



Research Signpost
37/661 (2), Fort P.O.
Trivandrum-695 023
Kerala, India

Recent Developments in Wear Prevention, Friction and Lubrication, 2010:
ISBN: 978-81-308-0377-7 Editor: George K. Nikas

5. Tribofilms – On the crucial importance of tribologically induced surface modifications

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Abstract

The interface between two solid bodies in sliding contact is an extreme environment. The local conditions typically result in substantial changes of the composition and properties of the mating surfaces. These tribologically induced surface modifications have decisive effects on the tribological performance of very different mechanical components and tools. They include topography changes (smoothing or roughening), formation of micro-cracks, phase transformations, deformation hardening, formation of oxides, formation of solid films by reactions with lubricant additives, transfer of material from the counter surface, and so on. The thickness of these layers and films range from atomic monolayers to tens of micrometres. Due to these modifications, it is not the original materials but the strongly modified layers that provides the wear resistance and friction level of face seals, brake pads, cutting tools, rock drills and so on.

This chapter gives an overview of this crucially important area. Due to its complexity and enormous range, this is done by presenting illustrative examples covering different materials combinations from a wide range of tribological applications.