



GLOBAL JOURNAL OF RESEARCHES IN ENGINEERING
MECHANICAL AND MECHANICS ENGINEERING
Volume 12 Issue 6 Version 1.0 Year 2012
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4596 Print ISSN:0975-5861

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GJRE-A Classification : *FOR Code: 091305*



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Electromagnetic Fuel Saver for Enhancing The Performance of The Diesel Engine

Houtman P. Siregar^α & Rufinus Nainggolan^σ

Abstract - This article is devoted to the production and testing of the performance of electromagnetic fuel saver. Purpose of the work is to analysis effect of varying of core of electromagnetic fuel saver to the performance of the internal combustion diesel engine. Materials for core of electromagnetic fuel saver are made of plain carbon steel and copper. Diameters of the wire winding, which is used in the research, are 0.25 mm and 0.35 mm. Speed of the engine, and number of coil which is coiled in the winding core of the fuel saver are chosen as the testing variables. The produced fuel saver is tested in the laboratory and on the road in the traffic jam condition and in the highway. Measured variables in the laboratory is the specific fuel consumption and measured variable for road testing is fuel consumption. From this work is obtained that the performance of the electromagnetic fuel saver which use copper core is better than the electromagnetic fuel saver which use steel core and permanent magnet.

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I. INTRODUCTION

Nowadays for solving the crisis of energy in Indonesia, many works are done to search the alternative source of energy. Simultaneously the researcher tries to create the gadget which can save the fuel consumption for automobile.

Purpose of the work is to produce and analysis the performance of the electromagnetic fuel saver for automotive diesel engine and to analysis effect of the change of the core of electromagnetic fuel saver to the performance of the diesel engine.

The fuel saver which is based on permanent magnet has sold in the market and its performance has tested [4, 5]. In comparison to the former fuel saver, in the considered work is produced fuel saver which is based on electromagnetic induction. The considered work is the continuation of former works [1, 2, 3].

II. WORKING THEORY OF THE ELECTROMAGNETIC FUEL SAVER

The combustion engine vehicle efficiency is about 9%. This means that our car consume more

energy than it converts in to movement. In other words, we pay more energy than we use. In the article we describe method and gadget for improving the combustion of fuel in the internal combustion diesel engine of automobiles where the fuel employed is liquid [4, 5].

Applying a magnetic field to ionizing fuel to be fed to combustion devices we can ensure more complete combustion, obtaining a maximization of the fuel economy, improving the fuel efficiency and reducing polluting emissions. The fuel is subject to the lines of forces from electromagnetic magnet mounted on fuel inlet lines. Most fuels for internal combustion engines are liquid. But liquid fuels don't combust till they are vaporized and mixed with air. Currently regulated gas emissions from motor vehicles are unburned hydrocarbon (HC), carbon monoxide (CO), and oxides of nitrogen (NOx).

Fuel mainly consists of hydrocarbons. Groupings of hydrocarbons, when flowing through a magnetic field, change their orientations of magnetization in a direction opposite to that of the magnetic field. The molecules of hydrocarbon change their configuration. At the same time intermolecular force is considerably reduced or depressed. These mechanisms are believed to help to disperse oil particles and to become finely divided. The resultant conditioned fuel electromagnetized burns more completely, producing higher engine output, better fuel economy, more power and most importantly reduces the amount of hydrocarbons, carbon monoxide and oxides of nitrogen in the exhaust. Another benefits if these devices is that magnetically charged fuel molecules with opposite polarities dissolve carbon build-up in carburettor jets, fuel injectors, and combustion chambers help to clean up the engine and maintain the clean condition.

