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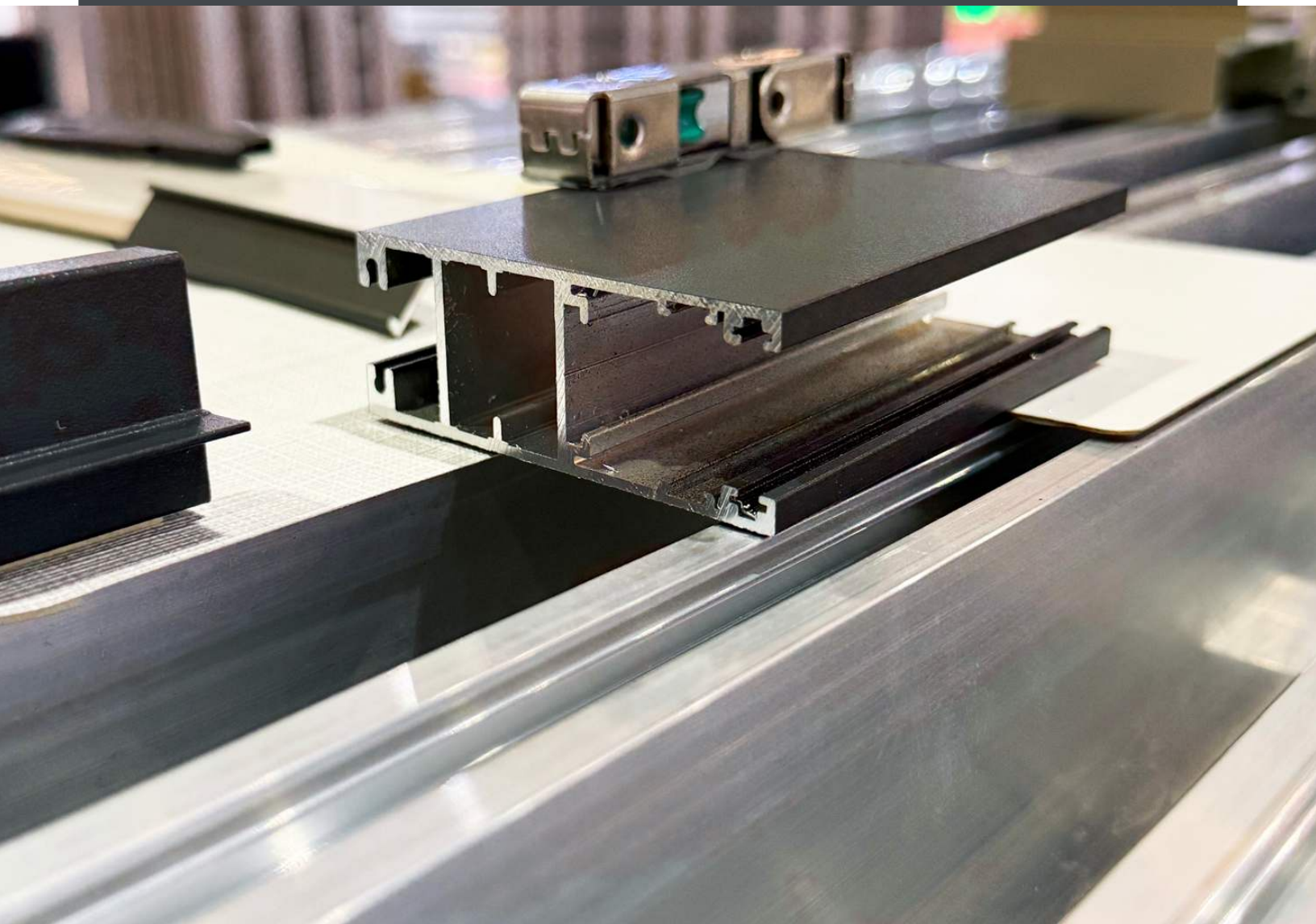
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Anodizing vs. Plating: A Guide to Optimal Component Performance

Each process affects the substrate's surface differently. Anodizing is a conversion coating process that occurs due to a chemical reaction with the base metal, creating a uniform layer with excellent adhesion properties. Plating is an additive coating process that deposits a new layer on top of the base metal, resulting in new material properties (e.g., plating a layer of nickel onto aluminum).

As a single-source metal finisher specializing in plating, anodizing, and chemical film conversion coatings, Saporito Finishing offers reliable, environmentally responsible finishing services that meet the unique demands of a range of industries. Our skilled team has created this eBook to provide a comparative and definitive guide to help make an informed, technical decision when choosing among these coating process types, selecting the appropriate process based on performance, material, and other application requirements.



Understanding the Foundation: Material and Process Differences

Anodizing is an electrochemical conversion coating used to thicken the natural protective oxide layer on aluminum and other metal surfaces. When placed in an acid bath, the metal part acts as an anode, utilizing an electric current to grow a durable oxide layer that is significantly stronger and thicker than the naturally formed one. This process enables the use of decorative coloring, making the workpiece harder with greater wear and corrosion resistance.

Plating involves depositing a thin layer of metal onto the surface to enhance its hardness, conductivity, corrosion resistance, and appearance. Implementing electroless plating (a chemical reaction) or electroplating (an electric current) helps achieve the desired coating.

The base material is a critical factor to consider. Anodizing is primarily used on aluminum and other types of easily oxidized, non-ferrous metals. Anodizing converts the base metal, allowing the coating to grow in and out of the part. Plating, on the other hand, is a highly versatile process that can be used with a wide range of materials, including aluminum, steel and stainless steel, cast iron, brass, ductile iron, and copper.



