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沿海环境下服役飞机铝合金零件的表面涂层破坏与腐蚀

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Failure and Corrosion of Coating on Aluminum Alloy Parts Used on Airplanes Serving in Coastal Environment

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摘要

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摘要 为了探讨在斐济沿海机场某型国产飞机铝合金零件出现的腐蚀问题,研究了热带海洋环境条件下油漆涂层的老化失效对铝合金零件腐蚀的影响,采用宏观、微观腐蚀形貌,腐蚀产物成分分析等方法,对比研究了实验室中性盐雾和紫外光老化条件下油漆涂层的老化失效特点。结果表明在海洋环境和实验室环境条件下,飞机铝合金零件都是先出现表面涂层的老化失效,而后表面氧化膜层和基体出现点腐蚀,直至发生晶间腐蚀到剥蚀破坏。分析认为铝合金零件表面油漆涂层的老化失效起源于热带海洋大气环境中温度、湿度、Cl⁻、光照等共同作用导致的微孔隙、微裂纹等缺陷。

关键词: 飞机铝合金零件 涂层老化 点腐蚀 海洋环境 微裂纹

Abstract: In order to study the corrosion of aluminum alloy parts used on airplanes serving in the tropical coastal environment of Fiji, the effect of the aging and failure of the coatings on the corrosion of aluminum alloy parts and the main causes for the corrosion of these parts was researched. The aging and failure characteristic of the coatings was discussed in the condition of a neutral salt spray and ultraviolet ray in the laboratory, by examining the macro and micro images, and analyzing the composition of corrosion products. The results show that the aging and failure of the coatings emerges first on the surface of the aluminum alloy parts on airplanes in the coastal and laboratory environment. Subsequently pitting corrosion occurs on the anodic oxidation film and aluminum alloy, which continues until intergranular corrosion and exfoliation corrosion take place. The origin of the aging and failure of coatings on aluminum alloy parts is such deficiencies as pinholes and cracks produced by the combined effect of temperature, moisture, Cl⁻, and sunlight in the tropical environment.

Keywords: aluminum alloy parts on airplanes aging of coating pitting corrosion coastal environment micro-cracks

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