III. METHODOLOGY

In figure 1 is shown flowchart of the considered work. First of all it is designed the fuel saver which is based on electromagnetic and then it is produced according to the determined specification. Speed of the engine, diameter of the wire winding, core materials, and number of coil of winding of fuel saver are chosen as the testing variables. The performance of fuel saver, which has produced, is tested in the laboratory of the

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internal combustion engine rig. Performance of the produced fuel saver which is installed in the fuel line of internal combustion engine rig is compared to the performance of the standard internal combustion engine rig (without installing fuel saver in the fuel line). Performance of the produced fuel saver is compared to the performance of the permanent magnet fuel saver, which has sold in the market. And then results of the work are discussed and finally the conclusions are drawn.

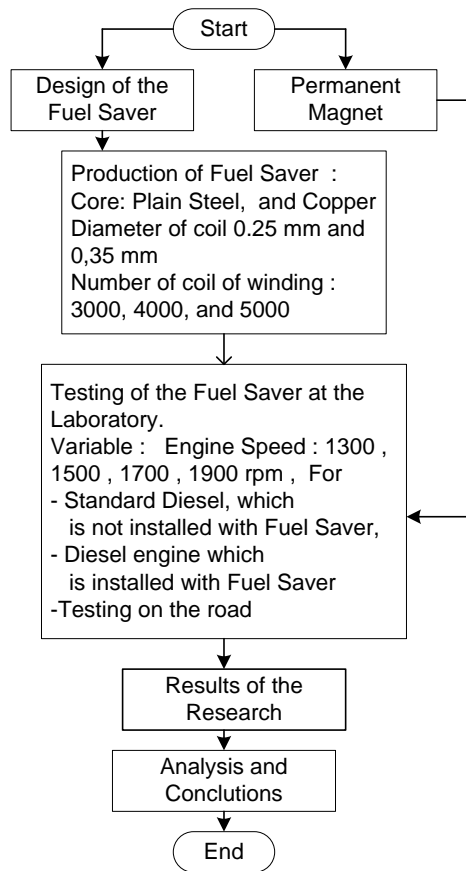


Fig. 1 : Flowchart of the proposed research

IV. RESULTS AND DISCUSSION

In the considered work, terminology of fuel saving means fuel consumption of fuel saver which is based on electromagnetic induction minus fuel consumption of diesel engine which is not installed with fuel saver (standard). Difference of the fuel consumption between a standard diesel engine and diesel engine which is installed with fuel saver may be positive and negative value. Negative value means more consume fuel and positive value means less consume fuel than standard diesel engine.

In the figures use some abbreviations. The meanings of each abbreviation are as follows. Cu-35/5000 means that the electromagnetic fuel saver use core of copper, diameter of wire 0.35 mm and number

of coil 5000 turns. St-25/5000 means that the electromagnetic fuel saver use core of plain carbon steel, diameter of wire 0.25 mm and number of coil 5000 turns. PM means permanent magnet.

In the figure 2 up to figure 6 are drawn results of laboratory test of diesel engine. And in the figure 7 is drawn result of the road test for the best gadget and permanent magnet.

In the figure 2 is drawn results of laboratory test for diesel engine which relate the percentage of specific fuel consumption (SFC) saving for average speed of rotation of engine for electromagnetic fuel saver, which use diameter of wire 0.25 mm and steel core versus number of winding. As it is shown in figure 2 that electromagnetic fuel saver which use number of coil or winding 5000 turns is better in fuel saving than the fuel saver which uses number of coil 3000 and 4000 turns. Electromagnetic fuel saver which uses number of coil or winding 5000 can save specific fuel consumption 9.80 %. For number of winding 3000 and 4000 turns can save SFC, respectively, 7.55% and 4.76%.

In the figure 3 is drawn results of laboratory test for diesel engine which relate the percentage of specific fuel consumption (SFC) saving for average speed of rotation of engine for electromagnetic fuel saver which uses diameter of wire 0.35 mm and steel core versus number of winding. As it is shown in figure 3 that electromagnetic fuel saver which uses number of coil or winding 3000 turns is better in fuel saving than the fuel saver which uses number of coil 4000 and 5000 turns. Electromagnetic fuel saver which uses number of winding 3000 turns can save specific fuel consumption 6.77 %. For number of winding 4000 and 5000 turns can save SFC, respectively, 6.14% and 5.93%.

