

Analysis of Wear Debris from Lubricated Machinery to Human Joints

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In Lubricated Machines, wear particles analysis is a condition monitoring technique used to monitor the contact condition of two surfaces in contact and in relative motion. Wear is resulting from the generated friction between the two surfaces. Wear and friction are two main disciplines of Tribology, the science dealing with interacting surfaces including wear, friction and lubrication. Qualitative, quantitative and morphological data could be obtained from the wear particle analysis through the periodically taken samples of the lubricant. This is implemented through different techniques to indicate the wear mode and severity.

In human joints, hips, knees, ankles, shoulders, elbows and finger joints, the phenomena of Tribology is found including wear, friction and lubrication. Wear particles are generated from cartilages and bones and released into the synovial fluid. The generated wear particles could be used for monitoring the joints condition. This is applied for natural and artificial joints and artificial joints as well. Debris materials could be metals, polymers, ceramics, cements as well as cartilage and bone materials. Analysis of these particles could be an effective tool for disease diagnosis especially in the early stages.

In this study, a survey of the applications of the wear particle analysis in human joints is presented, the similarity of the Tribological aspects between the lubricated machines and human joints is introduced and the different techniques used in this analysis is indicated. Recommendations for future works are offered.

Biography:

Dr. Sayed Akl is a Professor in the Mechanical Department from British University in Egypt (BUE). He completed his Ph. D in Mechanical Engineering, Tribology, National Institute of Applied Sciences, Lyon, France, 1983. His Fields of Interest in Planning, Supervising and Participating in Applied Researches in different areas like Wear, Material, Lubrication, corrosion, Vehicle Power Pack, Transmission and Suspension, Nano-materials and also in Modules: Production Technology.