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The Influence of Wall Tile and Glass Fiber Waste Particle Sizes on the Wear Behavior of Hybrid Epoxy Matrix Composites

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Abstract- The study presents the tribological behavior of epoxy matrix composites containing two different fillers. Hybrid composites were produced with casting method. The composites contains fillers with different particle sizes (<90µm and in the range of 150-300 µm) and different wall tile to glass fiber waste ratios (55:5, 50:10 and 40:20). The pysico-mechanical properties such as bulk density, porosity, three point bending strength, impact resistance and Shore hardness and wear characteristics of hybrid composites were determined. Tribological tests were carried out by ball-on-disk configuration and rotational sliding at room temperature against 6Co/WC ball with a diameter of 3mm. 3N of constant test load was applied at a frequency of 8 Hz and the wear distance is 400m. During the tests, the friction coefficient of samples was continuously recorded online by the variation in the tangential force. The results showed that the steady-state CoFs were changed in between 0,38 to 0.47 and the wear rate are between $1.74x10^{-5}$ to $1.09x10^{-4}$ mm^3/Nm. Increase in filler particle size lead to decrease in wear resistance. The correlation between the microstructure, pysico-mechanical properties and tribological behavior were discussed in detail.

Keywords- hybrid composites, waste, epoxy matrix, glass fiber, wall tile