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MECHANICAL EFFICIENCY AND FRICTIONAL POWER LOSSES-THE USE OF FUEL FROM EOPSS AGAINST BASE FUEL FROM TEMA OIL REFINERY, GHANA

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ABSTRACT

Mechanical efficiency, a measure of friction losses in the engine, is thus an important topic in engine development and therefore engine testing. This study focuses on the performance of motor vehicle engines with the use of petrol fuel from Electrical Operated Pump Petrol Service Stations (EOPSS) against the base petrol fuel from the Tema Oil Refinery (TOR) using a test engine in the laboratory. Specifically, the study is to identify the quality of both the petrol fuel from Electrically Operated Pump Stations (EOPSS) against the base petrol fuel from the Tema Oil Refinery. To measure and compare the mechanical efficiency and frictional losses of an engine using petrol fuel from these different sources. A comparative study of an engine mechanical efficiency and frictional losses with the use of these two petrol fuels was done using engine dynamometer. A Morse test was carried out to establish how properties of these petrol fuels influence the internal combustion engine performance characteristics such as mechanical efficiency and frictional losses.The results of the tests showed that petrol fuel from the Electrically operated pump petrol service stations compared with the base petrol fuel from Tema Oil Refinery gave different engine mechanical efficiency and frictional loss power. It concluded that the quality of petrol fuel sold from the electrically operated pump petrol service stations compared with the base fuel from TOR are not the same and that most of the stations had poor quality fuel which had influenced over engine efficiency and frictional power loss.

Keywords: EOPSS; Fuel Quality; Engine, Mechanical Efficiency; Frictional losses

INTRODUCTION

The processes taking place in the cylinder and combustion chamber are central to the performance of the internal combustion engine. There are several reasons why the output powers of an internal combustion engine maybe influenced. In most cases drivers attribute the low output performance of their engines to probably be an engine trouble. There are no standard methods or ways of classifying output performance of an engine. They may be classified in many ways, such as according to speed, working cycle, quality of fuel used, method of fuel injection, number of cylinders, thermodynamic cycle, among others. The use of a quality fuel contributes to a good output engine performance. The use of adulterated transport fuel affects the torque produced by the vehicle engine and consequently influences mechanical efficiency and the frictional and pumping powers developed.

According to Ale (2003) the sale of adulterated transport fuel not only defrauds customers but also poses threats to the overall efficiency of their engines. In Ghana, petrol fuel is sold at both standard fuel service stations using electrically operated pumps service stations (EOPSS) and the local filling stations using manually operated pumps. Undoubtedly, most

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drivers were of the view that buying fuel from these standard fuel stations was a means to safeguard the life span of their engines. Considering their economic importance, a study which focuses on engine performance characteristics such as mechanical efficiency and frictional losses with the use of petrol fuels from the electrically operated pump service station (EOPSS) terminals is an important strategy for improvement. Ale (2002) indicated that adulterated fuels, often but not always, lead to increased tailpipe emissions of harmful pollutants, affect engine performance and also reduce the life span of the engine components. This paper aims at determining the mechanical efficiency and frictional power and losses of a motor vehicle engine using petrol fuel from the electrically operated pump petrol service stations (EPOSS) against base petrol fuel from Tema oil refinery (TOR). Ale (2003) noted that engines are designed and manufactured to run on specified fuel. Ale indicated that poor altering and maintenance of the specified engine fuel will emit substantially more pollutants and as a result, engine performance will be affected. Similar to Ale's assertion is that of Osueke and Ofondu (2011) both of the university of Science and Technology, Enugu State, Nigeria. They also pointed out that the fuel dealers do this (adulteration) so as to make maximum profit from the product neglecting the damage it does to motor vehicles. Several researches and experiment have been carried out to establish the effect of the use of adulterated fuel and additives on petrol engines to determine their performance, which has resulted in a number of findings. Kameoka *et al.* (2005) studied the effect of alcohol fuel on fuel line materials and reported the corrosion of fuel system components. Latey *et al.* (2004) conducted experiments using 5% methanol and a maximum of 20% ethanol in a single cylinder SI engine and reported the improved engine performance and lower emission characteristics. Yuksel and Yuksel (2004) used ethanol and gasoline blend on a four-cylinder SI engine and concluded that the torque output and consumptions of engine increased slightly, CO and HC emissions decreased to a detriment while CO_2 emissions increased. Bayraktal (2005) also carried out experiments with blends in lower proportions of ethanol and reported that the most suitable for engine performance and CO emission was 7.5% ethanol. Again Oldberding *et al.* (2005 carried out dynamometer testing of an ethanol water fuelled transit van and concluded important factors, mainly the advantage of replacing the conventional ignition system by catalytically assisted ignition system, decreased NOx formation, reduced CO emissions, and slightly decreased CO_2 emissions and increases in the thermal efficiency. Al-Hasan (2003) conducted experiments on a four stroke four cylinder SI engine. The fuels used to investigate the performance of the engine were the gasoline-ethanol-blends in different proportions. In his findings, it was mentioned that the performance of the engine improves with gasoline ethanol blends. Usha *et al.* (2004) conducted a similar study and presented their findings entitled "Study on Automobile Exhaust Pollution with regard to Carbon Monoxide Emission" in the Natural Environment Pollution Technology Journal. Maji (2001) carried out the experiments to evaluate the engine performance and exhaust emissions of CO and HC with ethanol-gasoline blends in a single cylinder four stroke SI engine. It is worthy to note that blend of fuel influences fuel quality and performance of the engine. Martyr and Plint (2007) describe an engine test facility as a complex of machinery, instrumentation and support services. Martyr and Plint indicate that engine and vehicle developers now need to measure improvements in engine performance that are

