Tribological Behavior of Warm Rolled Spray Formed Al-6Si-1Mg-1Graphite Composite

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Abstract : In the present investigation tribological behavior of Al-6Si-1Mg-1Graphite composite has been explained. The composite was developed through the unique spray forming route in the spray forming chamber by using N_2 gas at 7kg/cm^2 and the flight distance was 400 mm. Spray formed composite having a certain amount of porosity which was reduced by the deformations. The composite was subjected to the warm rolling (WR) at 250ºC up to 40% reduction. Spray forming composite shows the considerable microstructure refinement, equiaxed grains, distribution of silicon and graphite particles in the primary matrix of the composite. Graphite (Gr) was incorporated externally during the process that works as a solid lubricant. Porosity decreased after reduction and hardness increases. Pin on disc test has been performed to analyze the wear behavior which is the function of sliding distance for all percent reduction of the composite. 30% WR composite shows the better result of wear rate and coefficient of friction. The improved wear properties of the composite containing Gr are discussed in light of the microstructural features of spray formed the composite and the nature of the debris particles. Scanning electron microscope and optical microscope analysis of the present material supported the prediction of aforementioned changes.

Keywords : Al-6Si-1Mg-1Graphite, spray forming, warm rolling, wear
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