

Hot Metal Spray

As a preparation to powder coating

Merv Radford (MSSA) and Mario S Pennisi (Penlia & Co)

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Principal Consultant - Penlia & Co

PO Box 6198, UPPER MOUNT GRAVATT, QUEENSLAND, AUSTRALIA 4122

Telephone: +61 7 3849 6460; Facsimile: +61 7 3849 7302; Email: mariopen@coat-fab.com

Introduction

The corrosion resistance of a powder coating on steel for use in industrial, rural and marine atmospheres can be improved significantly by hot metal spray or galvanizing.

Preparation for metal spray galvanizing

Grit blasting is the most commonly used method for preparing surfaces for metal spray galvanizing. It removes rust, mill scale and other surface contaminants and produces a suitably roughened surface that promotes mechanical adhesion as well as chemical and metallurgical adhesion of the coating. In grit blasting a highly concentrated stream of relatively small abrasive particles is projected at high velocity against the surface to be cleaned.

For the coating to be effective, the area to be metal spray galvanized has to be cleaned to a "white metal finish BS 4232" or SIS 055900 'SA3' or AS 1627: Part 4 Class 3. Once this has been achieved, the steel will immediately begin to corrode in the atmosphere; the rate is dependent on a number of factors with moisture, high humidity and salts in the atmosphere having the greatest effect. To ensure that the anti corrosive properties of the hot metal spray can be achieved, the cleaned steel should be metal sprayed as soon as possible but within three to four hours after deposition.

Types of abrasives commonly used to prepare a surface for metal spray galvanizing

A wide range of grits may be used to clean the steel:

- * Chilled angular iron grit
- * Crushed slags
- * Ceramic grits (aluminium oxide and silicon carbides)

The ceramic grits are used where the base metal has a hardness greater than 300HV that cannot be blasted effectively by chilled iron grit or slag.

The metal spray process

The process involves heating a material to the molten or semi-molten state and propelling it against the substrate to produce a suitably adherent coating.

There are five different coating processes for applying thermal spray metals:

- * Powder combustion
- * Wire (rod) combustion
- * Twin-wire arc
- * Plasma arc
- * High velocity Oxy/fuel.

Either oxygen/fuel combinations or a DC electric arc is used to apply heat.

Many powder coaters use the twin-wire arc process for applying adherent, fine grained and non-porous coatings as an undercoat.

The process imparts little heat to the substrate – between 100 and 260 degrees Celsius. Because of this, metal spray can be applied to most substrates including metals, plastics and composites and to finished machined parts.

Uses

Metal spray coatings are used for:

- * Wear resistance
- * Dimensional restoration
- * Corrosion resistance
- * Thermal barriers
- * Abradables
- * Abrasives

- * Dielectrics
- * Conduction
- * RFI/EMI shielding
- * Medical implants
- * Undercoat for paints and powder coatings.

Undercoat for powder coating

The property that powder coaters want from metal spray is corrosion resistance. Metal spray provides a method of applying pure zinc or zinc/aluminium alloy to a cleaned steel substrate to make use of the corrosion properties of zinc. Zinc is a metal that oxidises rapidly and because of its colour the oxidation products are difficult to see in the early stages of development. Adhesion of the powder coating is dependent on the surface of the zinc being completely free of oxides and other corrosion products and to achieve this, it is important that the surface is powder coated immediately or within 30 minutes after the zinc is applied.