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frequently so small as to require the best available instrumentation in order to fine comparative changes in performance to be observed. According to Martyr and Plint, this level of measurement requires that instrumentation is integrated within the total facility such that their performance and data are not compromised by the environment in which they operate and services to which they are connected. It is a fact that, in the long run, all the power developed by all the road vehicle engines in the world is dissipated as friction: either mechanical friction in the engine and transmission, rolling resistance between vehicle and road or wind resistance. Martyr and Plint point out that Mechanical efficiency, a measure of friction losses in the engine, is important in engine development and therefore engine testing. Under mixed driving conditions for a passenger vehicle between one third and one half of the power developed in the cylinders is dissipated either as mechanical friction in the engine, in driving the auxiliaries such as alternator and fan, or as pumping losses in the induction and exhaust tracts. Since the improvement of mechanical efficiency is such an important goal to engine and lubricant manufacturers, an accurate measure of mechanical losses is of prime importance. Haines and Shields (2006) describe one method of estimating mechanical losses as a method which involves running the engine under stable temperature conditions and connected to a four-quadrant dynamometer. Ignition or fuel injection are then cut and the quickest possible measurement made of the power necessary to motor the engine at the same speed. Sources of error include: Under non-firing conditions, the cylinder pressure is greatly reduced, with a consequent reduction in friction losses between piston rings, cylinder skirt and cylinder liner and in the running gear. The cylinder wall temperature falls very rapidly as soon as combustion ceases, with a consequent increase in viscous drag that may to some extent compensate for the above effect. Pumping losses are generally much changed in the absence of combustion (Haines and Shields, 2006).

Objectives

- To find out and compare the mechanical efficiency of an engine using petrol fuel from Electrical Operated Pump Petrol Service Stations (EOPSS) against the base petrol fuel from the Tema Oil Refinery.
- To also find out and compare the frictional losses of an engine using petrol fuel from Electrical Operated Pump Petrol Service Stations (EOPSS) against the base petrol fuel from Tema Oil Refinery

RESEARCH METHODOLOGY

Materials and Methods

Samples of petrol fuel were collected from different sources for the study. They were:

- **Category 1. (Base fuel):** This sample of petrol fuel was collected from Tema Oil Refinery (TOR). It is a first hand or primary fuel collected from the plant and used as the basis of comparisms with other fuel samples. 4.5 litres was used.
- **Category 2 (Electrical Operated Pump Petrol Service Stations - EOPSS):** Petrol fuel sample were collected from eight (8) electrical operated petrol fuel stations popularly called the “standard” stations in the Cape Coast Metropolitan area. 4.5 litres

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of sample fuel was collected from each of the station earmarked for the research. Each sample was tagged with a specimen number for easy identification. The given specimen numbers were from EOPSS 1 to EOPSS 8, where the inscription EOPSS represent electrical operated pump petrol fuel service station specimen.