Anodizing Types

Anodizing generally produces oxide layers with a thickness range between 0.000070" and 0.004". Class I, II and III are classifications for anodizing that designate the coating thickness, with Class III coatings offering a greater degree of thickness to support high wear or heavy-duty applications.

Regarding the process itself, anodizing types are classified by the acid used and resulting coating properties, with the primary categories for aluminum being:

Type I (Chromic Acid / Anodize)

This process uses chromic acid to produce a thin surface coating, offering the following:

- ➔ Provides excellent corrosion resistance
- ➔ Ideal for military and aerospace applications
- ➔ Self-limiting in terms of thickness, TI anodizing provides a safeguard against reduction in fatigue strength of the part being anodized.



Type II (Sulfuric Acid / Clear Anodize)

This type commonly utilizes sulfuric acid. It creates a clear, porous layer and the following features

- ➔ Good corrosion and wear resistance
- ➔ Offers moderate protection
- ➔ Suitable for general use
- ➔ Can be used for decorative purposes (often involving dyes, bright dip, or etching)



Type III (Hard Coat / Hard Anodize)

Hard coat anodizing is known for the following properties and benefits:

- ➔ Excellent wear resistance
- ➔ Exhibits extreme hardness
- ➔ Ideal for industrial parts that require superior durability
- ➔ Produces a thick, dense surface layer
- ➔ Utilizes sulfuric acid or other mixed chemistries at low temperatures



Other Methods & Variations

Additional anodizing processes include the following:

- ➔ **Boric-sulfuric acid anodizing (Type I Alternative).** Utilizes sulfuric and boric acid, offering good corrosion resistance without the harshness associated with chromic acid. Ideal for aerospace applications and specialized coloring processes. (Note: Saporito does not offer this service.)
- ➔ **Titanium anodizing.** The process utilizes electrical voltage to create a thin oxide layer, often used for coloring titanium. Ideal for aesthetic or identification purposes. (Note: Saporito does not offer this service.)



Plating Types

Plating types depend on the substrate, desired properties (hardness, appearance, protection), and complexity of the part, ranging from tiny fasteners to large industrial components:

- ➔ **Electroplating.** Electroplating uses an electric current to deposit a metal layer such as zinc, zinc nickel, or chrome onto a conductive surface to achieve the desired thickness.
- ➔ **Electroless plating.** Without the use of electricity, a chemical reaction takes place, depositing a uniform coating that is ideal for electroless nickel and other complex shapes.
- ➔ **Immersion plating.** With immersion plating, a sacrificial, thin layer of copper, tin, or silver is applied via a displacement reaction.



Common Plated Metals

Metal materials that plating can be used with include steel, brass, aluminum, stainless steel, copper, and other types of metals. Certain metals may require more than one type of plating to achieve the desired final properties of the part. Heat treated and stainless steel parts may require a strike to ensure good adhesion depending on the plating being applied.

Nickel or chrome plating can provide a bright finish with protective properties, with zinc nickel offering the highest corrosion resistance. Tin plating is a useful finishing process for food-contact, medical, and electronic applications where surfaces must be non-toxic and free of substances of very high concern (SCHC).

Performance Showdown: Corrosion, Wear, and Electrical Properties

The following four key performance metrics can be used to compare both processes:

- 1 Color and aesthetics.** Plating features an opaque, matte, or shiny finish, while anodizing is ideal for dyed and transparent options.
- 2 Corrosion resistance.** Anodizing forms a sealed oxide barrier, with Type III coatings excelling in corrosion and abrasion resistance. Plating provides sacrificial layers or barrier protection, depending on the plating type and substrate.
- 3 Electrical conductivity.** Plating is typically used to enhance or impart electrical conductivity, such as plating with silver, tin, or copper. Anodizing acts as an electrical insulator and is non-conductive.
- 4 Hardness and wear.** Type III (hardcoat) anodizing features a ceramic-like coating with high wear resistance. Chrome plating or electroless nickel features excellent hardness.



Saporito's decades of experience allow us to provide engineers with the guidance they need to choose between plating and anodizing, helping them select a process that can provide results in line with their requirements.

The Saporito Advantage: A Single Source for Optimal Decisions

Selecting a finishing option that is best suited for the application is a technical decision driven by the project specifications, not cost alone. With over 80 years of industry experience, Saporito has developed a trusted reputation as a single-source provider for both anodizing and plating services.

This dual capability enables us to offer unbiased expertise, recommending the best option for the part. Using a single [quality-certified](#) vendor for all your metal finishing needs ensures unsurpassed efficiency and risk reduction.

[Contact us](#) or request a [quote](#) today, leaning on Saporito's expertise to guide your next project.



About Saporito Finishing

Saporito is also a leader in environmentally responsible finishing. Charles J. Saporito set a standard in pollution compliance that has been passed down over the years. Realizing that one day his grandchildren would be drinking the same water he left behind, Saporito became the first metal finisher to voluntarily request a permit from the Metropolitan Sanitary District of Greater Chicago to treat his company's wastes. Since then, Saporito Finishing has strived to maintain high standards in areas of environmental regulation. Most recently, Saporito Finishing was the recipient of the Governors Award for its environmental compliance activities in the state of Illinois.

For information about how our extensive finishing experience can help improve your next metal finishing project, [request a quote](#) using our easy to use form, you can even upload a file schematic – or – [contact us](#).

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