Anodizing 101

What is it, and why an in-house supplier is important

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Anodizing aluminum is an electrochemical process that creates a layer of protection that makes the lightweight, durable material ideal for applications from automotive parts to bakeware. Working with a supplier that understands the process from prototype to production offers you a better experience and result.

Aluminum is ideal for a variety of applications from parts for vehicles, and marine and medical, to commercial bakeware and food and beverage packaging. It's even been to space as part of the equipment NASA uses on its missions.

The lightweight, durable metal offers versatility and strength to manufacturers. Like most metal, aluminum can be susceptible to corrosion and deterioration under certain conditions. Unlike most other metals, however, aluminum can be made stronger and more corrosion resistant by going through an electrochemical process called anodizing.

Sulfuric acid anodizing is not a plating operation where a coating is applied on a metal surface. With anodizing, the surface of the aluminum is converted to aluminum oxide so the anodized film is part of the substrate/material and will not flake or chip off.

When your project calls for anodized aluminum, it's important to work with a manufacturing partner that not only understands the process, but has the capacity to work with you from the initial prototyping phase through to production. That's important because when your supplier has a complete picture of your product's journey, they are better able to provide you with the right recommendations and processes for your particular piece.

TWO COMMON TYPES OF ANODIZING ARE:

1
TYPE II CLEAR COAT ANODIZING
Hardens the surface of the metal and seals its porous surface. In this kind of anodizing, the metal retains its natural color.

2
TYPE III HARD COAT ANODIZING
Offers a thicker protective surface and creates a darker color on the metal – something that is typically needed by makers of bakeware products.

The three-step process starts with a **pretreatment** which prepares the metal surface for anodizing by cleaning it, and exposing a clean surface of aluminum free of organic soils by using what's known as an alkaline etch. A deoxidizer following the etching helps remove any debris still on the metal.

Then, the metal is ready for the **anodizing tank.** The aluminum is placed in a bath of sulfuric acid while an electrical current is delivered to the parts. While the chemistry is the same for both **type II** and **type III** anodizing, there are some key differences. For instance, while type II is done with a room temperature bath, type III requires the tank to be chilled to 32°F. Type III hard coat anodizing also demands two to three times the current density.

Finally, **the piece is rinsed** and, in the case of type II anodizing, the clear coat is sealed by boiling deionized water to seal the metal's pores. This provides protection against corrosion by creating an impenetrable layer on the surface of the piece.

Anodizing has several benefits

Anodizing increases corrosion resistance and helps protect against abrasions and scratching. But those aren't the only benefits. Anodizing aluminum also provides electrical insulation and cosmetic improvements on certain pieces.

ELECTRICAL INSULATION – Although raw aluminum is very conductive, the anodized film created during the anodizing process does not carry an electrical current. In some applications this is a desirable quality. This is also why aluminum can not be welded after it has been anodized, so welding needs to be performed prior to the anodizing process.

COSMETIC IMPROVEMENT AND DULLING OF SHARP EDGES – As mentioned above, part of the pretreatment processes on the finishing line leading up to the anodizing tank includes cleaning and etching the aluminum surface. The etching process can remove light scratches and even help to dull out sharp edges that may have been created during the manufacturing process. This both helps to improve cosmetic appearance and can help to eliminate the need for manual deburr operations to remove an otherwise unacceptable sharp edge.

Capacity isn't the only consideration

A nationwide restaurant chain may need their anodizing partner to produce 900,000 bakeware pieces quickly for a new product rollout. Knowing the supplier can handle the anodizing part of the job is, of course, extremely important.

But, it's not the only thing to consider.

In this example, the restaurant chain needs to trust that the anodizing will be completed on time and to their exact specifications. But they also need to know it will be done within their budget.

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Suppliers that only provide anodizing services may be excellent at anodizing, but they may not be the most efficient choice for the job. A supplier that has a variety of capabilities in-house, such as metal fabrication, racking, tooling, and surface finishing can offer benefits such as:

COST SAVINGS

Your project won't need to be outsourced for prototyping or at other phases in the production process.

EFFICIENCY

Keeping your project in-house can eliminate lengthy lead-times.

QUALITY

A supplier that has been with the project from prototype through production will have a deeper understanding of your goals and needs, and will be better able to quickly make adjustments if and when they are needed.

IN-HOUSE CAPABILITIES

A supplier with finishing knowledge in-house can spec out the proper finish for your application.

The bottom line

A supplier with built-in versatility could be the difference between a successful rollout and one that misses the mark.

Find out more about anodizing and other industrial product solutions from the experts at Vollrath Manufacturing Services.

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