# ROTATING MAGNETIC FIELD ON FUEL QUALITY

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## OBJECTIVE:

To verify nominal improvement in the fuel quality (Flash point & Viscosity) by subjecting the oil samples to strong rotating magnetic field.

## PRINCIPLE/CONCEPT:

Magnetic field is known to be associated with flowing charges. The hydrocarbon molecules in motion, however minutely charged, are anticipated to re-orient, when subjected to a magnetic field. When a strong rotating magnetic field is applied to a fuel sample, it is hypothesized that the weak bonds between complex molecules are broken and shorter molecular chains are formed. This can improve the fuel oil quality and the improvement can be observed by noting the changes in the fuel oil flash point and viscosity before and after a sample oil is subjected to a rotating magnetic field.

Test Equipment: Stator (of a motor) for magnetic field creation, heavy fuel oil, plastic jar and wooden stirrer, Redwood viscotherm machine, Pensky-Martens Flash Point Apparatus.

The fuel oil used was furnace oil of viscosity 180 cst.

Specifications of induction motor (stator) used for the experiment:

Power: 2 HP; Voltage rating: 318/440 volts; Frequency: 50 Hz

## DESCRIPTION OF OPERATION:

Stator was operated at 25% of its rated voltage to avoid burning and overheating of coil. Fuel was placed in a plastic jar with a wooden stick (to stir the fuel oil) and was placed on the rotor (inside the stator space). It was placed for fifteen minutes in the rotating magnetic field with continuous stirring of fuel with the help of the wooden stick. Then it was stored in water tight bottles and further tests were carried out.

*Figure 1 Filter Paper Blots of N.T.F (untreated fuel) and T.F (treated fuel) filter paper*

*Figure 5 Motor Stator and Rotor*


*Figure 4 Motor Data*


*Figure 2 Semi-automatic Pensky-Martens Flash Point Apparatus*

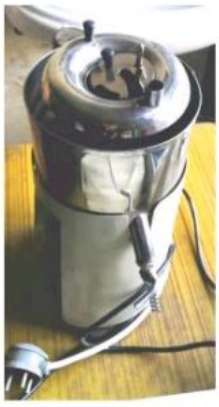

*Figure 3 Redwood viscotherm machine*

## TESTS WERE CARRIED OUT AS FOLLOWS:

### 1. Filter paper test:

Drops of 'treated fuel' (undergone magnetic field effects) and untreated fuel (not undergone magnetic field effects) were placed on filter papers using a dropper and the samples were kept at normal room temperature without any disturbances (wind, heat etc.) for 24hours. Later, observations were made.

### 2. Flash point test:

Flash point tests for both 'treated' and 'untreated' fuel samples were conducted with the help of semi-automatic Pensky-Martens flash point apparatus.

### 3. Viscosity test:

Viscosity tests were conducted for both 'treated' and 'untreated' fuel samples with the help of Redwood viscotherm machine at a temperature of 50 deg. Celsius.

The tests were carried out several times and average values were taken.

## RESULTS & OBSERVATIONS:

**Data extracted from test number 1:**

The 'treated' fuel caused a smaller blot on filter paper than the 'untreated' fuel for equal drop of fuel on two different filter papers.

**Data extracted from test number 2:**

The 'untreated' fuel indicated a flash point of 125 deg. Celsius and the treated fuel indicated a flash point of 72 deg. Celsius.

**Data extracted from test number 3:**

A viscosity difference of 1 cst was observed between treated and untreated fuel.

## CONCLUSION/INFERENCE:

We have observed significant decrease in flash point and viscosity. The filter paper test indicated that the fuel oil composition is more uniform after treatment. It may be assumed that the treated fuel could perform better.

## SCOPE FOR FURTHER STUDIES

The tests can be carried out with increased magnetic intensity on a variety of fuels including Biofuels. The 'treated' fuels can be used on engines and compared with the performance of regular, 'untreated' fuels.

## PROJECT SUPPORT/SPONSOR:

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## PROJECT PARTICIPANTS:

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## BIBLIOGRAPHIC REFERENCES USED FOR THE PROJECT:


[1] Figures 1,2,3,4 & 5 were taken with a phone camera (vivo1814).

[2] Faris, A., Al-Naseri, S., Jamal, N., Isse, R., Abed, M., Fouad, Z., Kazim, A., Reheem, N., Chaloob, A., Mohammad, H., Jasim, H., Sadeq, J., Salim, A., & Abas, A. (2012). Effects of Magnetic Field on Fuel Consumption and Exhaust Emissions in Two-Stroke Engine. Energy Procedia, 18 doi: 10.1016/j.egypro.2012.05.044. pg. 327 – 338. (Available online: www.sciencedirect.com)