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Effect of sand concentration on erosive – corrosive wear behavior of chill cast aluminum – boron carbide composites

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Abstract

In the present investigation, the erosive – corrosive wear behavior of chill cast aluminum boron carbide composites have been studied in marine environment. The composites were fabricated by gravity die casting using vortex method. Metallic chill materials with different thermal conductivity (stainless steel, cast iron and copper) were used as mold materials. Silica sand of particle size 312 microns was used as erodent material. The experiments were performed at room temperature for a testing period of 3 hours at a speed of 900 rpm by varying the sand concentration from 10–50 wt. % in steps of 20 wt. %. From the present study it is noticed that, irrespective of the material the slurry erosive wear rate increases, as the quantity of the sand in the slurry increases. It is also noted that the copper chill cast composites exhibits greater wear resistance than the cast iron and stainless steel chill cast composites due to its fine grain structure obtained through faster cooling rate of the copper chill because of its high thermal conductivity. The study of the worn surface by scanning electron microscope reveals that the increase in the quantity of the sand in the slurry solution leads to greater damage to the exposed surface due to the rise in the extremity of the erosive – corrosive attack.

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Keywords: Erosive – Corrosive wear; Chill casting; Aluminum - Boron carbide composites.

1. Introduction

In the current scenario, the aluminum metal matrix composites have gained a huge demand and engineer's preference as the most eligible candidate for the structural applications due to their excellent strength and wear resistance.

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