



UNDERSTANDING WHAT
HAPPENS THE MOMENT
AFTER FINISHING AIRCRAFT
ALUMINIUM POLISHING

SUMMARY

Aluminium brightwork polishing business or private jets is normal. What we need to understand is what happens there after.

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Generally, the corrosion of bare aluminium with a liquid water medium, is the second sum of chemical reactions, oxidation and reduction: $Al+3H_2O\rightarrow Al(OH)_3+3/2H_2$. This reaction is accompanied by a change in the oxidation field in aluminium, from 0 in the metal to the oxidation number of alumina (+3). By exchanging electrons, aluminium loses three electrons absorbed by $3H^+$. Aluminium corrosion is obtained in the formation of alumina $Al(OH)_3$ which is insoluble in water and precipitates as white cells where it is found to rust as white oxidation. With Acid rain, this reaction can be accelerated when rainwater dries in place on the surface of the aluminium as it turns acidic with the creation of Sulphuric acid (H_2SO_4). Sulphur in the air is contained in the water drops which become rain. The Sulphuric Acid then reacts with the Aluminium becoming Aluminium Sulphate which is also insoluble in water, this is seen on aircraft as water spotting and is hard to remove, the only way to remove watermarking is by abrasive polishing.

Lower grades of Aluminium will contain small amounts of impurities, other metals. These molecules will cause bi-metallic corrosion cells on the surface of the aluminium when water is present. These 'cells' will grow if left unchecked into 'pitting' which is a common corrosion issue on polished aircraft surfaces. Pitting will penetrate deeper into the Aluminium which could lead to substrate weakening.

Currently, there are very limited, approved products which can be used on Aluminium to prevent the onset of corrosion following polishing. These products are generally based on mould release agents used in the composite manufacturing industry. They only provide a limited hydrophobic surface which temporarily repels water / rain from the surface. They do not prevent oxygen from reaching the surface, and after a short time will not be hydrophobic anymore. This temporary solution only delays polishing by a few weeks, no more.

Summary

Excessive polishing results in:

- Excessive metal removal (clad).
- High labour cost.

Lack of polishing:

- Pitting corrosion through cladding.
- Bi-metallic rivert corrosion.

The Solution.

A solution is a product or coating which will:

1. Prevent oxygen reaching the surface. (stops oxidation)
2. Prevents water from making contact with the surface. (stops pitting and watermarking)
3. Adhere to the aluminium surface without delaminating.
4. Withstand the elevated surface temperature when de-icing during flight.

Products available to reduce the onset of corrosion:

1. Skyde Clear
2. Aerozane BW



For further information, contact us at Frasers Aerospace

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