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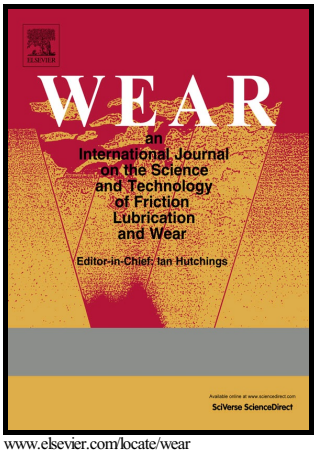

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A new test method to simulate low-severity wear conditions experienced by rubber tire materials

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Abstract

An innovative rotary tribometer was developed in order to reproduce the abrasive wear of reinforced rubber materials for tire. The device allows performing accelerated, quantitative friction and wear tests which mimic real usage conditions in terms of kinematics and dynamics of the contact, temperature and open cycle conditions, specifically in low severity conditions, which often represent a challenge to mimic and study. The specific point emphasized here is the strong impact of wear debris accumulated in the contact zone on the measured wear rate. To quantify this phenomenon, the amount of wear debris in the contact was varied by changing the frequency at which debris are eliminated. It was found that the presence of more debris in the contact zone generally decreases the wear rate. Two distinct types of wear debris were identified, which are likely to correspond to two distinct mechanisms of wear. Within a transitory period at the beginning of the tests, wear debris essentially consist in a sticky layer of soluble (thus decrosslinked elastomer material). Further on, a steady regime (representative of wear in real low severity conditions) occurs, with a well established ridge pattern, in which the predominant wear mechanism consists in tearing away material fragments of micrometric sizes. The proposed test method allows discriminating quantitatively these mechanisms.