

COATING GENERATION : VAPOR CLOUD SURROUNDING A PARTICLE PRIOR TO IMPACT AND SPLAT FORMATION

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ABSTRACT

Plasma spray deposition is a versatile technology that offers a reliable cost-effective solution for many industrial problems. It allows the spraying of a wide range of materials from superalloys and refractory intermetallic compounds to ceramics. This technology encompasses also the manufacture of net shapes which can be used directly as engineered materials.

However, the distinctive microstructure of plasma-sprayed coatings which consist of many layers of thin lamellas parallel to the substrate surface with possible inclusions of pores, unmelted particles and crack network can curb their use. The control of this microstructure is linked to the injection conditions and particle size range of the powders, the natural fluctuations of the plasma jet in both time and space mode and the flattening and freezing of the particles impinging on the substrate.

This review discusses the basic phenomena which affect coating formation and may explain the inhomogeneity of its morphology. The first part will refer to the plasma jet fluctuations. The second part describes the conditions of injection of the powder and the resulting distribution of trajectories into the plasma jet. The third part examines the behaviour of the particles in flight and specially their evaporation. The last part relates the interactions between particles and the underlying layer.