A COMPUTER AIDED DESIGN ADVISOR FOR OPTIMUM AND CONCURRENT COMPONENT DESIGN FOR POWDER METALLURGY MANUFACTURE

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ABSTRACT

This paper presents an new approach for the manufacturing evaluation of powder metallurgy (PM) 3D component designs. Innovative techniques are proposed that utilise space domain transformations to isolate and analyze the 3D topology and dimensional geometry of component designs (either during design or post design), in terms of their suitability for production using the PM manufacturing process. Undesirable features, including re-entrant geometry, sharp corners, feathered edges, tapers, thin walls, slender grooves and notches, may readily be identified, together with the location/orientation of suitable parting lines. Other aspects subject to evaluation include die fill, component density control, and details of tooling design. Having identified potential problematic design issues, the proposed system may highlight any problem features, and if possible, suggest alternative design solutions, including the addition of fillets, chamfers and tapers.

INTRODUCTION

The growing demand for improved product performance and the implementation of 'zero-defect' and 'total quality' strategies in consumer product based manufacture, particularly within the automotive industry, is exerting considerable pressure on suppliers to improve component part performance at economic cost. To stay competitive, the industries concerned must address the technical issues affecting their ability to react to customer needs in both traditional and new market sectors. The optimisation of component design and the control of manufacturing process parameters are critical issues affecting part quality. For example, there is a general consensus across the powder metallurgy (PM)