Experiment Apparatus and Procedure - Engine and Equipment

The experimental set up consists of a four stroke, twin cylinder carburettor spark ignition (S.I) engine. The engine is coupled to a hydraulic dynamometer for measuring its brake power (b.p). The engine is a water cooled engine and a wet sump lubrication system. Table 1 shows the engine specifications.

Table 1 Test Engine Specifications

ENGINE	SPECIFICATIONS
Engine Model	Ford YSG414
Seriel No/Date	E780/183
Build No	D 000 041 403
Bore	70mm
Stroke	90mm
Cubic Capacity	1.6
Compression Ratio	7.4:1
Fuel	Petrol
Engine Lubrication	Wet sump lubrication
Engine Cooling	Water Cooled

Source: Test Engine Manual

Hydraulic Dynamometer

The hydraulic dynamometer was coupled to the engine to measure the engine torque, brake power (b.p) and the indicated power. The engine and the dynamometer coupled are shown in Figure 1. A reading instrument panel was coupled to the dynamometer and the engine. The specifications of the dynamometer is shown in Table 2

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Table 2: Hydraulic Dynamometer - Specifications

SPECIFICATIONS	
Model	E-50
Motor / pump capacity	KW 1.1, V 220, A 7.7, µF 30
Crank position measurement	By rotary encoder
Water pressure gauge	Bourdon berg gauge
Overall Dimension	3800 x 2500 x 1500

Fig. 1 Engine/hydraulic Dynamometer test rig

Test Procedure

Engine Torque Measurement

The following procedure was followed to carry out the test using the petrol engine coupled to the hydraulic dynamometer.

1. The engine was switch on with the throttle at the lowest setting.
2. After a period of 2-5 minutes time, the throttle opening was gradually increased by one notch on the setting and the dynamometer was adjusted to return the rotational speed to about 2500rev/min.
3. Condition was allowed to settle and the brake torque was recorded.
4. The cylinders were cut-out in turns and the engine torque was recorded accordingly.
5. Similar procedure was followed for all specimens and their test result recorded.

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In determining the performance of the engine based on the quality of petrol fuel used, a Morse test was used to determine the influence of the quality of fuel being used and its consequent effect on the engine performance.

Computational Formulae

Speed = Rev/min x 10^3 ……………………………………………eqt (1)

Actual Torque, T = $\frac{\text{Recorded Torque (T)}}{9550}$ (Nm) …………………………… …… .eqt (2)

Brake Power, bp = $\frac{2\pi NT}{60}$ (W) ……………………………………………………...eqt (3)

Indicated Power, ip = (A x 4) – (B_1+B_2+B_3+B_4) …………………………………eqt (4)

Mechanical efficiency (%) = $\frac{bp}{ip}$ x 100 ………………………………………eqt (5)

Friction power and pumping losses = ip – bp ……………………….............eqt(6)

Where;

T = Engine Torque, N = Engine Speed, Bp= Brake Power of the engine, Ip = Indicated Power of the engine, A = Brake Power (bp) of the engine with all cylinder working and B_1, B2, B3, and B_4 = Brake Power (bp) of the engine with each of the respective cylinders cut out in turn (Zamit, 1987).

RESULTS AND DISCUSSION

In all, four readings were taken from the experiments. After the four readings, the average engine torque was calculated for each case. The average engine torque was used to calculate mechanical efficiency, and the frictional power loss using the computational formulae (1) to (6). Table 3 shows the test results for the base petrol fuel from TOR

Table 3. Average Test Results: Base Fuel from TOR

Cylinder cut out	None	Number 1	Number 2	Number 3	Number 4
Speed (N): rev/min x 10^3	2.5	2.5	2.5	2.5	2.5
Recorded torque (Nm)	0.49	0.39	0.36	0.34	0.36
Actual torque (Nm): $\frac{Nm}{9550}$	$5.08\ x10^{-5}$	$4.05x10^{-5}$	$3.75x10^{-5}$	$3.51x10^{-5}$	$3.79x10^{-5}$
Brake power developed (W): $\frac{2\pi NT}{60}$	0.0133	0.0106	0.0391	0.0091	0.00995
Indicated power	0.0136	0.0208	0.01993	0.0193	0.0201
Mechanical efficiency	98	84	55	53	55
Friction power and losses	0.0102	0.0102	0.0102	0.0102	0.0102

Source: Field work 2012

Specimen Specification: Petrol Fuel from Electrical Operated Pump Stations (EOPSS)

With a constant speed of 2500 rev/min at various cylinders cut-out in turn, various values were recorded under engine torque. In all four reading were taken from each specimen experiments. After the four readings the average engine torque was calculated for each case.

