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JAMSHEDPUR CHAPTER

Seminar On

GROWTH WITH QUALITY
CHALLENGES & OPPORTUNITIES
FOR FOUNDRY

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TECHNICAL PAPERS 2008

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2	Mr. K. N. Rao	Designing of high strength sand mix for spin cast rolls to substitute imported sand mix (Luverite)
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11	Dr. A.K. Vaish, Mr. R. K. Minj and Dr. S. D. Singh	Energy efficient and eco- friendly processes to make Indian foundries globally competitive

Effect of wt% Reinforcement on Mechanical and Wear Properties of Al-2Mg base Short Copper Coated Steel Fiber Composites

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Abstract

In the present investigation, mechanical and wear properties on 2.5, 5 and 10 wt% copper coated short steel fiber reinforced Al-2Mg alloy composites prepared by stir casting process were evaluated. Steel fibers were coated with copper by electro less deposition process. It is observed that density and hardness of composites increased with increasing wt% of fibers. The mechanical properties of these composites were measured and the results are correlated with the microstructure observation. It was found that copper coated short steel fiber reinforced composites showed improvement in strength with reasonable good ductility. Tensile strength increased with increasing wt% of copper coated steel fiber but percentage of elongation decreases. It is observed that 10 wt% fiber composites shows minimum strength among the composites due to high porosity. Wear test was carried out using Pin-on-Disc wear testing apparatus. The effects of sliding distance, applied load and wt% of fiber on the dry sliding behaviour were evaluated. Dry sliding wear tests at room temperature revealed that the cumulative volume loss of MMCs were significantly lower than alloy. The coefficient of friction and the wear rate also decreased with increasing fiber content. The worn surface and debris of specimens were examined under scanning electron microscopy (SEM) to find out the wear mechanism. SEM observations revealed that extensive microcracks occur on the surface of the Al-2Mg alloy tested at lower loads. The growth of these microcracks eventually led to the delamination of debris from the alloy surface. The copper coated steel fiber addition tended to reduce the plastic deformation in the surface layer there by reducing the occurrence of microcraking in the MMCs. The wear mechanisms of MMCs are dominated by oxidative wear at lower load but it changed to severe wear when applied load were increased. The composites containing 2.5 and 5-wt% of fibers exhibited a load dependent transition from mild to severe wear with increasing load. In case of 10-wt% fiber composites showed only mild wear even at higher applied load.