ORB203

Tribological Study of Tribocatalytically Active PVD Mo-X-N Coating

Ricardo Henrique Brugnara, Edgar Schulz, Ladislaus Dobrenizki, Romina Bächstädt, Astrid Heckl, Nazlim Bagcivan

Schaeffler Technologies AG & Co. KG, Herzogenaurach, Germany

ricardo.brugnara@schaeffler.com

Due to the globally growing demand for reduction of CO_2 emissions, the reduction of energy losses from tribological contacts on sectors such as transportation, manufacturing and power generation becomes more and more important. One application is the tribological contact bucket tappet/cam or roller finger follower/cam in valve train system of passenger cars that offers potential for friction reduction but also places high requirement for coatings due to its complex kinematics and high contact pressures. A new approach is the use of a nanostructured tribocatalytically active PVD nitride coating system, which is composed of Mo-X-N (X = catalytic element) and interacts with the base oil and its additives. The tribological investigations of this new tribocatalytically active coating were carried out using two different ball-on-disc tribometers and fully formulated low viscosity engine oils with and without molybdenum containing additives. The tribofilms on this coating were investigated for the first time by in-situ Raman spectroscopy measurements during the tribological tests. In terms of friction behavior of the Mo-X-N coating, a friction reduction up to 35% was achieved with engine oil containing molybdenum additives compared to uncoated polished steel surface. The results of the in-situ Raman investigations pointed out the formation of a tribo-film on the coating consisting of molybdenum disulfide. The results reveal the high potential of this new tribocatalytically active Mo-X-N coating as major enabler to increase energy efficiency in the field of the “Mobility for Tomorrow”.

Keywords
Tribocatalytically active coating
Nanostructured coating system
friction reduction
energy efficiency
engine components