
Tribological and mechanical properties of PM Fe-Cu-Sn alloy containing graphite as a solid lubricant

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Abstract: The mechanical and tribological properties of Fe-Cu-Sn alloy containing graphite as a solid lubricant were investigated. An attempt is made to develop graphite added Fe-Cu-Sn alloy using simple single stage compaction and sintering of elemental powders. The influence of varying compositions of graphite on the mechanical and tribological properties of the sintered alloys was studied. The tribological behaviours of sintered alloys sliding against EN8 steel ball under dry sliding conditions were studied using a ball-on-disk tribometer. The composition containing 3 wt% graphite shows better mechanical properties due to the formation of Cu-Sn, Fe-Cu and Fe-Sn compounds in large amounts at the high sintering temperature. The friction coefficient of Fe-Cu-Sn alloy decreases by 60% with increase in sliding distance with variation from 0 wt% to 3 wt% of graphite content. The higher amount of graphite content is found to be beneficial in improving wear resistance. The wear mechanism of Fe-Cu-Sn alloy containing 0 wt% of graphite is adhesive wear and abrasive wear. However, the wear mechanism of Fe-Cu-Sn alloy containing 3 wt% of graphite is mildly abrasive wear.

Keywords: Fe-Cu-Sn alloy; solid lubricant; powder metallurgy; coefficient of friction; COF; wear rate.

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