PLASTIC COATING OF METALS

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INTRODUCTION

Most of the metal articles are given a surface coating to prevent corrosion and other damages due to environmental hazards as well as to provide a colorful appearance. Painting and electroplating are the most common methods of surface coating. Coating of metals with plastics is a recent development. Refrigerator shelves, shoe racks, cloth racks etc. are the items that are most commonly coated with plastics.

Plastic coating is done either by dipping or by spraying. No solvents are used in both these methods. Spraying is done by flame process or by electrostatic process. Fluidized Bed method is most commonly used in dipping.

Flame Spraying

Plastic powder together with a flame of propane or acetylene gas is directed on to the metal surface using a spray gun. The powder gets fused due to the heat of the flame and deposits on the metal surface as a thin film.

Electrostatic Spraying

Plastic powder taken in a tank is given a negative charge and the metal items are given a positive charge. When this powder is sprayed on to the metal it gets adhered to the surface. This item is then kept in a heated oven for a specific period of time. During this time the powder gets melted and forms into a thin coating over the surface of the metal.

Dipping

Fluidised bed technique is the simplest method of dipping. This method has been used in the present study since it could be adopted for commercial operations with a relatively low investment.

Machinery & Equipment

List of machinery and equipment required for this project is given below. The dimensions and capacities of these equipment depend on the dimensions of the articles to be coated.

Air Compressor Capacity 250 lit Press. Upto 10 bar	- 01 No.
Electric Oven Internal dimension 2' x 2' x 3' Temp. up to 300^0 C	- 02 Nos. -
Fluidized bed	- 01 No.
Acid bath 2' x 2' x 3'	- 02 Nos.
Polisher	- 01 No.

Buildings

A building of floor area around 20' x 25' is adequate for this industry.

RAW MATERIALS

Plastic Powder

There are several types of plastic powders available in the market. e.g. Polyethylene, Polypropylene, Polyamide, Polyvinylchloride etc. Polyamide 12 (Trade name VESTOSINT) has been used in this experiment. 1 kg. of plastic powder is sufficient to coat 10 sq. meters of metal surface.

Present price of 1 Kg. of plastic powder used in this experiment is Rs. 550/-.

Hydrochloric acid and abrasive paper are required for cleaning the metal.

EMPLOYMENT

Number of employees required depends on the types of products to be coated and the volume of production. However, for the purpose of evaluation of this project, it has been assumed that the Owner/Manager, Supervisor/Clerk, 02 Unskilled Laboures and 02 Skilled Laboures are employed.

METHOD

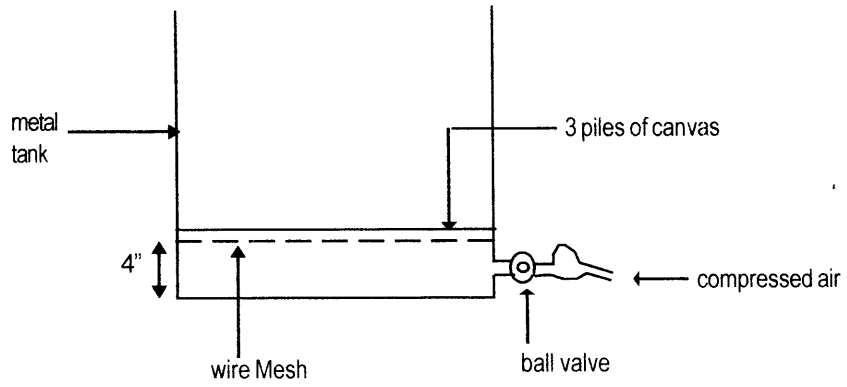
Dipping in a Fluidized Bed:

Fluidized bed method is the simplest among the dipping methods of plastic coating of metals.

A steel tank with a false bottom as show in Fig.1. is used as the dipping tank.

