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Wear Behavior of Commercial Aluminium Engine Block and Piston under Dry Sliding Condition

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Abstract : In the present work, the effect of load and sliding distance on the performance tribology of commercially used aluminium-silicon engine block and piston was evaluated at ambient conditions with humidity of 80% under dry sliding conditions using a pin-on-disc with two different loads of 5N and 20N yielding applied pressure of 0.30MPa and 1.4MPa, respectively, at sliding velocity of 0.29ms-1 and with varying sliding distance ranging from 260m-4200m. Factors and conditions that had significant effect were identified. The results showed that the load and the sliding distance affect the wear rate of the alloys and the wear rate increased with increasing load for both the alloys. Wear rate also increases almost linearly at low loads and increase to a maximum then attain a plateau with increasing sliding distance. For both applied loads, the piston alloy showed the better performance due to higher Ni and Mg content. The worn surface and wear debris was characterized by optical microscope, SEM and EDX analyzer. The worn surface was characterized by surface with shallow grooves at loads while the groove width and depth increased as the loads increases. Oxidative wear was found to be the predominant mechanisms in the dry sliding of Al-Si alloys at low loads

Keywords : wear, friction, gravimetric analysis, aluminium-silicon alloys, SEM, EDX
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