

Chapter 1-8METAL SPRAYING FOR PROTECTIVE SURFACE TREATMENTS

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Introduction

1 Metal spraying may be used to deposit most metals and alloys and has a wide range of applications, the three main classifications being:

- 1.1 Corrosion-resistant coatings for use in atmospheric and high temperature conditions.
- 1.2 Building up of worn and undersized parts.
- 1.3 Coatings with special mechanical properties, e.g. hardness, wear resistance etc.

Spraying guns

2 There are three types of gun used, differing only in the method employed for feeding the metal into the gun viz:

- 2.1 Metal wire. The wire, approximately 1.5 mm dia., is mechanically fed at a uniform rate to the flame nozzle where it is melted, atomised and sprayed as a divergent cone.
- 2.2 Metal powder. The powder is heated and fed to the flame at a uniform rate. The powder melts in the oxygen/gas cone and is spray-projected.
- 2.3 Molten metal. The metal is furnace heated and transferred to a heated container, fed into the gun, and atomised by heated compressed air.

Preparation

- 3 It is important to appreciate that the bond between the parent metal and the sprayed coating is essentially mechanical, and that the surface of the work-piece should be thoroughly cleaned and roughened to provide a key.
- 4 Where worn parts are to be built up, or where a coating is applied for wear-resistance, the surface is to be undercut so that a sufficient coating will remain after full wear has occurred.
- 5 On heavily worn parts, it is preferable to have a series of steps rather than a single deep step at each end of the worn section. The coating edges should be rounded, with shoulders provided where necessary.

- 6 When dealing with flat and concave surfaces, it is essential to provide a good key for the coating, due to the tensile stress in the deposit resulting from the coating contracting when cooling.
- 7 In such cases, alloys having a low coefficient of expansion should be used.
- 8 Casting blow-holes and craters should be sufficiently opened out to ensure positive location of the metal being deposited.
- 9 The workpiece is to be pre-heated to approx. 95°C to prevent the condensation of moisture and heating. Heating to 150 to 250°C gives better deposit adherence, reducing the possibility of stresses which could crack thick deposits. The procedures outlined in DEF162 Sect. 3 are to be complied with.

Metal spraying

- 10 Spraying should be commenced without delay following surface preparation. In the case of steel parts, the whole of the prepared surface is to be metallized within one hour of preparation.
- 11 Articles such as shafts can be lathe mounted for spraying, the gun being carried on the traversing cross-slide.
- 12 The initial coating is applied at an angle of 45° to the surface in alternate directions, using a series of thin layers to build up the required deposit thickness.
- 13 All steel parts metallised are to be followed by a full paint scheme as outlined in DEF162. No baking is required.