EFFECT OF RUBBER TREAD HEIGHT AND SHAPE ON FRICTION

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ABSTRACT
The frictional performance of treaded rubber has implications to many everyday applications (sports shoes, tyres etc.). The effect of tread on rubber friction on dry rough surfaces is not clearly defined in the literature. The analytical theories do not include parameters to account for changes in a rubber block's height or shape. However, studies conducted to determine the coefficient of friction (μ) between rubber and rough surfaces find significant differences to occur with different tread patterns [1,2].

Sliding experiments were performed on three different shapes (square (S1), rectangle laid perpendicular to sliding direction (S2) and rectangle laid parallel (S3)) of rubber all with the same nominal contact area and flat ends. The rubber samples were clamped at different heights (5 and 10 mm) allowing the investigation of tread shape and height and their respective influence on the frictional performance of rubber.

No significant differences in static μ were found between any of the shapes tested. Additionally, no difference in dynamic μ was recorded at the two different tread heights. However, significant difference in dynamic μ is found between all three tread shapes. This is contrary to the classical laws of friction.

Based on the findings of [3] it is theorised that these frictional variances found between tread shape occur as a result of the differing amounts of frictional heating that occur. As shown in Figure 1, when plotting the length of the sample that is parallel to the direction of sliding, against the dynamic μ, a negative correlation is found. More tests are needed to further investigate the exact reason for these frictional differences.

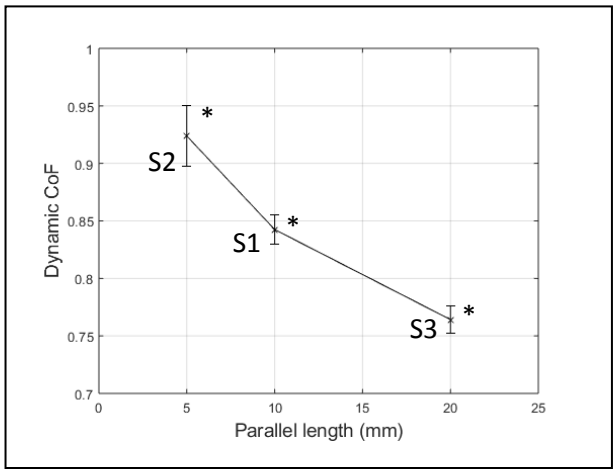

Fig.1 Relationship of rubber sample length and dynamic μ of three different shapes of rubber

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