In the figure 4 is drawn results of laboratory test for diesel engine which relate the percentage of specific fuel consumption (SFC) saving for average speed of rotation of engine for electromagnetic fuel saver which uses diameter of wire 0.25 mm and copper core versus number of winding. As it is shown in figure 4 that electromagnetic fuel saver which uses number of coil or winding 5000 turns is better in fuel saving than the fuel saver which use number of coil 3000 and 4000 turns. Electromagnetic fuel saver which uses number of winding 5000 can save specific fuel consumption 9.54 %. For number of winding 3000 and 4000 turns can save SFC, respectively, 4.77% and 7.95%.

In the figure 5 is drawn results of laboratory test for diesel engine which relate the percentage of specific fuel consumption (SFC) saving for average speed of rotation of engine for electromagnetic fuel saver which uses diameter of wire 0.35 mm and copper core versus number of winding. As it is shown in figure 5 that electromagnetic fuel saver which uses number of coil or winding 5000 turns is better in fuel saving than the fuel saver which uses number of coil 3000 and 4000 turns. Electromagnetic fuel saver which uses number of

winding 5000 turns can save specific fuel consumption 11.53 %. For number of winding 3000 and 4000 turns can save SFC, respectively, 6.76% and 8.35%.

In the figure 6 is drawn graph of comparison of optimal percentage of specific fuel consumption (SFC) saving for average speed of rotation of engine versus type of gadget. As it is shown in figure 6 that gadget which uses copper core is better in fuel saving than the gadget which uses steel core and permanent magnet. Once more the electromagnetic fuel saver is better in fuel saving than the permanent magnet. As shown in figure 6 that the electromagnetic fuel saver which uses copper core, number of coil 5000, and diameter of wire winding 0.35 mm can save specific fuel consumption 11.53 %. Electromagnetic fuel saver which uses steel core, number of coil 5000 turns, and diameter of wire winding 0.25 mm can save specific fuel consumption 9.80 %. But gadget which uses permanent magnet just can save specific fuel consumption 8.53%.

In the figure 7 is drawn results of road test for diesel engine which relate the percentage of fuel consumption saving for optimal electromagnetic fuel saver and permanent magnet. It is seen from figure 7 that the electromagnetic fuel saver which uses copper core, number of coil 5000 turns, and diameter of wire winding 0.35 mm can save fuel consumption 31.50 %. Electromagnetic fuel saver which uses steel core, number of coil 5000 turns, and diameter of wire winding 0.25 mm can save fuel consumption 28.40 %. But gadget which uses permanent magnet just can save specific fuel consumption 25.30%. In this case, the best gadget is the electromagnetic fuel saver which uses copper core.

As we know that the more the number of winding the stronger the magnetic force. So the stronger magnetic force will give stronger induction to solar fuel and resulting in complete combustion process. So the cluster of solar fuel is fully oriented and the configuration of fuel is changed. At the same time intermolecular force is considerably reduced or depressed. These mechanisms are believed to help to disperse oil particles in this case and to become finely divided and make easy to mix compressed air with solar fuel and resulting in complete combustion process. The resultant conditioned fuel burns more completely, producing higher engine output, better fuel economy, and more power.

In the work, electromagnetic fuel saver which uses copper core is better than electromagnetic fuel saver which uses steel core and permanent magnet. It seems that the copper core is more effective in inducing magnetic force than steel core. This phenomenon is an anomaly in this work, because according to the theory of magnet that ferrous material (steel) is better in inducing magnetic force than nonferrous material (copper). In this case, it seems that the strength of the magnetic force of electromagnetic fuel saver is stronger than permanent

magnet fuel saver. So, the stronger magnetic force results in more complete combustion process than permanent magnet fuel saver.

So the produced electromagnetic fuel saver can significantly save consumption of fuel. Saving the fuel consumption means that the heat of combustion which is released to the atmosphere is diminishing. Consequently the produced fuel saver can reduce and overcome global warming.

