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Optimization of dry sliding wear behavior of aluminium-based hybrid MMC's using experimental and DOE methods

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Abstract

Due to its exceptional mechanical characteristics combined with lightweight and fuel-efficient materials, metal matrix composites (MMCs) have largely been developed for the automotive and aerospace industries. In this paper, an attempt was made to investigate the dry sliding wear behavior of aluminium-based hybrid MMC 's through the experimental approach. The experiments were performed for three types of filler materials: Boron carbide (B_4C), Molybdenum Di-sulphide (MoS_2), and graphite (Gr) particulates of 50 μm were reinforced into aluminium-2219 matrix using stir casting technique. On the other hand, data computing is a trend in mechanical engineering and is increasing drastically in recent years. It has proved one of the most cost-efficient methods to identify the optimum results with a limited number of experiments. Hence, this research was carried, with an emphasis on optimization , utilizing the design of experiments (DOE) technique with specified parameters. For DOE , additional experiments were conducted based on full factorial design and then different analyses were performed such as ANOVA, regressions equation, and confirmation tests to examine the effect of parameters on the wear behavior of composites. Besides, the influence of wear parameters such as applied load (L), sliding speed (S), and sliding distance (S-D) on the wear loss were investigated. The current investigation realized that B_4C particles in the matrix increases the wear resistance of MMC when compared to other selected materials of this study.

Author keywords

Aluminum alloys; Dry sliding ; Hybrid MMC 'S; Wear

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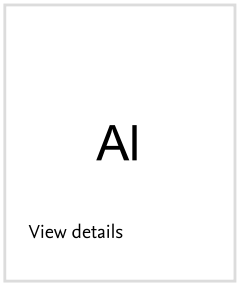

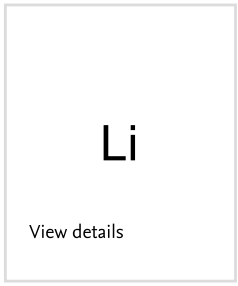

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