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Characteristics Between New Oil and Used Oil by Using Laser Light Intensity and Lux Meter

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Abstract. Tests on the characteristics of making new oil and used oil by using laser light intensity and lux meters have been done. The purpose of this study is to distinguish the characteristics of the light intensity between fresh oil and used oil. In this study used an alternative method to the light intensity Lux meter. To get the data is done by varying the distance from the laser to the sample as much as five times. Based on data obtained from testing the intensity of light on new oil and used oil can be concluded that the value of the light intensity at the new oil is greater than the used oil. New oil has a light intensity of I = (0.122591964) Cd and used oil has a light intensity of I = (0.017841741) Cd.

Keywords: Laser, Lux meter, Oil

INTRODUCTION

Oil is a substance used in the maintenance of the engine to lubricate the motor vehicle engine. On all machines using almost the lubricating oil. Lubrication is one of the complement systems in a vehicle with the purpose of regulating and lubricating oil channel gets moving machine parts. The function of the lubricating oil to prevent direct contact between the surfaces rubbing together, as well as cooling oil, the oil must also be able to reduce the heat generated by friction between moving metal on the machine. With the classification of different machines of course required by the engine oil level light intensity all different anyway. A common tool to use to detect the intensity of light is a Meter Lux. This detection device has advantages in terms of measuring the intensity of light or illumination level. Usually used indoors. The lighting requirements of each room is sometimes different. It all depends and adapted to the research conducted.

MATERIALS AND METHODS

Characterization Lux Meter

Characterization Lux meter to determine differences in new oil and used oil based on the intensity of the light.

Diagram Detection System

Producing detection system illustrated in Figure 1.

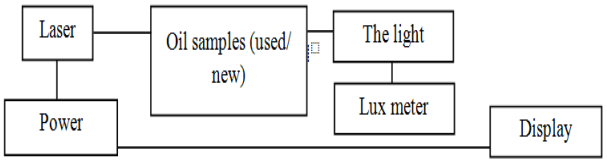

Figure 1. Block diagram of the hardware detection system.

After designing research is done, the next step is to prepare the samples, then take the data from the sample, then process and enter the sample data into the data acquisition system. Samples are like oil and new oil that is included in a 100% transparent container with a depth of 0.5 cm attached to the laser. Data collection was performed by laser light fired through the sample to be accepted by the lux meter sensor. Then the results of the data are converted to SI units (International Standard) is Candela. In order to obtain the results of the data it uses equation 1:

$$\mathbf{Iv\ (cd) = 0.09290304 \times Ev\ (lx) \times (d\ (ft))\ 2}$$

Equation 1. Conversion unit to candela lux.

Where Ev (lx) is the luminescence intensity in lux meter and d is the distance between the light source to the sensor.

RESULTS AND DISCUSSION

Light is wave-shaped energy and helps us to see. Light is also the basis of the size of the meter, where one meter along with the distance traversed light. The speed of light is 299,792,458 meters per second. The lighting is divided into two types, namely natural lighting and artificial lighting. Natural Lighting (day-lighting) is the use of the light source of the sun that is always available in nature and light sky sunlight reflection results. While the artificial lighting (artificial lighting) is the lighting that comes from energy light systems are limited in nature, such as electric energy and the energy of the process of oil and gas.

The light intensity is strong light output by a light source in a particular direction and is measured using a Luxmeter with units of Candela (Satwiko, 2004). In general, the light has four factors that can affect the quality of lighting that contrast, glare, reflections of light and color quality of light. An instrument for measuring the intensity of light is a lux meter. Where Luxmeter is a powerful measurement tool lighting in a room. The unit of measure is lux meter. Luxmeter also called digital light meter. This tool includes a light sensor that is extremely sensitive to changes in the amount of light received. We conducted this study using a lux meter.

By varying the distance between the laser sensor attached to the sample with the lux meter to 5 times, the data obtained in Table 1.

Table 1. Summary of data observations.

Distance (m)	New oil (lx)	Used Oil (lx)
0.01	1379	121
0.02	294	59
0.03	135	25
0.04	74	10
0.05	47	6

From equation 1 result data such as table 2.

Table 2. Results of calculation data conversion to SI units.

Distance (m)	Distance (ft)	New oil (Cd)	Used Oil (Cd)
0.01	0.03281	0.137913459	0.012101181
0.02	0.06562	0.117611478	0.023602303
0.03	0.09843	0.121511859	0.022502196
0.04	0.13124	0.118411556	0.016001562
0.05	0.16405	0.117511468	0.015001464
The mean	**0.09843**	**0.122591964**	**0.017841741**

Research on the characteristics of the new oil and used oil by using the light intensity of the laser and lux meters can be observed difference as the picture 3 and 4.

Figure 3. Illustration of used oil research.

Figure 4. Illustration of new oil research.

Based on the illustration above can be observed that used oil detection system based on the intensity of light will be darker or less the intensity of light received by the sensor rather than the oil that is still new. This can be seen from the difference between Figures 3 and 4.

CONCLUSIONS

Based on data obtained from testing the intensity of light on new oil and used oil can be concluded that the value of the light intensity at the new oil is greater than the used oil. New oil has a light intensity of I = (0.122591964) Cd and used oil has a light intensity of I = (0.017841741) Cd.

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