

Empirical Study on influences of electromagnetic field on Hall Effect sensor for analysing oil lubricant deterioration

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Abstract. This study aims to present the procedure developed for detecting deterioration of oil lubricant under variation of electromagnetic field which was generated by a ferrite-core solenoid coil. The overall diameter of coil was 18.5 mm and the inductance was 22.421 mH from direct current stimulation. The results were then compared to those from frequency stimulation. The optimal efficiency of measurement systems was then assessed by real-time analysing the metal particle contamination of 3 oil lubricants categorized by grade namely ISO 32, ISO 46 and ISO 68 as well as the viscosity under specific conditions which were flow rate and temperature ranging from 25 °C to 100 °C. The analysis was performed to compare the results from experiments of unused and used (approximately 6 months) oil lubricants. From experiments, the viscosity of oil lubricant was reduced when the temperature exceeded 50 °C. However, the stimulation of coil using 0.9 A direct current could clearly distinguish the difference between the unused and used oil lubricants with metal particle contamination comparing to other values of direct currents applied with 0.42 % of error. Also, the 0.5 kHz of frequency would be the most appropriate value for frequency stimulation with 0.38 % of error.