

Mathematical modeling and analysis of tribological properties of AA6063 aluminium reinforced with fly ash by using response surface methodology

ABSTRACT

Lightweight, high-strength metal matrix composites have attracted considerable interest because of their attractive physical, mechanical and tribological properties. Moreover, they may offer distinct advantages due to good strength and wear resistance. In this research, AA6063 was reinforced with FA particles using compocasting methods. The effects of fly ash content, load, sliding speed and performance tribology of AA6063 –FA composite were evaluated. Dry sliding wear tests were carried out according to experimental design using the pin-on-disc method with three different loads (24.5, 49 and 73.5 N) and three speeds (150, 200 and 250 rpm) at room temperature. Response surface methodology (RSM) was used to analyze the influence of the process parameters on the tribological behavior of the composites. The surface plot showed that the wear rate increased with increasing load, time and sliding velocity. In contrast, the friction coefficient decreased with increasing these parameters. Optimal models for wear rate and friction coefficient showed appropriate results that can be estimated, hence reducing wear testing time and cost.

Keyword: AA6063; Fly ash; Response surface methodology; Tribological properties; Wear rate; Friction coefficient