The average engine torque was used to calculate brake power indicated power, mechanical efficiency and frictional losses, respectively. The computational formulae 1-6 were used, respectively to calculate the performance characteristics under each specimen test.

The result of specimen from EOPSS 1 test recorded a constant frictional power and losses of 0.00238 throughout the cylinder operations. The test recorded an average engine torque of 0.49, 0.39, 0.32, 0.35 and 0.32Nm respectively at all cylinders working and when cylinder number 1-4 were cut-out in turns. The recorded torque further gave a corresponding mechanical efficiency of 85.02, 81.89, 78.48, 80.003, and 78.7%, respectively at all cylinder working and when cylinders were cut-out in turns.

An engine performance characteristics using specimen petrol fuel from EOPSS 2 at a constant speed of 2500 rev/min throughout the test recorded a brake power of 0.0148, 0.00842, 0.00742, 0.00975 and 0.0101W, respectively at all cylinders working and when cylinders were cut-out in turns. At full load condition the highest mechanical efficiency obtained was 63.83%. This occurred when all the cylinders were working. Again the lowest mechanical efficiency obtained was 47.25% and this occurred when cylinder number 2 was cut-out.

An average test result of specimen from EOPSS 3 recorded a variation in engine performance characteristics at full load conditions. Variation in torque occurs as the cylinders were cut out in turns, and base on this, an average friction power and losses of 0.00317, 0.0059, 0.00617, 0.0059 and 0.0059 were recorded, respectively for all cylinder working and cylinder cut-out in turns, starting from cylinder 1-4.

An engine performance variation was seen with the use of EOPSS 4 petrol specimen. At cylinders working 0.0082 friction and pumping losses was obtained while a constant frictional power loss of 0.0084 were obtained at cylinder cut out in turns. The test at full load condition recorded an engine torque of 0.53Nm at all cylinder working and 0.34, 0.29, 0.34 and 0.33Nm when cylinder number 1-4 was cut-out, respectively. A corresponding brake power, indicated power and mechanical efficiency were recorded, respectively.

Again the test indicated a variation of engine performance using specimen petrol fuel from EOPSS 5. At full load condition a constant frictional power loss obtained was 0.00582, respectively from cylinder number 1 to 4. The highest mechanical efficiency recorded was 71.84% at all cylinders working and lowest mechanical efficiency of 61.73% was recorded at cylinder number 3 cut-out.

There were variations of an average test results from EOPSS 6 and EOPSS 7, respectively. Maximum cylinder torque obtained was for EOPSS 7 at 0.51Nm and the lowest torque obtained was for EOPSS 6 at 0.30Nm both at full load condition with a maximum speed of 2500 rev/min. Both specimen recorded a constant frictional power lost of 0.00345 and 0.00697 for EOPSS 6 and EOPSS 7 respectively at all cylinder working condition and cylinder cutout respectively. Lowest

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engine mechanical efficiency observed was 55.38% for EOPSS 7 whereas EOPSS 6 had the highest mechanical efficiency of 84.02%.

However, an average test result-of specimen petrol fuel from – EOPSS 8 indicated a performance result of engine torque of 0.61Nm at all cylinder working condition and a constant torque of 0.41 Nm was recorded as cylinders 1- 4 was cut out in turns. With a constant recorded torque at cylinder cut out, a corresponding brake power was also recorded respectively. The brake power at cylinder cut-out was 0.41KW at cylinder number 1-4 respectively. Again a corresponding friction and power loss of 0.007475 was recorded throughout the test. The general objective of the experiments was to compare performance characteristics (mechanical efficiency and frictional power and pumping loss) of petrol fuels sold from the electrical operated fuel stations (EOPSS) also called the standard fuel stations to petrol fuel from Tema Oil Refinery (TOR) as the base petrol fuel for the experiment. MAT LAB™ programming software was used to generate graphical results for the study. The graphs are shown in figure 2 and 3.

