



Inherent Anodize Color Variation When Using Multiple Alloys

The utilization of multiple alloys on an anodized fabricated part or adjacent components will always lead to some degree of color variation. A common example here is when windows made from 6063 alloy extruded aluminum are installed adjacent to panels or trim fabricated from 5005 alloy aluminum sheet. These alloys are produced in very different processes and chemistries, leading to inherent differences in grain structure, color and gloss.

Pure aluminum is a very soft, ductile metal with limited practical uses. In order for aluminum to be a viable option for most applications, something must be done to transform it into a stronger material. When aluminum is used in products for manufacturing and construction applications, it is generally in the form of an alloy. An alloy is a mixture of two or more metals. Mixing small amounts of other metals with aluminum greatly increases its strength properties and other characteristics. Because of the many different applications for aluminum, hundreds of aluminum alloy recipes exist in order to meet the numerous requirements.

Anodizing converts the outermost surface of an aluminum component into a film of aluminum oxide, but it also incorporates all of the alloying constituents into this film. The oxide coating produced on pure aluminum surface is nearly transparent. Every metal added to an aluminum alloy will have a different effect on the resulting color and opacity of its anodic coating. For example, silicon gives a grey cast to the coating, while manganese lends a brownish tint. The sheen of the coating is also affected by certain elements. Elevated copper content will produce a brighter look, while higher levels of iron give a duller appearance. As the concentrations of these metals increase, thus does the effect on appearance of the coating. The Aluminum Association sets standards for all alloys, but the ranges allowed within these standards are significant. This can cause anodized coatings from different aluminum lots of the same alloy to vary in color. When more than one alloy is required, this variation becomes even greater.

Anodized finish color consistency can be better controlled if the appropriate procedure is followed for aluminum alloy selection and utilization. Guidance through this process is available from AaCron's Technical Service experts.

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