



Electrical Applications

Thermal spray deposits are used extensively in the electrical industry for a number of applications including electrically conductive coatings and resistance type heating circuits.

Condensers, Resistors, and Brushes

One application is the production of electrolytic condensers. Automatic wire flame spray equipment is used to apply aluminum onto a gauze-like fabric. Special air caps are employed to provide uniform spray patterns at high velocities. Carbon and ceramic resistors and carbon brushes are sprayed with a thin film of copper to provide an electrical connection of high conductivity.

Pigtails may be soldered to the copper layers on the carbon brushes. Ceramic resistors are also coated.

Surface preparation is unnecessary, because the copper particles readily adhere to the relatively porous surface of the carbon or ceramic parts.

Circuits, Panels, and Switches

Thermal spraying is a useful method of producing thick film electrical circuits. These circuits can carry higher currents than the printed type, yet are more flexible than stampings.

Circuits are produced by spraying the metal onto a nonconductive substrate - usually plastic, ceramic, or glass. The bond to plastics is obtained by grit blasting the surface. Unglazed ceramics are sprayed without surface preparation. The circuit patterns are produced by spraying through masks and etching away unwanted material afterward, or by molding the patterns into the plastic. After the entire surface has been coated, the molded circuits are revealed by grinding away the excess coating to the plastic substrate. The most commonly used metals for thick film applications are copper, aluminum, zinc, and silver. Materials which may make thermal spraying even more attractive to the electrical industry are being developed for stable resistors, capacitors, and inductors. Heater panels have been produced by spraying onto thermally treated glass. Aluminum is the preferred metal for use on glass. Silver is used in the contact areas of large knife switches to provide good electrical contact.

Shielding

Shielding material is used to eliminate electromagnetic and radio frequency interference (EMI/RFI) and to dissipate static discharge sparks. Applications include computer terminals, electronic office equipment, medical monitoring devices, and sensitive electronic equipment. Housings constructed of temperature sensitive plastics do not offer shielding. Zinc coatings provide protection, are inexpensive, and are easily applied. Adhesion is excellent, as is electrical conductivity, which provides high levels of attenuation in the range of 60-120 dB.

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In electronic applications that require wear resistance with a high dielectric factor, pure aluminum oxide is applied by wire flame spraying.