

## ***MPIG proposal to revise MSG-3 2009.1***

The following is the MPIG recommendation to address EASA concern on IP 97, revision based on MSG-3 2009.1

### **On Chapter 2-4-3:**

- a. **Accidental Damage (AD)**, which is characterized by the occurrence of a random discrete event which may reduce the inherent level of residual strength. Sources of such damage include ground and cargo handling equipment, foreign objects, ~~erosion from rain~~, hail, lightning, runway debris, **discrete** spillage **events**, ~~freezing, thawing~~, etc., and those resulting from human error during aircraft manufacture, operation or maintenance that are not included in other damage sources.

The same sources of accidental damage as those considered for metallic materials are to be considered for non-metallic material such as composites. The consequence of damage may not be readily apparent and may include internal damage, e.g., disbonding or delamination.

Large size accidental damage, such as that caused by engine disintegration, bird strike or major collision with ground equipment, will be readily detectable and no maintenance task assessment is required.

- b. **Environmental Deterioration (ED)**, which is characterized by structural deterioration as a result of a ~~chemical~~ interaction with its climate or environment. Assessments are required to cover corrosion, including stress corrosion, and deterioration of non-metallic materials. Corrosion may or may not be time/usage dependent. For example, deterioration resulting from a breakdown in surface protection is more probable as the calendar age increases; ~~conversely, corrosion due to galley spillage is a randomly occurring discrete event.~~ **conversely, corrosion due to rare events, like battery acid spillage, should be assessed as a randomly occurring discrete event.**

~~Stress corrosion cracking in a given environment is directly dependent upon the level of sustained tensile stress which may result from heat treatment, forming, fit up, or misalignment.~~

~~In contrast to the environmental deterioration process of metallic structures, non-metallic structures such as composites are not normally susceptible to degradation due to the environment.~~ **When evaluating the effect of the various sources of ED on the structure, consideration must be taken of the specific properties of the material being affected.** ~~However,~~ The effect of long-term aging in an operating environment has to be taken into consideration when developing the structural maintenance.

**When evaluating inspection requirements attention should be paid to the design of the drainage system, as environmental deterioration is directly dependent on the time the structure is exposed to fluids.**

### **On Chapter 2-4-5:**

#### **1. Rating Accidental Damage**

Accidental damage rating systems should include evaluations of the following

- a. Susceptibility to minor (not obvious) accidental damage based on frequency of exposure to and the location of damage from one or more sources, including:
1. Ground handling equipment
  2. Cargo handling equipment

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3. Those resulting from human error during manufacture, maintenance, and/or operation of the aircraft, that are not included in other damage sources.
  4. ~~Rain~~, hail, etc.
  5. Runway debris
  6. Lightning strike
  7. ~~Water entrapment~~ **Spillage (discrete event)**
3. Rating Environmental Deterioration (non-metals)

Environmental deterioration rating systems should allow for evaluations of susceptibility to, and timely detection of, structural deterioration (e.g., delamination and disbonding).

Susceptibility to deterioration (~~e.g., loss of stiffness~~) is assessed **based on two factors:**

- a. The structure composition/design and the likelihood of exposure to specific environmental conditions. The structure composition/design should cover the material type, production techniques, structural design and surface protection**
- b. The likelihood of exposure depends on factors such as the location of the installation and installed protective systems, coupled with the AD likelihood.**

~~on the basis of materials subjected to environmental sources and the adequacy of the protective system. For example:~~

- ~~a. Aramid Fiber Reinforced Plastic (AFRP, also known as Kevlar) is sensitive to Ultra-Violet (UV) light, moisture and other fluids, when directly exposed.~~
- ~~b. Glass Fiber Reinforced Plastic (GFRP) may undergo long term degradation when directly exposed to UV light, but otherwise has low sensitivity to the environment.~~
- ~~c. Carbon Fiber Reinforced Plastic (CFRP) has low sensitivity to the environment.~~

~~——— Susceptibility to delamination and disbonding is assessed on the basis of material type, adequacy of the protective system, and structural composition (e.g., honeycomb and solid laminate), coupled with the likelihood of AD, and exposure to certain environmental conditions.~~

## **On Appendix A:**

### **Corrosion Level 1**

Corrosion damage that does not require structural reinforcement or replacement. or Corrosion occurring between successive inspections exceeds allowable limit but is local and can be attributed to an event not typical of operator usage of other aircraft in the same fleet (~~e.g. Mercurey spill TBD~~).