In conclusion we have succeeded to produce good prototype of electromagnetic fuel saver and it has good performance. The produced fuel saver can significantly save fuel consumption for diesel engine. In addition the proposed fuel saver can improve quality of environmental and overcome global warming.

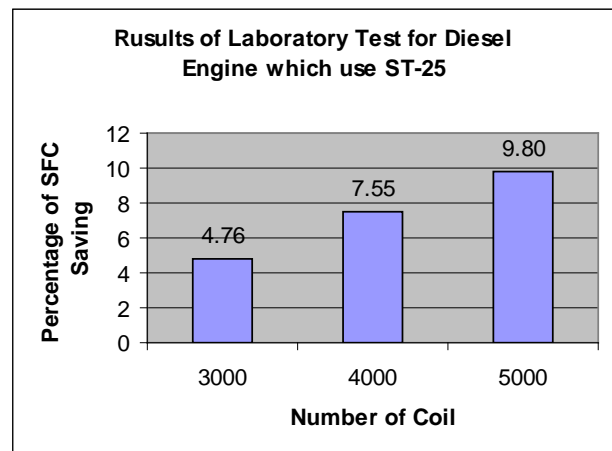


Fig. 2 : Results of laboratory test for steel core and diameter of wire 0.25 mm.

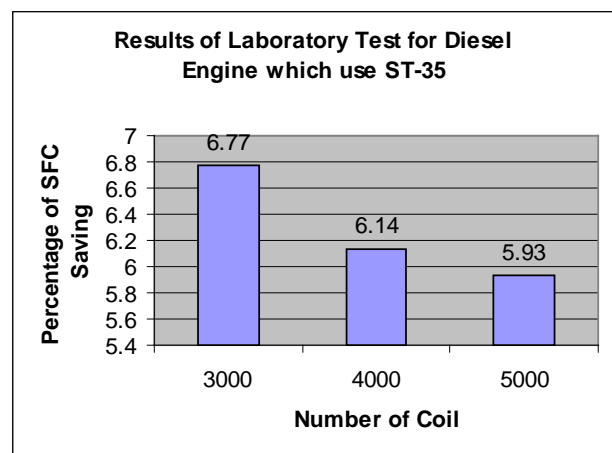


Fig. 3 : Results of laboratory test for steel core and diameter of wire 0.35 mm.

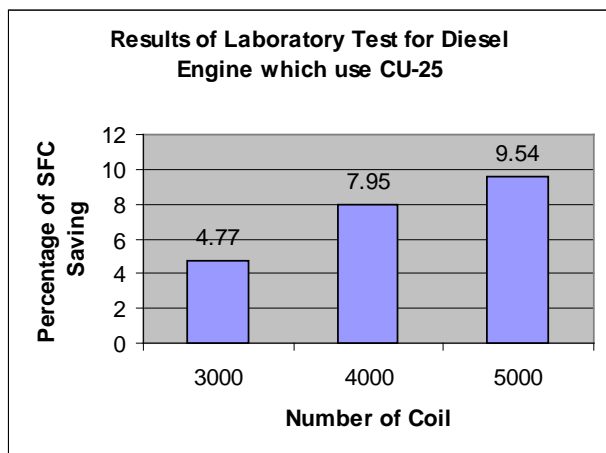


Fig. 4: Results of laboratory test for copper core and diameter of wire 0.25 mm.