Cylinder Cut out Vs Mechanical Efficiency

Figure 2. shows variation in engine mechanical efficiency with Cylinder Cut out with the use of petrol from TOR and electrical pump stations. The results from the test show that only petrol product from EOPSS 1 was observed to have a mechanical efficiency of about 85% close to TOR product of about 96% mechanical efficiency. The graph show that all other electrical pump stations obtained mechanical efficiencies far below the 96% mechanical efficiency indicated by the base petrol fuel from TOR.

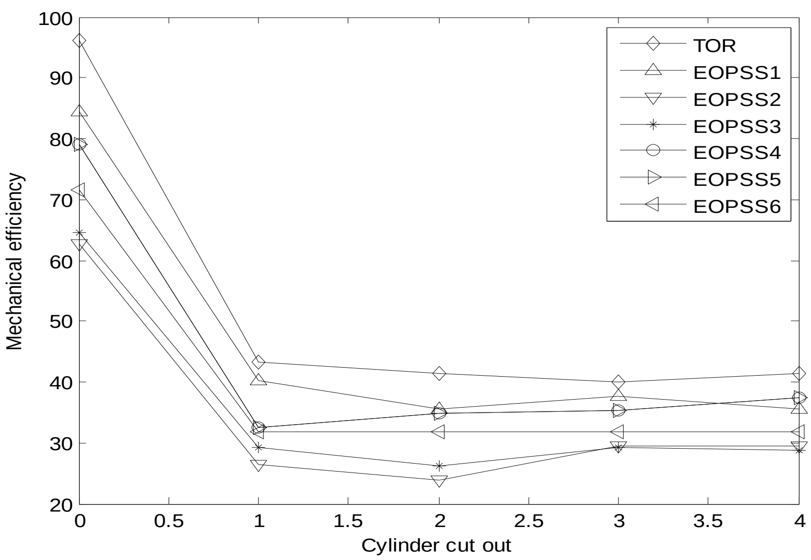

Figure 2. Variation of Cylinder Cut out with Mechanical Efficiency (TOR Vs EOPSS)

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Cylinder Cut out Vs Frictional Power

Figure 3 shows variation in frictional power and losses occurred with the use of TOR and electrical operated petrol fuel stations respectively with engine torque at various cylinder cut out. From the graph the result shows only EOPSS 1 showing frictional and pumping losses of 0.016kw at cylinder 1-4 cut out respectively and slightly above frictional power loss of 0.010kw at cylinder 1-4 cut out respectively as performed by the TOR petrol specimen used. It is noticed from the graph that the rest of the electrical fuel stations specimen used indicated frictional and pumping losses above that recorded for the base fuel from TOR.

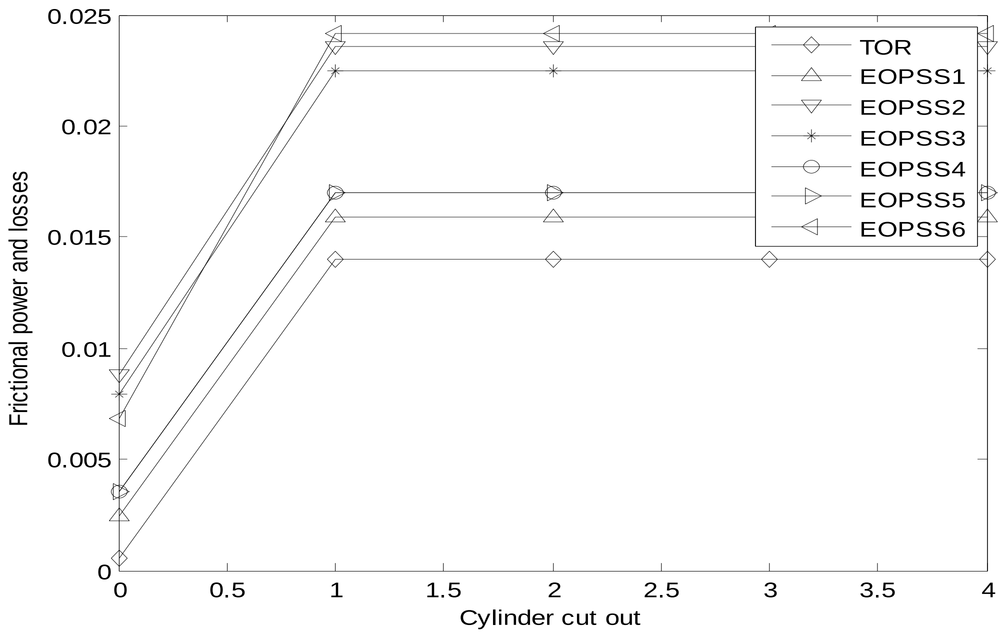

Figure 3 Variation of Cylinder Cut out with Frictional Power (TOR Vs EOPSS)

