عنوان مقاله:

The Effect of Simple Shear Extrusion on the Microstructure and Surface Properties of Aluminum Components Produced by Powder Metallurgy

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خلاصه مقاله:

This study focuses specifically on the combination of two methods: powder metallurgy and severe plastic deformation. In this research, the influence of a single pass of simple shear extrusion (SSE) on the grain refinement, structural evolution, and some tribological properties of pure aluminum samples produced through the powder metallurgy method has been investigated. It is observed that after a single pass through the channel of SSE, the average grain size decreases, and the tribological properties of the sample significantly increases. The innovation of this research lies in the simultaneous combination of two methods: Fabrication of samples through powder metallurgy and severe plastic deformation. These methods lead to the alignment or even enhancement of the properties of the produced samples compared to conventionally cast samples. The recorded hardness values for the produced samples decreased from ۵۷ Brinell for the as-cast sample to ۲۹, ۴۳, and ۶۰.۳ Brinell after initial pressing, sintering, and a single pass of SSE, respectively. Wear test results also indicate a substantial improvement in wear resistance in the refined-grain sample, with a weight loss reduction of ۰.۰۱۱ grams compared to the powder metallurgy stage. Furthermore, corrosion test results show an increase in corrosion potential from ۷۳۰ to ۷۲۰ millivolts in the powder metallurgy sample after SSE, and the current density decreases from ۱.۷۱ to ۱.۵۴ amperes per square centimeter in the powder metallurgy and simple shear extrusion samples, respectively.

کلمات کلیدی:

aluminum, severe plastic deformation, Powder metallurgy, Simple Shear Extrusion, Wear