

CONTEMPORARY METALLIC MATERIALS

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Edited by:

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Aluminum Spray Coating for Corrosion Resistance of Steel

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Keywords: Spray coating, aluminium, corrosion resistance.

Abstract: With thermal spray, there are a large number of options available for coating a substrate with various coating materials. The characteristics of the coatings can be varied within a wide range to suit specific application requirements. Carbon steel has been coated with aluminum by thermal plasma spray technique. It is subjected to some tests in order to understand the characteristics of the coating. The results show that coating is uniform and dense with an faced center cubic FCC structure. The coating has some porosity and oxide particles. Surface of the coating is quite rough and hardness of coating is higher than that of the substrate of carbon steel. Moreover, the corrosion rate is lower compared to that of the steel. Therefore, it is concluded that the coating of steel with aluminum powder by thermal plasma spray technique enhances the properties of the steel.

Introduction

Thermal spraying is a group of processes wherein a coating material is heated and propelled as individual particle or droplet onto a surface[1]. The thermal spray gun generates the necessary heat by using combustible gases or an electric arc. As the materials are heated, they are changed to a plastic or semi molten state and are confined and accelerated by a compressed gas stream to the substrate. The particles strike the substrate, flatten, and form thin platelets that conform and adhere to the irregularities of the prepared substrate and to each other. As the sprayed particles impinge upon the surface, it cools and builds up, into a laminar structure forming the thermal spray coating. The coating that is formed is not homogenous and typically contains a certain degree of porosity, and, in the case of sprayed metals, the coating will contain oxides of the metal. Coating material may be any substance that can be melted, including metals, metallic compounds, cements, oxides, glasses, and polymers. Coating materials can be sprayed as powders, wires, or rods. The bond between the substrate and the coating may be mechanical, chemical, or metallurgical or a combination of these. The properties of the applied coating are dependent on the coating material, the thermal spray process and application parameters, and post treatment of the applied coating. Figure 32.1 Schematic diagram of the plasma spray process.