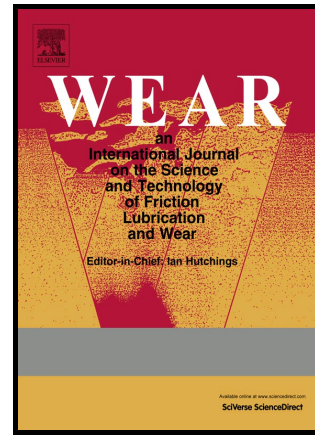


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# Evaluation of the Effect of Temperature on Mechanical Properties and Wear Resistance of Polyurethane Elastomers

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## ABSTRACT

Polyurethane has excellent wear resistance and is an effective protective coating and liner against erosion caused by the impact of solid particles. However, the wear resistance of polyurethane is a function of working temperature due to the influence of heat on its mechanical properties. In this study, an erosion test assembly was designed and developed to evaluate the wear resistance of polyurethane elastomers at controlled temperatures. A cold gas dynamic spray system was used to conduct the erosion tests. The temperature of the exposed front surface of the target material was controlled by adjusting the gas temperature of the cold spray system, and the temperature on the unexposed surface of the samples was kept constant at a desired set-point by the use of a temperature controller, a thermocouple, and cartridge heaters. The transient temperature distribution within the samples was determined by the development of a three-dimensional finite element model. The velocity of the impacting particles was determined by a model based on the principles of supersonic fluid flow through a converging-diverging nozzle. Four polyurethane elastomers with Shore A hardness values of 55 - 85 were tested. The stress-strain behavior of the polyurethane elastomers **was** characterized at room and elevated temperatures by conducting

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