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BAMBERGER POLYMERS TECH TIPS

Metallizing Plastic Parts

Vacuum metalizing plastic is a process which allows a user to create a layer of metal on a substrate, usually of another material. Also referred to as “vacuum deposition”, vaccuum metalization involves heating the metal coating material until it vaporizes inside a vacuum chamber.

There are two primary methods to perform metalization on plastic parts:

Flame Spraying - Which has a high deposit rate and can become very thick. Specific areas of parts usually required for complex shapes. A handheld device is used to apply the coating. Driven by a flame of oxygen and gas. The metallic powder is heated and melted. The flame accelerates the mix and releases the spray. The coatings are generally porous and rough.

Arc Spraying - Which utilizes an electric arc as its source. Two wires of the metallic material carrying DC current touch together at the tips producing the energy to melt the wire. A stream of gas deposits the molten material to the part. Both are lower cost and minimal training.

Vacuum Metallizing - The parts are fixtured and placed on a turntable in the vacuum chamber. A filament is used to evaporate the metal. Usually Tungsten. The fixture is rotated within the cloud of vapor. The metal is evaporated in a vacuum chamber around 1500 degrees C. Lack of pressure in the vacuum lowers the boiling point of the metal and changes from a condensed phase to gaseous. Usually, aluminum or copper. The vapor condenses leaving a thin layer on the part. The process takes place within the vacuum chamber to prevent oxidation. A secondary topcoat is applied if additional abrasion resistance is required. Vacuum Metallizing offers lower cost and does not require exposure to chemical mixture.

Electroplating - The part is immersed into a tank of concentrated sulfuric and chromic acids for Etching. The mixture etches the surface of the part with microscopic holes. These holes are necessary to receive the first layer of metal in the electroless process just before electroplating. Neutralization in an alkaline mixture to ensure the acids do not continue to degrade the part. Catalytic film is applied to the part in prep for electroless plating. the part is cleaned to accelerate the film to react better to the metal plating. Electroless plating is performed to apply a thin layer of nickel or copper to promote conductivity for electroplating. Next electroplating applies a neg charge to the new coating. Then immersed into the tank containing
the positively charge chrome ions. Attachment occurs to the part. Then the ions revert to neutral form which ensures an even layer.

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