Wear resistance and interlocking properties of aisi 5200 steel ball bearings coated by nanocomposites

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Abstrak

The performance of ball bearings is strongly influenced by the lubrication system. In this research, the development of a lubrication system was performed by the formation of an interlocking system through a composite coating, i.e. Zn3(PO4)2 / MoS2 / MWCNT / nanographite / Na2SiO3 prepared by chemical immersion. The coating was applied through the one-mixing-layer and multi-layer techniques. The results showed that the one-mixing-layer technique has the ability to form an homogeneous thin layer with a surface roughness index that varies between 1.00 μm and 1.35 μm, whereas the thickness of the composite layers was found to be in the range from 5 μm to 6 μm. The multi-walled carbon nanotube (MWCNT) technique increased the interlocking capabilities of the coating and the solid lubricant. The one-mixing-layer technique indicated better results than that of multi-layer coated balls in terms of distribution and uniformity of elements on the coating surface, good interlocking between the composite compounds, and the thickness of the layer formed. The performance of nanocomposite coatings on the friction of the steel balls also showed that the ball bearings with a one-mixing-layer composite coating have a higher wear resistance than that of both the uncoated and the multi-layer coated ball bearings.