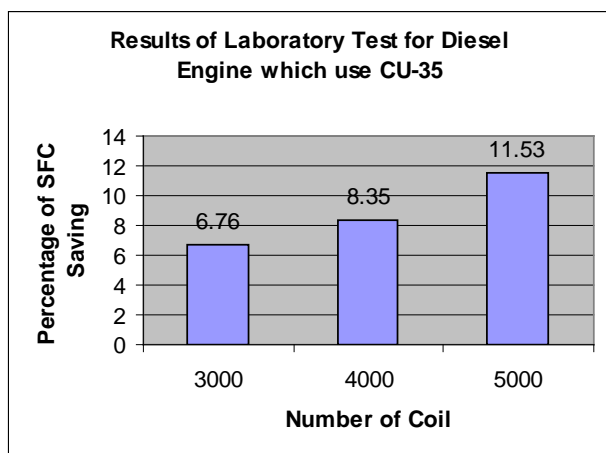


Fig. 5: Results of laboratory test for copper core and diameter of wire 0.35 mm.

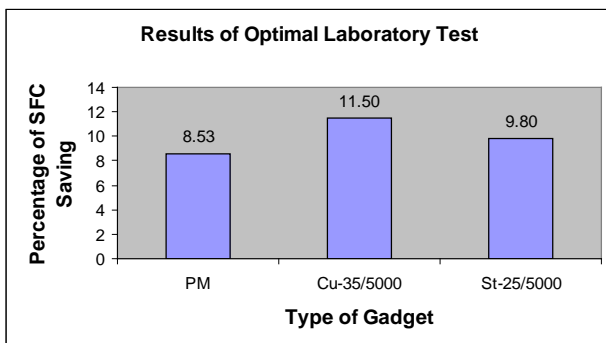


Fig. 6: Comparison of the optimal saving in relation to the type of gadget

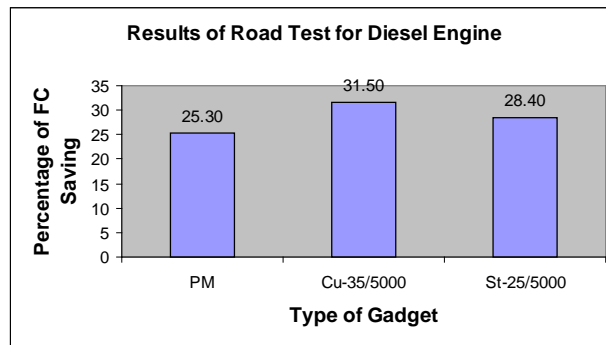


Fig. 7: Results of road test versus type of gadget

V. CONCLUSIONS

1. The considered work has succeeded to produce fuel saver which is based on electromagnetic induction for saving the fuel consumption of diesel engine.
2. Wire diameter and number of winding of the produced fuel saver effect fuel consumption of diesel engine.
3. Laboratory testing shows that the produced fuel saver can save specific fuel consumption about 11.53 % which use diameter of wire 0.35 mm and number of winding 5000 turns, for copper core.
4. Road testing shows that the produced fuel saver can save fuel consumption about 31.53% which uses diameter of wire 0.35 mm and number of winding 5000 turns, for copper core.

REFERENCES RÉFÉRENCES REFERENCIAS

1. H. P. Siregar, "Performance Analysis of the Energy Saver which is Based on Electromagnetic Induction for Diesel engine," *Proceeding of 5th National Seminar of Mechanical Engineering*, (University Of Indonesia, Depok-Jakarta.), pp. 7-14, 2006.
2. Houtman P. Siregar, Maradu Sibarani, "Fuel Saver which is Based on Electromagnetic Induction for Automotive Engine," *Proceeding of the 5th International Conference on Mechatronics and Information Technology - ICMIT 2007*, (Gifu, Japan.), pp.6794-114, 2007.
3. M.Sibarani, H.P. Siregar, D. Siregar. *Enhancement of Performance of Internal Combustion Engine by Electromagnetic Fuel Saver*, Journal of Japan Society of Applied Electromagnetics and Mechanics, Vol 17, S149-S152, 2009.
4. Magnetic Fuel Saver, other Fuel Savers and Fuel Optimizers, http://www.tinet.org/~sje/mag_fuel.htm, May 2010.
5. Magnetic Fuel Saver for Petrol & Diesel Vehicles, <http://www.ecomagnets.com/motoflow.htm>, May 2012.