

Near Net Shape Structures of Hypereutectic Aluminum Structures by Vacuum Plasma Spray Forming

Arvind Agarwal and Tim McKechnie
Plasma Processes Inc.
4914 D Moores Mill Road
Huntsville, AL 35811, USA
Phone: (256) 851 7653
Fax: (256) 859 4134
Email: arvind@plasmapros.com

Hypereutectic Al-Si alloys find several applications in aerospace, automobile and electrical equipment industries due to their low density, high specific stiffness, temperature resistance, wear-resistance and low coefficient of thermal expansion (CTE). Some of these applications include high performance automobile engine parts (connecting rods, rocker arm, cylinder sleeve, piston rings, valve retainers, lightweight optics and electronic packaging material for aerospace applications). Conventionally, hypereutectic Al-Si alloys (e.g. A 390 containing 16.5 wt. % Si) were processed by casting route but it results in growth of large columnar silicon grains, which causes problem in the machinability of the material. Automotive industry has experienced such difficulty during honing operations due to the large and angular Si particles. Hypereutectic Al-Si alloys processed by powder metallurgy route involves the presence of oxides. In view of these problems, vacuum plasma spray (VPS) forming technique has been adopted to fabricate *near net shape structures* of hypereutectic Al-Si alloys. This article explains the near net shape forming by VPS process, describes the microstructural development of the spray formed alloy and relates to the properties and applications