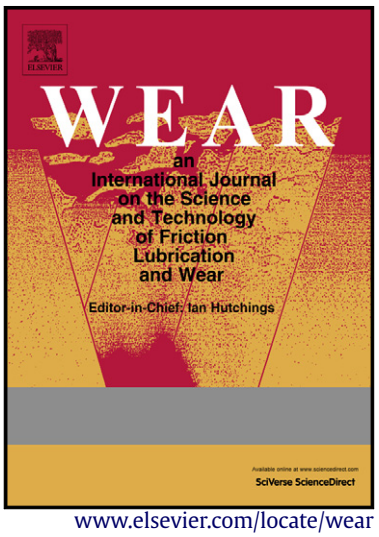

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Lubrication of DLC-coated surfaces with MoS_2 nanotubes in all lubrication regimes: surface roughness and running-in effects

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Abstract

MoS_2 and WS_2 nanoparticles, on the one hand, and DLC coatings, on the other, are receiving increasing attention for tribological applications. However, investigations that combine DLC coatings and lubrication using nanoparticles are very scarce and the understanding of such tribological systems remains limited. In this work we looked at such a lubrication system by studying the effects of surface roughness and running-in on the behaviour of DLC-coated contacts in all lubrication regimes. We also present a model of how the surface roughness influences the mechanism of lubrication for the MoS_2 nanotubes. This model is based on a 2D 1:1 projection scale of dimensions of the surface profile, including its asperities, nanoparticles and film thicknesses, and is thus independent of the contacting materials.

It was realized that the addition of the nanotubes to the base oil lowered the coefficient of friction of the DLC by more than 50 % for the smooth, DLC-coated surfaces and up to 40 %