

Analysis of Warm Metal Powder Compaction Process-An Experimental Investigation

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Abstract

The process of powder metallurgy has many advantages in comparison with conventional methods of materials processing such as casting, forming and machining. New materials and component manufacturing methods can increase the competitiveness of powder metallurgy, which is the production of solid components from powders by compacting and sintering. The development of high performing materials and more efficient production methods makes a changeover from traditional manufacturing methods to powder metallurgy both possible and profitable. The objective of this paper is to present an experimental investigation of warm powder compaction process. Two types of experiments, i.e., compaction and shearing experiments have been conducted in several temperature levels starting from room temperature to 150°C using iron powder. The objectives of compaction experiments are to obtain the information regarding the force balance histories during the process and to derive the material parameters of warm powder during the deformation. The shearing experiments have been conducted to derive the temperature dependent friction criterion for the powder. The results showed that the force balance during the compaction cycle is temperature dependent. A lower load is required to achieve a specific deformation by giving the lower hardening parameter at elevated temperature. The friction coefficient is also found to be lower for the compaction at elevated temperature.

Keywords: Experimental investigation, warm compaction, elevated temperature, force balance