Erosion of Mild Steel for Engineering Design and Applications

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ABSTRACT

The erosion characteristics of mild steel have been evaluated for a variety of test parameters using dry compressed air jet test rig under room temperature. Random-shaped silica sand (SiO_2) is selected to account as erodent size within the range of 300–600 µm. The impact velocity within 30–50 m/s, impact angle of 15° to 90°, and standoff distance of 15–25 mm were set as the operating test conditions to be maintained in the present study. The extreme level of erosion was obtained at 15° impingement angle, which demonstrates the ductile nature of the examined mild steel. Increasing the impact angle also increases kinetic energy; as a result, erosive wear was increased and standoff distance was reduced. Erosive wear was increased because the flax concentration was increased in all test conditions. SEM and 3D SEM were also utilized to analyze the surface damage propagation and determine the causes of the erosive wear behavior. SEM micrographs of the eroded surfaces show that, at shallow impact angles, the material is mainly removed by the platelet mechanism and material is displaced in the direction of flow in all tested materials. The elemental compositions of the eroded test material at different percentages of mild steel were analyzed by EDX.

KEYWORDS

Mild steel; Erosion rate; Operating parameters; Impact velocity; SEM; EDX

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