MECHANICAL PROPERTIES AND WEAR RESISTANCE OF SEVERELY DEFORMED ZA-27 ALLOY AFTER EQUALCHANNEL ANGULAR EXTRUSION

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ABSTRACT

Experiments were conducted on the superplastic ZA-27 eutectoid alloy where the materials were subjected to Equal Channel Angular Extrusion (ECAE) using routes A, BC and C up to four passes at 900 C. Ultra-fine grained ZA-27 alloys were produced and influence on the microstructure and mechanical properties such as strength, hardness, ductility and extrusion load were evaluated. The effects of different processing routes for different number of passes on the dry sliding wear of the ZA-27 alloy at low load were also investigated. The ECAE process revealed a significant enhancement of the strength and hardness of the alloys after the first pass followed by a gradual decrease with increasing number of passes for all processing routes. The elongation to failure, however, exceptionally increased with increase in the number of passes for all processing routes. Combined high strength and good ductility were obtained in the alloy after the ECAE process. The strength and maximum extrusion load showed similar trends with number of passes for all processing routes. The wear resistance properties of the ZA-27 alloy were affected after the ECAE process compared to unprocessed ZA-27 alloy.