Figure 1

Fluidised Bed



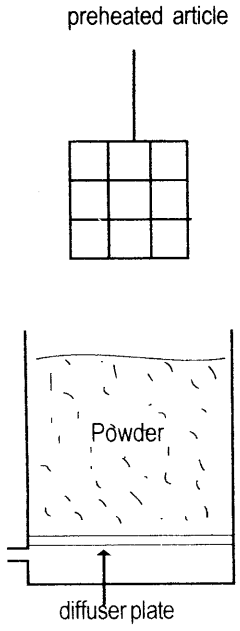


Figure - 2

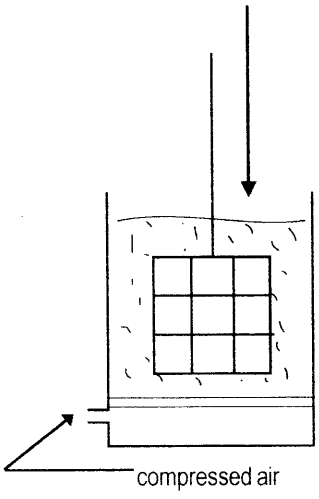


Figure - 3

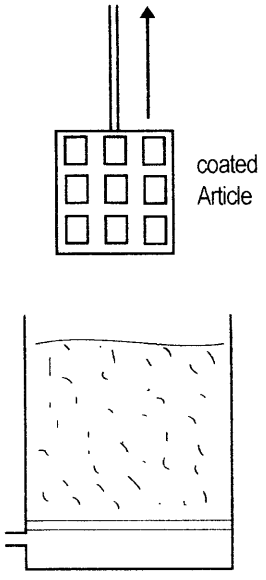


Figure - 4

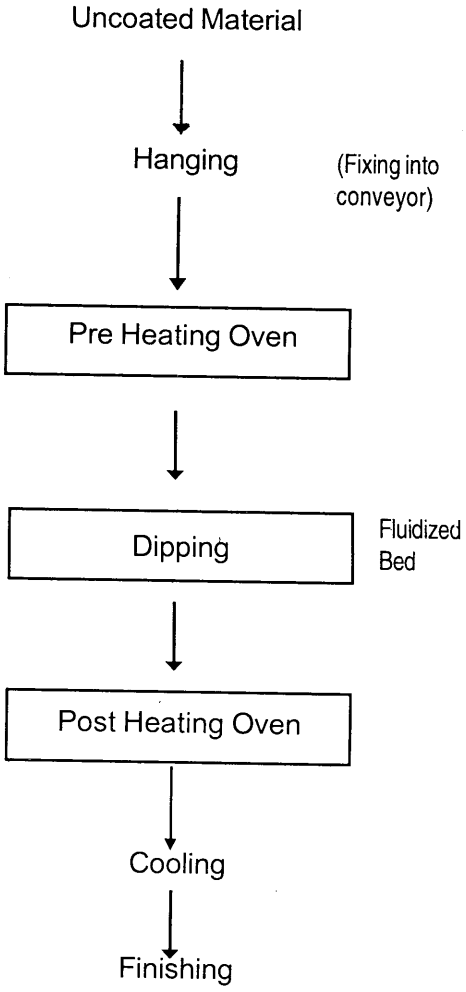
The false bottom is made out of a steel wire mesh of 'countless microholes' (of diameter about 50μ) ; and placing 3 piles of canvas cloth over it. Plastic powder is placed on the canvas and compressed air is blown into the space between the two bottoms of the tank at a pressure of about 0.7 kg./CM^2. This will force the powder to be blown out in the form of a fluidized bed.

Metal critical with a well cleaned surface is heated to the recommended temperature, around 220^0 C (Fig 2) by placing it in an oven. Cleaning of metal is done either using abrasive paper or by dipping in a bath of acid or cleaning salt.

The heated article is removed from the oven and immediately dipped in the fluidized bed. (Fig.3) The article has to be slowly shaken while it is being dipped. The item will be taken out (Fig. 4) after about 2 - 3 seconds and transferred into the second oven (maintained at about 200^0 C) for fusion of the powder and to form a smooth film on the surface of the metal.

The pre and post heating temperatures and the dipping times specified here would vary with the type of plastic material and the heat capacity of the metal to be coated.

PROCESS FLOW CHART



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