

## **INVESTIGATION OF MULTI-STAGE DEPOSITION TECHNIQUES OF INDUSTRIAL EPD PAINT FOR HIGH FILM THICKNESS AND MULTI-LAYER APPLICATIONS**

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EPD paint systems are well established in industry and used for applying various decorative, protective and functional coatings to a wide variety of metal items as diverse as automotive vehicle bodies and costume jewellery. Being aqueous systems, deposition is principally driven – at least in the early stages - by the electrochemical breakdown of water rather than electrophoresis. The resultant polarisation of the deposit by diffusing or retained electrolytic gas leads to a self-limiting rate of coating. This self-limitation is beneficial for equalising thickness distribution, but prevents higher thicknesses that may be required for protection. If the electrodeposition is interrupted and the polarising blanket of gas bubbles removed by rinsing, electrodeposition can be resumed with electrophoresis becoming more significant and higher thickness achieved. It is also possible to build multiple layers of different paint compositions. In addition, substrate movement as opposed to whole bath agitation can be significant for refining the deposit. Studying the final composition of multiple layers of different paints provides some insight into the dynamics of the deposition processes. Practical advantages include enhanced corrosion protection from higher thickness, and various functional attributes – e.g. friction control – from multiple layering with dry lubricant containing top-coats.