MmePr17-002

Influence of Solidification Microstructure on Hardness and Wear Resistance in Al-33Cu-3.2Bi Alloy

Rocha, O.F.L.(1); Junior, M.S.(1); França, R.S.(1); Magalhães De Azevedo, H.A.(2); Costa, R.B.(1); Nascimento, L.S.(1);
(1) IFPA; (2) UFPA;

Research with aluminum alloys containing Bi has been developed in recent decades due to the great potential that these alloys present for the manufacture of components used in various sectors of the aerospace and automotive industries, subjected to friction conditions. Generally, the mechanical properties of Al-33Cu alloys largely depend on the size and morphology of the eutectic constituents. In this sense, efforts have been performed to refine and modify Al alloy eutectics. However, in the literature there are many doubts to be clarified about the interrelationship between the microstructure, mechanical properties, and wear resistance of unsteady-state directionally solidified multicomponent Al-Cu alloys, with high Cu content and containing Bi. Thus, this work aimed to investigate the effect of eutectic spacings (ES) on the hardness and wear resistance in the Al-33Cu-3.2Bi (wt.%) alloy by means of a water-cooled device. Rockwell B hardness (HRB) and micro-abrasive wear tests using a fixed rotating sphere, were carried out on solidified samples in positions from the heat transfer interface. For the wear tests, two times were considered equal to 7min and 28min. The wear parameters evaluated were worn volume (VD) and wear rate (TD). After the aforementioned tests, the HRB, VD and TD values were correlated with the measured ES values. The results showed that finer microstructures, that is, smaller ES, promoted higher HRB values. . On the other hand, VD and TD decreased for coarser microstructures, i.e., presented high wear resistance for higher ES values.