

The effect of disc surface texturing on tribological properties of pin-on-disc assembly

The influence of a surface texture is substantial. It is concerned with contact problems but also with friction and wear, mainly in the initial period of life. A reduction of the frictional resistance is important, because there is need to improve efficiency of machines. Creation of surface texture is cheaper compared to development of new materials.

The opinion exists that surface of the sliding elements should be smooth. However smooth surfaces are characterised by small seizure resistance in conditions of starved lubrication. Wear of rough surfaces is high, leading to high frictional resistance. Therefore two-process surfaces occurred. A plateau-honed cylinder surfaces is the earliest example of two-process textures. It combines in an ideal manner good sliding properties of smooth surfaces with great abilities of maintain oil of porous textures. It contains connected valleys. Tribological properties of sliding surfaces can be also improved by creation of individual dimples. The laser treatment is the most frequently used method of oil pockets creation. Precise cavities can be created using this method. However, it can also cause non-profitable changes in the surface layer due to high temperatures. The abrasive jet machining is the alternative to laser treatment. There are a lot of research works concerning tribological influences of textured surfaces. However one can find only a few papers about the effects of dimples shapes and pattern on tribological properties of machine elements. The effect of surface texturing on a reduction of frictional resistance in variable conditions was also rarely studied. Multi-shaped and multi-dimensional surfaces will be probably the best in such situation. This project aims to fill these gaps.

The purpose of this project is determination of the effect of surface texturing on tribological properties of the frictional pair steel-steel.

The experimental investigations will be conducted. The investigation will be carried out in flat on flat (pin-on-disc) contact in conditions of starved lubrication and full fluid in reciprocating and unidirectional sliding in rotary motions initially at constant operating conditions (temperature, speed, normal load). On the basis of such research surface textures leading to the best functional properties in given regimes will be selected. In the further test part, the possibility of obtaining the best textured surfaces for operating under variable conditions will be analysed. Dimples will be created using laser ablation and abrasive jet machining.