

# Microstructural Characterization and Wear behavior of as Cast and Heat Treated Zn-Al Cenosphere Composite

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**Abstract**—*The wear properties and the microstructure of as cast and heat treated stir cast Zn-Al Cenosphere composite were studied. The samples were prepared using stir casting technique at CSIR lab Bhopal. The samples were then cut into small discs and polished using different grades of emery paper. The mirror finish of samples was given by using fine alumina powder on velvet cloth. The microstructure examination was done by using SEM and hardness was determined by using Brinell hardness tester. The wear tests of the samples were carried out at two different loads of 80N and 100N, at the frequency of 30Hz. To determine the wear mechanism the worn surface analysis was done by SEM. The results showed that with increase in Al content the hardness and wear resistance of the samples increased. The microstructure of the as cast samples contained non uniform distribution of the phases. After heat treatment the phases got uniformly distributed in the microstructure. This uniform distribution of all the phases improved the wear properties of the samples however, the hardness was substantially reduced. It was also observed that in as cast samples the wear took place mostly by abrasive mechanism, which was evident from the presence of the parallel grooves in the SEM micrographs of worn surface. After the heat treatment the wear mechanism was predominantly adhesive, it was observed that the material from the ball has adhered on to the surface of sample. The micrographs showed the presence of smeared material and relatively shallow grooves present in the micrograph of the sample. It is envisaged that Zn-Al composites can be materials of choice for wear application with an improved properties after applying the heat treatment operations.*

**Keywords:** *Cenosphere; Zn-Al; Composite; Wear; Microstructure; Stir Casting.*