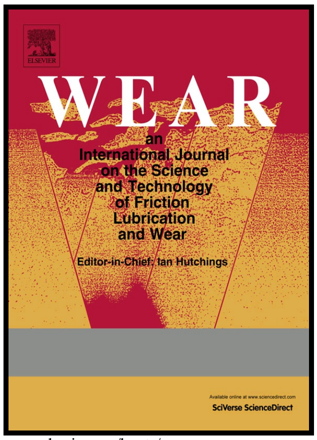

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ABSTRACT

In this study, a numerical model based on the finite element technique was developed to study the effect of temperature on the erosion mechanism of material removal during solid particle impact on polyurethane elastomers. The hyperelastic, isotropic hardening, and Mullins damage criteria were chosen as the material model formulations to account for elastic, plastic, and stress softening behavior of the elastomer, respectively. The model inputs were determined experimentally by tensile testing and cyclic loading. In the finite element modeling approach that was developed the impact of ten erodant particles at a single location on the substrate elastomer at controlled temperatures of 22ºC, 60ºC, and 100ºC was simulated. Erosion testing experiments were conducted to provide data for model verification. The results obtained from the finite element model showed that the **final elongation at break and associated ultimate stress** have the most significant influence on the erosion rate in cases where the stresses produced exceeded the failure stress during impact. This was the case for PU at 100ºC in which the material had the lowest failure stress. The model also successfully simulated the mechanism of material removal by accumulating residual strains such that detachment of larger pieces of material occurred at the surface. The plastic deformation and Mullins stress softening were found as parameters affecting