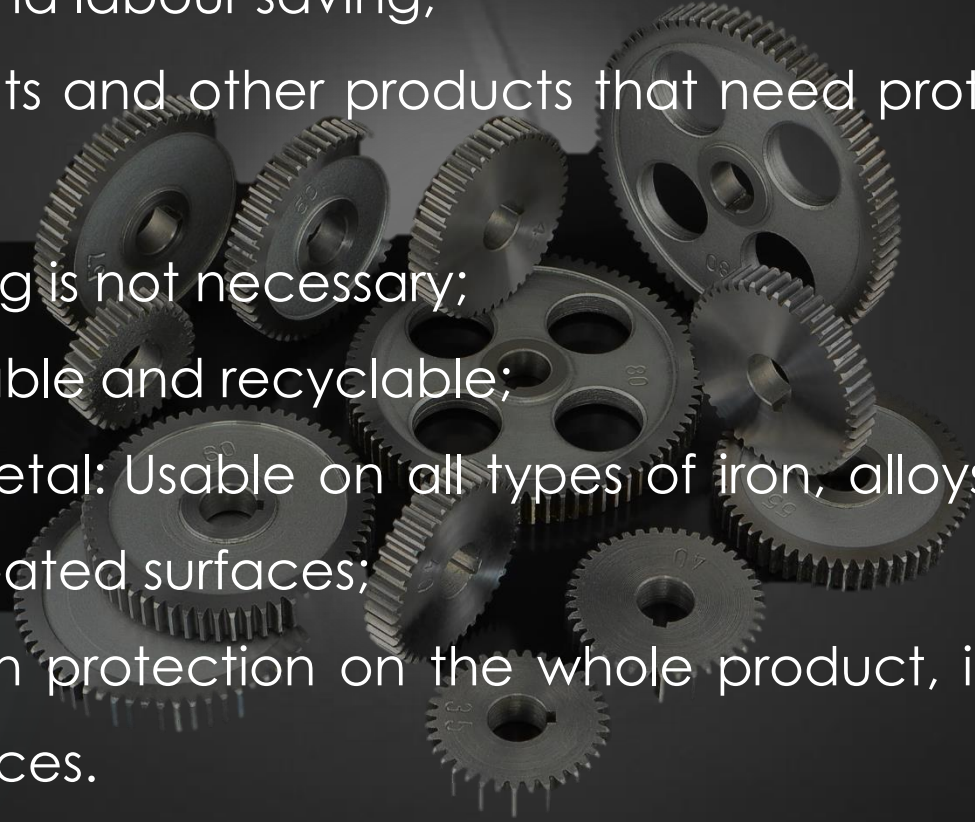
These materials can also be added to the regular packaging film formulation. It will emit some gasses that will be adsorbed on the metal surface making an invisible and very thin film on it. This thin film will protect the metal surface from corrosion (Figure below)



VCI Packaging Advantages



- ✓ Cost-effective: Time and labour saving;
- ✓ Machines, components and other products that need protection do not require pre-processing;
- ✓ Wiping and degreasing is not necessary;
- ✓ The VCI films are reusable and recyclable;
- ✓ Protects all types of metal: Usable on all types of iron, alloys, chrome, aluminium, nickel, copper and treated surfaces;
- ✓ Ensures 100% corrosion protection on the whole product, including cavities and other inaccessible places.



VCI Plastics Evaluation



There are two test methods generally accepted for the VCI film evaluation:

Military Spec

Our VCI masterbatch has received the MIL SPEC PRF-22019E which is the highest standard in the industry.

APL10

This is the short term corrosion test that verifies the efficacy of the VCI additives in inhibiting corrosion mostly on ferrous surfaces.

APL04

This test is more complicated and evaluates the VCI additives efficacy on multi-metal surfaces during a complicated cycle for 15 days.

End of Life



Our VCI films are fully recyclable in any Polyethylene recycling facility.



Polyethylene

VCI Plastics Packaging Examples for Transport & Storage





AxiPolymer

Innovation Partner of Polymer Industry

Contact us to explore this opportunity for your products protection:

info@axipolymer.com

www.axipolymer.com

Tel: (438) 929 4900

(647) 491 7979