Effect of Plate Thickness and Paint on Lightning Strike Damage of Aluminum Alloy Sheet

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Aircraft usually avoid areas associated with lightning. However, when such areas are directly along the take off or landing path and cannot be avoided without delay, there is a risk of lightning strike during flight. After an aircraft has been hit by lighting, maintenance technicians have to identify the lightning entry and exit points and conduct any necessary repairs before the next flight, and must perform these tasks as quickly as possible to minimize disruption to operations. Composite materials have low conductivity compared to conventional metal structures and so sustain greater lightning strike damage, and there has been much research into the lightning resistance of composites. On the other hand, metallic material has high conductivity and it is known that the damage is small comparing to composite material. However, the knowledge concerning about the lighting strike damage on metallic material contributes to minimize the damage size and the duration of repair.
The effect of plate thickness on lighting strike damage for 2024-T3 aluminum alloy sheet is evaluated. Dimension of the sheet is 150 mm X 150 mm, and two types of the thickness 1.27 and 2.03 mm are prepared. Modified wave form A of SAE APR 5412 B is utilized for evaluation. Two levels of peak current, 40 and 100 kA, are used. The effect of paint on the surface is also evaluated. Test result shows that the surface of the specimen is melt by the high heat imput during the lightning strike and the area can be distiguished by the appearance. In addition, the resutl shows that the lightning strike damage on the specimen with paint has smaller damage comparing to that on the specimen without paint, and then the paint acts as insulator.

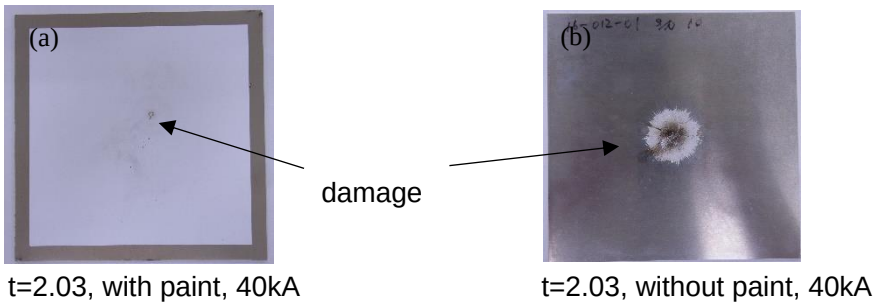

Figure 1. Lightning strike damage on 2024-T3 aluminum alloy. (a) with paint, (b) without paint

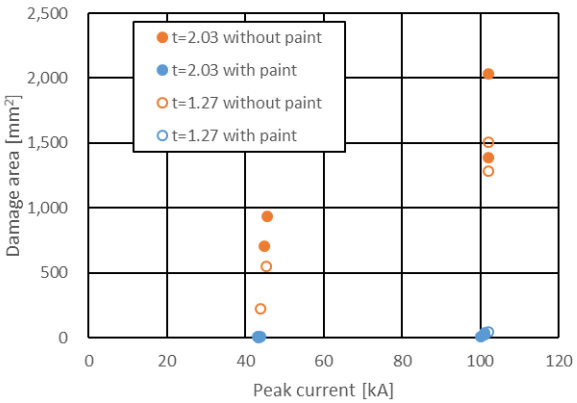

Figure 2. Effect of plate thickness and paint on lightning strike damage

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