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Study of erosive surface characterization of copper alloys under different test conditions

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ABSTRACT

In this study, the erosive behavior of copper alloy has been assessed practically at different test conditions using dry compressed air jet test rig under surrounding room temperature. Asymmetrical silica sand (SiO2) is taken into account as erodent particle within the range of 300-600 μm. The impact velocities of 30–50 m/, impact angle 15–90° and stand-off distance 15–25 mm are chosen as operating parameters to investigate the variation of data of erosion rate. The highest level of erosion is obtained at impact angle 15° which ensures the ductility behavior of the tested copper alloys. Increased trends of erosion are observed at increased velocity. Mass loss of copper alloy decreases with the increase of standoff distance. The range of erosion varies from 26.82%-39.83%, 26.12%-40.63%, 36.87%-30.33% and 39.29%-27.86% for erodent size, impact velocity, impact angle and stand-off distance respectively. After erosion process, the damage propagation on surfaces is inspected utilizing Scanning Electron Microscope (SEM) for the affirmation conceivable of nature of the wear behavior. Damage surfaces of copper alloy in some particular cases indicate the detachment of large fragments and plastic deformation with pitting and ploughing action. 3D SEM was used to determine the roughnesses of damage surfaces at different processing and operating conditions. The biological composition of eroded test samples is observed by energy dispersive X-ray analysis (EDX) examination.