CONCLUSION

The objectives of this paper were to compare petrol fuel from sampled terminal points and to measure and compare the mechanical efficiency and frictional power loss of an engine using petrol fuel from Electrical Operated Pump Stations (EOPSS) against the base petrol fuel from the Tema Oil Refinery**.** There is a significant difference in the quality of petrol fuel sold at the EOPSS also called the standard filling stations. Engine performance output with the use of petrol fuels from the electrical pump standard filling stations is different from that of the petrol fuel from TOR. That different mechanical efficiency is developed with the use of fuel from TOR against that of the Electrical Operated Pump Stations (EOPSS). There is a significant frictional power loss with the use of petrol fuel from the electrical operated filling

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stations as against base petrol fuel from TOR. With a performance efficiency of 98% obtained from the use of TOR specimen that of EOPSS deviated 24.8% .That different frictional losses exists with the used of fuel from TOR and the Electrical Operated Pump Stations (EOPSS). That high frictional loss exists in using petrol fuels containing properties other than the normal standard base petrol fuel.

REFERENCES

Al-Hasan, M. (2003). Effect of ethanol–unleaded gasoline blends on engine performance and exhaust emission. *Energy Conversion & Management, 44* (9), 1547–1561.

Ale, B. (2002). Fuel Adulteration and Tailpipe Emissions. *Seminar on Air Quality Management of Kathmandu Valley: Challenges & Opportunities* Organized By Esps and Evan.

Ale, B. (2003). Fuel Adulteration and Tailpipe Emissions. *Journal of the Institute of Engineering, 3* (1), 12 – 16.

Bayraktar, H. (2005). *Experimental and theoretical investigation of using gasoline– ethanol blends in spark-ignition engines. Renewable Energy Vol.30, pp.1733–1747.*

Haines, S. N. M., and Shields, S. A. (2006). The determination of diesel engine friction characteristics by electronic cylinder disablement. *Proceedings of the Institution of Mechanical Engineers, Part A: Journal of Power and Energy*, *203*(2), 129-138.

Kameoka, A., Nagai, K., Sugiyama, G., and Seko, T. (2005). *Alcohol Fuels on Fuel-Line Materials of Gasoline Vehicles*. Sae 2005-01-3708. Warrendale, Pa, Sae International.

Latey, A., Bhatti, T., Das, L., and Babu, M. (2004). *Experimental Investigations On Methanol 5% + Ethanol-Gasoline Mixtures Operated Single Cylinder SI Engine*. Sae 2004-28-0036. Warrendale, Pa, Sae International.

Maji, S. (2001). A Single Cylinder Engine Study Of Power, Fuel Consumption And Exhaust Emission With Ethanol. Sae 2001- 28-0029. Warrendale, Pa, Sae International

Martyr, J., and Plint, A. (2007). Angine Testing Theory and Practice. Published by Elsevier Ltd

Olberding, J., Beyerlein, D., Steciak, J., and Cherry, M. (2005), Dynamometer Testing Of An Ethanol-Water Fuelled Transit Van. Sae 2005-01-3706. Warrendale, Pa, Sae International.

Osueke, C. O., and Ofondu, I. O. (2011). Fuel Adulteration in Nigeria and Its Consequencies. *International Journal of Mechanical & Mechatronics Engineering*, *11*(4).

Usha, M. T., Srinivas, T., and Ramakrishna, K. (2004). A study on automobile exhaust pollution with regard to carbon monoxide emissions. *Nature Environment and Pollution Technology, 2* (4), 473–474.

Yuksel, F., and Yuksel, B. (2004). The use of ethanol–gasoline blends as fuel in a SI engine. *Renewable energy, 29*, 1181-1191.

Zamit, S. (1987). *Science for Motor Vehicle Technicians* (Vol. I). City and Guilds of London Institute.

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