TRIBOLOGICAL BEHAVIOR OF A GRAPHITE-PHENOLIC RESIN SOLID LUBRICANT UNDER HIGH LOADS

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ABSTRACT

A reliable and sustainable ‘’fluidless’’ lubrication mechanism for rolling bearings has long challenged the tribology community, since the conventional liquid lubricants tend to fail under high temperatures, loads or in vacuum. Several solid lubricants have sparked the interest of many experts in the field of friction and wear research due to their stability and favorable tribological properties but they are seldomly applied under high contact pressure situations. Among these solid lubricants, graphite is a rather peculiar option for its good lubricating behavior and stability. In previous research conducted in our group, we could show that graphite can lubricate a contact under high mechanical loads and moderately high humidity values, the lifetime however was limited [1].

In the quest of extending the lifetime of the advantageous lubricating properties of graphite, binders can be used. Phosphate-based materials were reported in the literature exhibiting a stable and low CoF at elevated temperatures though yielding a high wear [2]. Different authors reported that the use of phenolic resin as a binder results in low friction and wear at a wide range of temperatures, as well as a successful transfer of graphite to the counter surface, thus, ensuring a long-term lubrication [3-4].

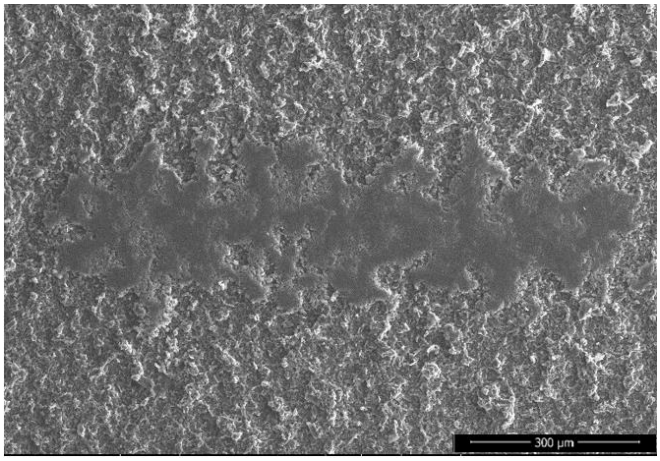

Fig.1 SEM images in the middle of the wear track after microtribometer sliding experiments of graphite-PR coated sample vs. a 100Cr6 sphere.

In this presentation we will present results on the friction and wear behavior of a solid lubricant consisting of graphite and phenolic resin on sliding-reciprocating motion; additionally, some insights about the lubrication mechanism of such lubricants, notably investigating the transfer layer build-up and its characterization.

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