

INFLUENCE OF THE SURFACE ROUGHNESS ON ADHESION OF CHROME COATINGS ON ALLOY TOOL STEEL X165CrMoV12

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ABSTRACT

The influence of surface roughness on the coating adhesion of electrodeposited chrome coatings with different roughnesses, has been evaluated using scratch testing technique. Coatings were deposited on the high alloyed tool steel. Photographs of the scratch grooves were recorded by the built-in optical microscope, at moments when critical loads had been reached. Crack pattern development was investigated. Results indicated that the increase of surface roughness lowers coating adhesion. Rough surfaces promote early coating failure, extensive spallation and early exposure of the substrate material.

Keywords: electrodeposited chrome coatings, scratch test, coating surface roughness.

AIMS AND BACKGROUND

Ever since the 1940's, chrome has been used to add a protective coating and shiny luster to a wide range of metal products, from home accessories to auto parts. Chrome plating is applied for wear resistance, lubricity, oil retention and other purposes. It can increase corrosion resistance, surface hardness, wear resistance and reduce friction^{1,2}. Chrome plating is easily applied and has a low cost^{3–6}. Much progress has been realised during the last years in the field of coating deposition and improved coatings with excellent frictional properties^{1,7–10}. Chromium plating provides excellent hardness, bright appearance and resistance to corrosive environments. Problems such as matt deposition, milky white chromium deposition, rough or sandy chromium deposition, insufficient thickness and hardness are the most common problems faced in the electroplating industry¹.

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