

Effect of Heat Treatment on Wear Behavior of ZA – 27 Alloy*

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Abstract

A new group of Zn - Al alloys suitable for casting was developed in the late sixties, These alloys are ZA - 8 , ZA - 12 and ZA – 27, where the numbers represent the approximate percentage of aluminum in the alloy. These alloys compete with cast iron and copper alloys and aluminum alloys. ZA – 27 alloy is characterized by the biggest strength and lowest density alloy from the rest of ZA alloys. It has good physical and mechanical properties (good strength, good cast ability, ease of machining, good wear properties and high corrosion resistance).

This research is aimed to study the effect of heat treatment on mechanical properties as well as to improve the wear properties of ZA-27 alloy.

Heat treatment of type T4 was applied on ZA-27 alloy (This treatment was done by heating the alloy to a temperature equal to 370 °C for a period of 3 or 5 hours and then immersion in water followed by natural aging for 30 days).

Wear testing has been made by using dry sliding test of pin samples on the disk - ZA – 27 alloy after casting without any treatment and wear tests were performed on heat treated ZA – 27 alloy samples. The microstructure of the alloy after casting and after heat treatment was examined and the effect of the microstructure on the wear behavior was studied.

The hardness and tensile strength of heat treated samples were reduced while elongation was increased compared with alloy after casting. The rate of decrease of hardness was equal to 34.7 %, which is consistent with solutionizing period. On the contrary, the increase in the solutionizing period decreases strength and increases elongation. The study shows also that the heat treated samples have achieved a significant improvement on wear properties compared to the samples after casting without heat treatment

Keywords: ZA – 27 alloy, wear properties, heat treatment

* For the paper in Arabic see pages (83-94)

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