

OPTICAL APPEARANCE AND CORROSION PROPERTIES OF ALUMINUM BASED PLASMA COATINGS

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When using aluminum alloys, appearance of the anodizing layer is extremely important. However, recycled aluminum can cause unpredictable optical appearance compromising product quality. However, recycled cast aluminum provides enormous freedom and versatility when it comes to product shape. Unfortunately, cast aluminum is soft, has low corrosion resistance, and anodizing is not possible due to the high amount of silicon. Therefore it is not possible to produce optical surfaces using recycled cast aluminum components alone.

Plasma processes can be used to aluminum-coat cast substrate components made by aluminum or plastics. The properties of the coating can be optimized by tuning the chemical composition and microstructure. Investigations focused on two aspects: (i) the effect of chemical composition and surface finish on the appearance of the anodized layer, and (ii) the effect of alloying elements such as Ti and Zr on optical appearance and corrosion resistance. The effect of heat treatment was investigated to understand the role of nano- to micro-size second phase particles on the formation and appearance of the anodized layer. Results show that the optical properties of the anodized layer is a function of chemical composition of the alloy/coating and surface finish, while the alkaline corrosion resistance is largely improved with increase in Ti and Zr content in the coating.