A COMPUTATIONAL FRAMEWORK FOR PREDICTION OF ATMOSPHERIC CORROSION

Mehdi Amiri, George Mason University
mamirida@gmu.edu

Key Words: Atmospheric corrosion, NOAA data, Dynamic thin film

Operating environment of aircraft vary depending upon the squadron location, fight requirements, and other field and ground activities. All these conditions promote a range of corrosion damage mechanisms. Accumulated corrosion damage of the airframes results from various factors, e.g., temperature, humidity, rain frequency, snowmelt, condensation and local pollution sources, flight conditions (ground, level flight), asset service history (e.g., stored indoors and outdoors) and operational condition (e.g., constant and variable loading under vibratory noises). Also, in each airframe not all parts and assemblies are equally prone to corrosion damage, i.e., severity of corrosion varies for different assemblies depending on the location of the parts within internal spaces of an aircraft. The bulk climate can be significantly different from local climate at the surface of a component or within crevices, pits and cracks. Prediction of corrosion damage of the aircraft parts and components can pave the way to optimize asset planning in terms of determining suitable washing cycles, maintenance and replacement actions. Model-based predictive tools can provide guidance on how to account for these parameters in order to optimize maintenance actions. In this paper a computational framework for prediction of electrolyte film thickness under dynamic environmental conditions is presented. The film thickness is influenced by environmental factors such as relative humidity, temperature, salt load density, and substrate material. The environmental conditions can be extracted from NOAA database for a particular geographic area.