Particle Counting and Characterization for Oil and Grease using advanced Direct Imaging techniques

Richard N. Wurzbach, MRG Labs, 410 Kings Mill Rd, York, Pennsylvania, 17401, USA

Colin Dalton, JM Canty, Ballycoolin Business Park, Blanchardstown, 15 Dublin, Ireland

Tod Canty, JM Canty, 6100 Donner Rd, Lockport, NY 14094, USA

Particle counting is a fundamental analysis tool for hydraulic fluids and lubricating oils. Monitoring fluid cleanliness by quantifying the size and numbers of particles in a given sample provides actionable data for corrective and pro-active steps to extend bearing and gear life, which can otherwise be compromised due to particle-induced fatigue wear. Bearings that are grease lubricated are likewise impacted by particulate, but to date limited options have existed for economically evaluating the cleanliness of greases. New technology that combines high-resolution optics and video, along with powerful backlighting and software to identify particle size, quantity, shape and other characteristics, now allow for comprehensive cleanliness evaluation and particle identification for both oils and greases. This paper will detail the direct imaging methods that allow the identification of "ghost particles", which can falsely inflate particle counts with simpler laser or optical scattering methods, and mesh obscuration. Video recordings of real-time particulate flow in oil samples are shown as software provides the particle count, and removes influences of air bubbles, water particles, and other false indications. A new method to prepare a thin-film of grease for inspection is coupled with this direct imaging method to provide routine, repeatable, and quantifiable analysis of grease cleanliness and particulate types.