The Effect of Degradation on a Full Synthetic vs. Conventional Motor Lubricant's Tribological Performance

Mason, Micajah (School: Central Virginia Governor's School for Science and Technology)

The purpose of this study was to determine which type of oil, synthetic or conventional, was most effective at maintaining its tribological performance when the oils experienced a simulated degradation process. The degradation of the oils was simulated by adding 3g of carbon particulates to 300ml of the oil. The oils were tested using a lubricity tester; a cast iron bearing was spun on an aluminum surface that was submerged in a vat of the oil type being tested. A wear mark was generated on the aluminum surface, the depth of this mark was measured to collect the data points. An additional data point was collected by gathering a temperature reading at the end of the lubricity test. These data points were used to gather information and determine tribological performance. The two groups of contaminated oil were tested in this way. When the data was compared using a t-test statistical analysis, a p-value of 9.76E-09 was determined for the wear mark depth comparison. For the operating temperature comparison, a p-value of 6.47E-16 was found. When compared to an alpha value of 0.05, the synthetic oil was found to be the most effective at maintaining its tribological performance. This supports the research hypothesis, stating that the synthetic oil would be more effective than the conventional oil at maintaining its tribological performance when the contamination occurred.