

Metalizing Capabilities Available from A.L.P.

Charlevoix, MI

In A.L.P.'s Charlevoix, MI location there are three evaporative metalizing chambers. Two are 72" in diameter and one is 24" in diameter. These chambers are almost exclusively devoted to evaporating 99.99 fine aluminum. This provides a highly reflective thin film coating with a minimum reflectivity of 85%*. This process differs from "plating," which applies a relatively thick coating using a chemical bath process. Whether applied by evaporative or sputter coating, aluminum thickness is in the range of a few hundred angstroms. Illustrating how thin this truly is, one ounce of aluminum can cover approximately one acre of surface area.

Base Coats

Some substrates do not accept direct metallization well and require a base coat. The benefits of base coating include increased specularity (shininess), improved adhesion, and added moisture resistance for longer part life. However, base coating does not necessarily improve reflectivity and increases costs by adding a labor intensive step to the process. A.L.P.'s standard base coat is thermal cured enamel or urethane.



Top Coats

In most instances, a top coat is needed. In indoor, dry applications that require no cleaning or direct contact, raw aluminum can remain specular for approximately 10 years. However, in outdoor, damp, or contaminated settings, raw aluminum may oxidize within a few months. Top coating prevents this oxidation.

Basic Topcoat

The standard top coat is thermal cured acrylic lacquer. It has minimal adverse effects on reflectivity and provides protection from weathering. However, it is still considered a "soft coat" coat that is extremely susceptible to scratching. Due to its relatively economical price, this is A.L.P.'s most popular choice for applications that do not require cleaning.



UV Curable Hardcoat

While more expensive, UV hard coating is for applications in which the part must be cleaned or is subject to chemical attack. Fingerprints can be wiped off the surface without scratching.

Fixtures

Using the large 72" chambers that can hold many parts, the cost to metalize can be economical despite a relatively long cycle time of approximately one hour. Each chamber has a reel that holds up to 6, 8 or 10 fixtures. For significant volume, two reels may be required to maximize efficiency. For example, 12 metalizing fixtures can cost between \$3000 (for the most basic holding mechanism) to \$25,000 (for processes that require selected masking).



**For more information on Reflectivity, please refer to the back of this document.*

A.L.P.  **LEXALITE**
AN A.L.P. BRAND

Production Locations:

10163 US Hwy. 31 North One Gum Branch Road
Charlevoix, MI 49720-9649 Dickson, TN 37055

Customer Service:

Tel: 877-257-5841 | www.alpadvantage.com

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Dickson, TN

A.L.P.'s Dickson, TN location offers metalizing in a sputtering machine with a vertical chamber of 36" in diameter. While this equipment is primarily used with aluminum, it can run most metals, including brass, silver, copper, stainless steel, chrome, and a variety of alloys. Like the evaporative process, sputtering produces a highly reflective thin film coating with minimum reflectivity of 85%. This chamber has additional capabilities that can make it much more economical than other metalizing options. Due to its small size and advanced pumping mechanism, its cycle time is approximately five minutes. Additionally, it can apply a plasma pre-treatment to the plastic prior to sputtering, which enhances adhesion. It also can deposit an in-chamber HexaMethylDiSilOxane (HMDSO) topcoat immediately following the sputtering operation. HMDSO is considered a "soft-coat" and cannot be cleaned. Since coating is conducted during the cycle of the machine, there is no additional labor cost involved in completing a finished part.

Base and Top Coats

Dickson has the same base coat capabilities as Charlevoix, with the standard being thermal cured enamel or urethane. With the in-chamber plasma pre-treatment, very few parts require a base coat.

Top Coats

As an alternative to the in-chamber HMDSO topcoat, Dickson offers the same basic acrylic lacquer top coat as is available from Charlevoix. However, the Dickson location does not currently offer a UV curable hardcoat.

Fixtures

Lower fixture cost is the final advantage of this sputtering operation. This chamber is capable of holding holding 4 or 8 smaller fixtures, which are proportionally less expensive. Metalizing fixtures can range from a base of \$1000 to \$5000 for specialty masking.



Reflectivity

Measuring reflectivity is simple, but only for flat surfaces. A.L.P. measures reflectivity by setting up a light source at a fixed distance from a simple light meter and taking a reading. Then a glass slide that has been metalized is mounted on a fixture and placed at a 45 degree angle to the light source. The light meter is rotated 90 degrees from the source so that the sample will reflect the light from the source to the mirror. The distance from the source to the mirror to the light meter is the same distance as the initial light source direct from the meter. The reading of the reflected light is compared to that of the direct light, and the resultant quotient is the reflectivity.

A.L.P.'s measurement of 85% minimum reflectivity is based on the flat glass slide test results. The glass slide is mounted on the fixtures adjacent to the production parts. A.L.P. uses the reference slide and visual inspection to ensure consistent production. Most parts have features such as curves, textures, or non-specular areas that prevent accurate reflectivity testing on the parts themselves.

Deep parts with narrow openings get less metallizing in the deep portion and proportionally more near the opening. In these cases, there will not be uniform 85% reflectivity in all areas. Product design should account for these variations. If specific performance criteria are required, A.L.P. can perform other photometric testing to confirm the finished parts meet the required output, however this method of testing does not provide a measurement of reflectivity percentage.

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