© *Proc. Indian natn. Sci. Acad.*, **48**, A, No. 5, 1982, pp. 527.
Printed in India.

Electrochemistry

INFLUENCE OF ADDITION AGENTS IN SULPHURIC ACID ANODISING BATH USING ALTERNATING CURRENT

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(*Received 16 November 1981*)

Anodising is an electrochemical process of building up the natural surface oxide film to various specifications depending upon the end use. Anodising processess use sulphuric, oxalic, chromic and to a much lesser extent phosphoric acid as anodising electrolyte. Of these, the sulphuric acid electrolyte is most commonly and commercially used in the anodising industry. In current forms, generally direct current is used for anodising. However, alternating current is used for continuous wire anodising for a small thickness to get a flexible coating which can be easily dyed. Further, alternating current is used to superimpose over D.C. to get hard anodic coatings.

Alternating current has not been used as such for anodising due to inherent problems associated with it in D C. sulphuric acid anodising process. Simple electrolysis of water takes place while in A.C. sulphuric acid anodising process in addition to electrolysis of water reduction of sulphuric acid that takes place with the subsequent deposition of sulphur and its compounds inside the pores of the oxide film. In A.C. anodising with sulphuric acid bath, in the initial stages anodising takes place followed by deposition of sulphur and its compounds which results in the rise of anodising voltage and forms streaks and pits. Hence, oxide film thickness above 10 microns are difficult to get and the resulting oxide film is coloured yellow or brown. Therefore, A.C. anodised films are unsuitable for coating dyes since it will introduce uncertainty in the final colour and colour matching will be difficult.

A.C. anodising process has certain advantages. Firstly, the costly rectifier can be dispensed with and in its place a transformer and a variac can be used. Secondly, since both the electrodes are aluminium, the cathode can be dispensed with resulting in full utilisation of the bath volume. Thirdly, the alloys of aluminium containing more than 5 per cent of copper of silicon which are difficult to anodise by D.C. process can be easily anodised by the A.C. process.

In view of the above advantages, the influence of additive compounds to eliminate the difficulties encountered in plain A.C. sulphuric acid bath have been studied. In this paper, the authors have presented the influence of various additives in 10 per cent sulphuric acid bath with respect to voltage time behaviour at various current densities using aluminium and its alloys. A comparative study of coating ratio obtained with D.C. sulphuric acid bath and A.C. sulphuric acid modified bath has been investigated.

Keywords : Addition Agents; Anodising; Sulphuric Acid; Anodising Bath; A.C. & D.C. Anodising Processes