

Experimental Analysis of Aluminium Hybrid Composite with Various Operating Conditions

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Abstract: This present study deals with the fabrication of Al7075/B₄C/HBN metal matrix hybrid composite and investigation of its tribological and mechanical behaviour. The aluminium alloy was reinforced with Hexagonal boron nitride (HBN) with various weight fraction (0%,2%,3%,4%) by keeping Boron carbide (B₄C) constant at 3%. Stir casting process was used for the fabrication of the composite. Wear experiment was conducted on pin-on-disc tester using four process parameters such as applied load (10N, 20N, 30N and 40N), sliding velocity (1m/s, 2m/s, 3m/s, 4m/s), temperature (25°C, 50°C, 100°C, 150°C) and percentage of reinforcement (0,2,3,4 HBN). The results indicated that the mechanical properties of the composite material were reduced at high temperatures. Hardness of the composites increases while increase the wt % of HBN. Hardness is minimum at 3rd composition. However, at high temperatures and humidity levels, some debonding was observed, which could reduce the mechanical properties of the material. Overall, the experimental analysis highlights the importance of considering the operating conditions when designing and using aluminum hybrid composites for various applications.

Keywords: Al7075 , B₄C , HBN, Wear, Hardness

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