The Following Is A Summary Of The

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Paper Number 881825 Entitled

"Correlating Lube Oil Filtration Efficiencies With Engine Wear"

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AC Spark Plug and Detroit Diesel Corp. performed a joint study of the relationship between the level of engine oil filtration and Engine wear rates, and found finer filtration reduced the rate of Engine wear.

Diesel and Gasoline Engine wear rates were established by building a Diesel and Gasoline Engine with fully inspected wear components and inspecting them after the test. In both Engines, the upper and lower main bearings, oil rings and compression rings were inspected. In the Diesel Engine, the cam lobe profile and cylinders were also inspected, while the piston pin bushings, piston pins and cylinder liners of the Gasoline engine were inspected.

The total test duration was eight hours. To accelerate wear, 50 grams of AC Fine Test Dust was added, in slurry form, to the crank case every hour.

Diesel Engine wear tests were performed using filters with high efficiency ratings for particle sizes: 40 Microns, 8.5 Microns and 7 Microns.

Gasoline Engines wear tests were performed using filters with high efficiency ratings for particle sizes of the following sizes: 40 Microns, 30 Microns and 15 Microns.

ANALYSIS

The researchers found clearances in the Diesel and Gasoline Engines varied between 2 and 22 Microns during engine operations. That means particles in the 2 to 22 Micron size range are most likely to damage Engine parts. Particles smaller than 2 Microns will slip through the clearances without damaging bearing surfaces.

CONCLUSIONS

The researchers drew the following conclusions:

Abrasive Engine wear can be substantially reduced with an increase in single pass efficiency. Compared to a 40-Micron filter, Gasoline Engine wear was reduced by 50 percent with 30-Micron filtration. Likewise, wear was reduced by 70 percent with 15-Micron filtration. Controlling the abrasive contaminants in the range of 2 to 22 Microns in the lube oil is necessary for controlling Engine wear.

"The Micron rating of a filter as established in a single pass efficiency type test, does an excellent job indicating the filter's ability to remove abrasive particles in the Engine lube oil system."

The smallest particles most popular "full Flow" filters capture with high efficiency are sized 25 to 40 Microns, depending on the filter brand.

What is a rare earth magnet?

Increases in the strength of magnets has been extraordinary, and the advent of rare-earth magnets has allowed the design of high intensity magnetic circuits operating without electrical energy. FilterMag's patented technology employs the use of these rare earth magnets. FilterMag is the only magnetic oil filtration device, on the market today, to use these high intensity rare earth magnets. That is what separates FilterMag from the rest of the pack. FilterMag's patented technology can withstand the force of oil flow and collects ferrous metal particles as small as 2 microns.

Originally thought to be rare, the metallic elements with an atomic number between 57 and 71 are classified as rare earth. Samarium cobalt could produce more than 4,100 surface gauss in a tube magnet circuit compared to 1,000 and 2,000 gauss for standard Alnico and Ceramic. (Gauss is a unit measuring electromagnetic force.)

The newest generation of rare earth magnets consists of neodymium iron boron. (Neodymium is number 60 on the periodic table.) The first neodymium iron boron magnet that came to market developed a surface gauss of approximately 4,800 in tube-type circuit. Strength levels have been increasing over the past ten years and are now producing surface gauss of more than10,000 in a tube-type circuit. FilterMag's rare earth magnets are generally 5 to 10 times stronger than other magnetic filtration devices using Ceramic magnets.

The required background magnetic field for effective particle collection is typically determined through an identification of the magnetic contaminant or by quantitative testing. Some general guidelines for magnetic field requirements are shown below:

1,500 Gauss	Relatively coarse ferromagnetic iron of abrasion.
2,500 Gauss	Fine ferromagnetic iron of abrasion.
5,000 Gauss	Very (Sub-micron) ferromagnetic iron of abrasion or scale, or paramagnetic contaminants such as iron bearing minerals or nickel and cobalt compounds.
10,000 Gauss	Fine paramagnetic contaminants.