Aircraft Corrosion

Some kinds of corrosion are, or can become, visually quite spectacular; others can remain almost undetectable for long periods. For those persons who are not familiar with the problem, here are some examples of the different types of corrosion that may be found on aircraft structures. Identifying the symptoms and understanding the causes are, of course, a great help in preventing corrosion proliferation.

### Galvanic
- **Symptoms:** powder-like white or grey deposits, two dissimilar metals in contact with each other in the presence of an electrolyte.
- **Cause:** galvanic action.
- **Prevention:** protective treatment, special assembly techniques (sealing, electrical insulation of metals).

### Exfoliation
- **Symptoms:** flaking and loss of metal thickness, swelling and flaking at grain ends exposed by machining.
- **Cause:** chemical action.
- **Prevention:** pre-heating treatment, material selection.

### Pitting
- **Symptoms:** holes in metal surface, hydrogen ions present in attacking electrolyte (corrosive agent), destroying surface treatment.
- **Cause:** pitting corrosion.
- **Prevention:** protective treatment.

### Filiform
- **Symptoms:** paint bulging and longitudinal propagation of blisters on surface.
- **Cause:** corrosion-resistant primer, restoration of paint system.

### Crevice
- **Symptoms:** severe local corrosion along adjoining surfaces, penetration of oxygen and corrosive agent into a joint (due to flexing).
- **Cause:** crevice corrosion.
- **Prevention:** efficient sealing of adjoining surfaces from corrosive substances.

### Intergranular
- **Symptoms:** normally only perceived by cracking, chemical action along grain boundaries within the material. Difference of electrical potential between grain and grain boundaries.
- **Cause:** intergranular corrosion.
- **Prevention:** material selection, protective treatment.

### Fretting
- **Symptoms:** destruction of natural protective film resulting from slight relative movement between mating surfaces and loss of metal from surfaces followed by oxidation, abrasion of metal under load in humid environmental conditions.
- **Cause:** fretting corrosion.
- **Prevention:** protective treatment, material selection.

### Stress
- **Symptoms:** normally only perceived by cracking with fast crack propagation leaving bare metal subject to corrosion, residual stress from manufacturing process, or stress concentrations due to design features in a corrosive environment.
- **Cause:** stress corrosion.
- **Prevention:** material selection, handling care, design, assembly techniques, background surface protection.

### Microbiological
- **Symptoms:** local surface attack or formation of deposits such as fungi.
- **Cause:** growth of micro-organisms in moisture traps.
- **Prevention:** protective treatment, assembly techniques, use of inhibitors and primers.

This list is not exhaustive. There are, of course, other types of corrosion which may occur under given conditions. But whatever the particular variety that is encountered, effective treatment begins with accurate reporting and prompt counter action. Maintenance crews should look carefully, look again — then do something about it!

Published by System Safety, Transport Canada Aviation. Original material credit to FAST Airlines Industries Technical Digest.