

Anodizing and the Environment

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Aluminum Life Cycle Enhancement with Anodizing

The environmental advantages of aluminum are widely acknowledged. Aluminum is one of the most durable and versatile of metals, offering improved mileage in automobiles by virtue of its lightweight and tremendous recyclability. According to the Aluminum Association, about one-third of all aluminum produced in the U.S. today is from recycled sources, saving some 95 percent of the energy required to produce aluminum from raw materials.



In light of environmental impacts, anodized aluminum is the "naturally green" material. Anodizing accentuates the environmental benefits of aluminum without compromising them, and the process is relatively benign when compared to other materials and processes

Anodizing enhances aluminum and its environmental virtues. Anodizing uses the base metal - the aluminum alloy - to create a thin, extremely strong and corrosion-resistant finish. The anodized surface is very hard and thus preserves and extends the life of the aluminum product.

In contrast to anodizing, coatings - paint for example - can dramatically reduce the ability to recycle the aluminum and can increase costs. Paints, plastics, and plating rely on problematic materials in their production that can compromise green objectives. Anodizing, on the other hand, is "recycle-neutral" with minimal use of such materials as volatile organic compounds (VOCs) and heavy metals.

The corrosion resistance of anodized aluminum is well established for industrial applications. Transportation components, building elements, storage containers, and process equipment utilize anodizing to extend the life and expand the utility of aluminum structures. Anodized aluminum is safe for cookware and provides durable work surfaces for applications that require superior abrasion-resistance.

Anodizing also reduces friction and increases lubricity, an advantage with fitted components and for moving parts. Increased wear resistance means a longer life cycle. Hardcoat anodizing further improves wear resistance and general coating durability to physical forces.

Aluminum Saves Energy and Materials

Aluminum metal is a good conductor of electricity; the anodic coating is an insulator. Combinations of the two properties can be incorporated into systems that save energy and materials. The metal can serve both a structural and conductive purpose, while the anodic coating insulates the circuit and preserves the structure. This simplifies physical design for electric circuits and saves space and wiring.

All of the aforementioned properties of anodizing contribute substantially to a product's life cycle and reduce energy demands.

Environmental Aspects of the Anodizing Process

Anodizing is a water-based process and uses no VOCs. There are no vehicle solvents, no carrier resins, and any pigmentation used in anodizing is created by extremely small amounts of metals or dye securely locked within the hard surface. No halogenated hydrocarbons or similar toxic organics are used in anodizing.

Similar neutralization reduces most anodizing chemicals to common dissolved minerals. Most anodizing is performed without generation of hazardous waste, and in many cases aluminum-rich anodizing wastes are environmentally valuable in removing pollutants and settling solids in domestic sewage treatment processes.

Anodizing is not metal plating. The two are sometimes confused, but in fact, are completely different processes. The anodic coating is generated from the base metal and, thus, has essentially the same constituents as the aluminum. The surface builds

from the metals as an ultra-thin, nontoxic aluminum oxide. Added materials constitute a minute amount of mass to a product; Material Safety Data Sheets for anodized aluminum are identical to those for the metal.

Under EPA rules, conventional anodizing generates no hazardous waste; it does not use VOCs or EPA-listed toxic organics. The involvement of heavy metals is dramatically lower than exterior-use paint pigments or plating.

Recyclability is unaltered by anodizing and no intermediate processing is needed for anodized metal to reenter the recycle chain, unlike thicker organic or plated metallic coatings.

Anodized aluminum is the environmentally sound choice for various applications.



Anodizing provides aesthetic appeal, as well as stability and durability.