

Evaluate the effects of various surface roughness on the tribological characteristics under dry and lubricated conditions for al-si alloy

Abstract

The effect of surface roughness average of hypereutectic aluminum silicon alloys (with 16 wt% Si) on the friction and wear was investigated. Various surface roughness average (Ra) of different degrees was verified as well as three different loads 10, 20 and 30 N, speeds 200, 300 and 400 rpm and relative humidity 77%. Different surface preparation techniques are resulted in different Ra values from (6, 8 and 12) \pm 0.05 μ m. The contacts were dried sliding and lubricated regime at 2.5 centimeters per second. Surfaces were analyzed with scanning electron microscopy and X-ray dispersive analyses. It was noted that the weighted and volumetric wear rate decreases as degree of roughness decreases, as well as coefficient of friction is considered as a function of the stability state. Wear rate is decreased and the transition stress from high to low wear is increased with increasing surface roughness average. There was a correlation between friction coefficient and hardness.

Keywords

Aluminum-silicon alloy, Boundary lubrication, Casting, Surface roughness, Adhesive wear