STEADY-STATE CONTACT TEMPERATURE OF FINITE BODIES DURING DRY SLIDING

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ABSTRACT
Contact temperatures are an important contact parameter in tribology design [1]. However, we still lack a generally accepted and broadly used model allowing for easy and fast estimation of the contact temperature for the long-running contacts, when the system reaches steady-state temperature conditions [2]. This is true for steels and various other metals, and so much more for polymers.

Namely, polymers are significantly more sensitive to contact temperatures due to their poorer mechanical and thermal properties [3]. Therefore, the inaccuracy in predicting the contact temperatures in polymer-steel (Fig. 1) and polymer-polymer contacts may result in notable variation of expected surface conditions and detrimental tribological behavior.

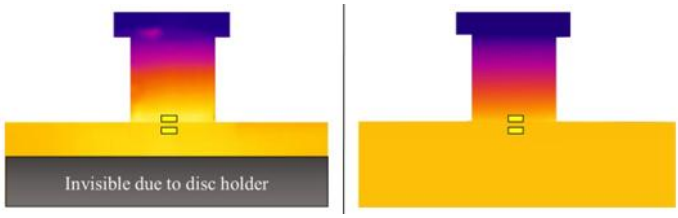

Fig.1 Side view temperature distribution of the (polymer pin)-on-(steel disc) system after a long 11-h-long run (left: experiment, right: FEM model).

In this work we present a ready-to-use temperature model, based on extensive experimental research, for polymer-steel contact, preferentially designed for pin-on-disc studies, which also considers tribo-system geometry (volume, surface, clamping). Moreover, further development of a more generalized model that includes low conductivity bodies and various tribological systems and their geometries is presented and discussed, as well as the effect of different contact material properties.

The results are accessible either as temperature maps (example given in Fig. 2) or simple-to-use equations.

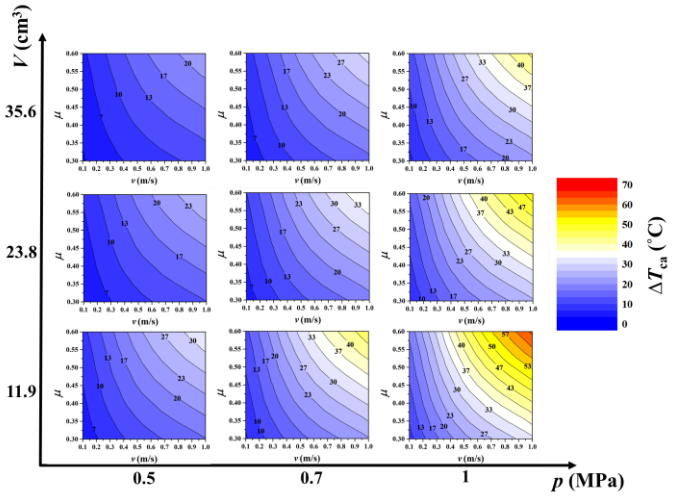

Fig.2 Contact-temperature-rise maps for POM (pin) and steel (disc) tribological contact.

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