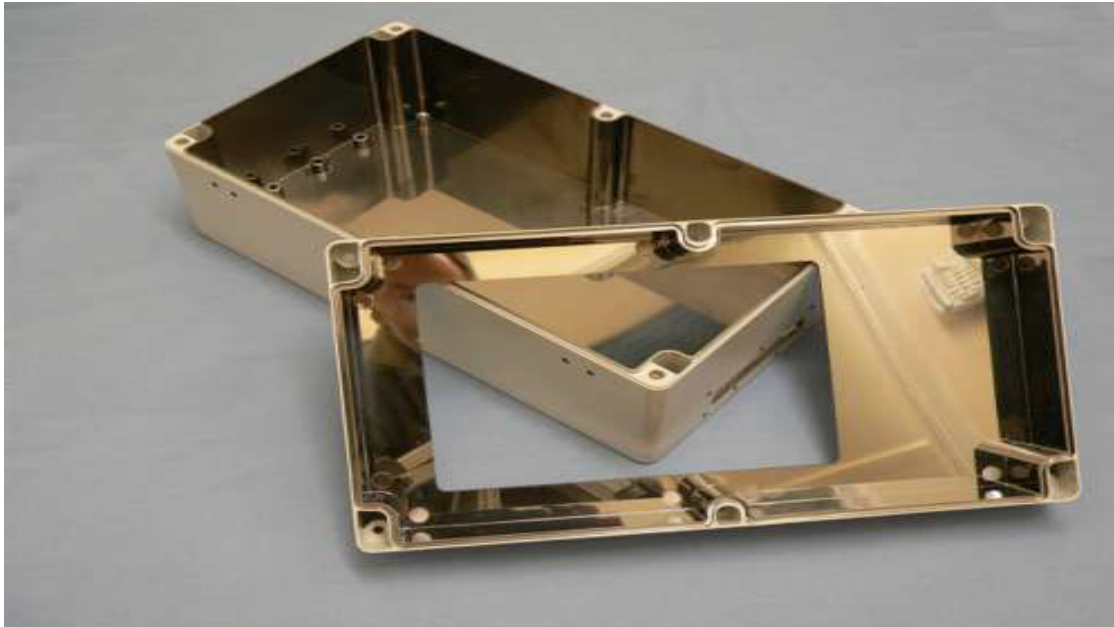




COATING FOR EMC PROTECTION

At Torr Scientific, we can also apply our extensive expertise and technology in the field of coating to other applications such as EMC protection.



Sputter coating is one of the most advanced processes by which thin films of virtually any metal can be deposited uniformly over complex shapes. Virtually any plastic, ceramic or glass substrate can be coated. Metallic films thus deposited are strongly adhering, durable, and very dense, so therefore have electrical properties closely approximating the bulk material. The ability to deposit virtually any metal or alloy such as Silver, Copper, Aluminium, Nickel and Stainless Steel etc. with the above characteristics makes the process ideal to the field of EMC shielding of enclosures made from plastics or other non-conducting materials.

For RFI shielding applications the coatings are usually only required on internal surfaces. Sputtered coatings can be deposited accurately on selected areas by using specially designed jigs.

The process is relatively straightforward

- PRE-CLEANING
- MASKING AND LOADING PARTS IN THE VACUUM CHAMBER JIGS
- IN/SITU PLASMA CLEANING
- DEPOSITION OF THE COATING Pure aluminium, copper, alloys or alternating layers are then deposited under controlled conditions to achieve the required shielding characteristics. The thickness of the coatings can be controlled to better than 0.1um and layers of up to 10.0um can be deposited.

The simplest coating may comprise a few microns of Al or Cu for example. The resultant shielding arises from the change in impedance as the wave passes from free space (377 ohm) into the coating, and attenuation of the transmitted wave results from reflection and absorption.



For good absorption, the metal should have a minimum thickness of at least six 'skin depths' – this will give at least 50dB absorption (8.6dB per skin depth). The skin depth in a metal depends upon the wavelength of the signals to be shielded, and the type of metal used.

However, even thin films will give good reflection loss, which may be sufficient in many applications. The table below shows the relative performance of sputtered versus a conductive spray paint for example

MATERIAL	Al 99.7%	CONDUCTIVE PAINT Ni in acrylic
COATING THICKNESS	5um	50um
CONDUCTIVITY relative to Cu	0.4	0.006
SPECIFIC RESISTANCE	$5 \cdot 10^{-6}$ Ohm cm	$3 \cdot 10^{-4}$ Ohm cm
SHIELDING EFFECTIVENESS	90dB	65dB

Overall, sputtered metallic layers offer the best EMC coating performance maximised shielding effectiveness through dense high conductivity layers

- maximise adhesion to most plastics through the physics of the sputtering process itself
- environmental stability, and corrosion resistance
- minimal impact on the intrinsic properties of the plastic substrates, whereas the solvents in paint can have deleterious effects
- accurate and reproducible masking
- cost effectiveness through zero defects.
- low environmental impact versus spray, flame-spray, and electroless plating

A high performance coating often requested comprises alternating layers of copper and stainless steel. A thin initial stainless layer provides excellent adhesion, followed by a thick copper layer to achieve good screening, with a final protective overcoat of stainless to resist corrosion etc. An example of this is shown in the image at the top of the page

TORR SCIENTIFIC Ltd.

The Knoll Business Centre
 Old Shoreham Road
 Hove
 East Sussex
 BN3 7GS
 UK

Tel: (44) 1273 424477
 Fax: (44) 1273 424962
 Email: sales@torrscientific.co.uk
 Web: www.torrscientific.co.uk

