

Investigation of MPFI System Using Magnetism for Petrol Engine Enhancement-A Review

Nilesh T. Waykole¹, Tushar A. Koli², Vijay H. Patil³

P.G. Student, Department of Mechanical Engineering, Godavari College of Engineering, Jalgaon, India¹

Assistant Professor, Department of Mechanical Engineering, Godavari College of Engineering, Jalgaon, India²

Prof and Head, Department of Mechanical Engineering, Godavari College of Engineering, Jalgaon, India³

ABSTRACT:For the economic success of nation, not only the conservation of fuel is important but also limitation of pollution through such fuel combustion. The present investigation is to find performance and emission characteristics of petrol engine (MPFI: Multi Point Fuel Injection) operating with oxyrich air energizer. The invention resides in the field of treatment of hydrocarbon fuels in the liquid or gaseous form to increase the fuel burning efficiency by subjecting the said fuel flowing to shaped uniform magnetic field having a consistent directional flux. The aim of this study is to investigate the effect of the fuel magnetisation on the performance of petrol engine. It has been observed that magnetic field helps to improve mixture formation by increasing the atomization process of the spray in the combustion chamber due to increasing the rate of disintegration of the droplets as a result of reduction in the surface tension and viscosity of the fuel. The effects of magnetic field on the engine performance parameters such as specific fuel consumption, break thermal efficiency, exhaust emissions etc. are analyzed by applying the magnetic field along the fuel line immediately before fuel injector.that on magnetisation viscosity of hydrocarbon fuel decreases due to declustering of the. All the researchers have done study of engine performance parameters with addition of H₂ or O₂. The application of the gradient magnetic field indicates a way to induce greater entrainment of oxidizer towards the combustion and also provide a mean to control combustion behaviour.

KEYWORDS: Magnetic field, efficiency, combustion, oxyrich, magnetization.

I. INTRODUCTION

In recent days due to exhaustive use of fossil fuel in a vehicular and industrial purpose its stock will almost come to end within few decades. Hence there are so many efforts towards the improving power output and emission of internal combustion engines per fuel,so that the products of combustion exhausted from internal combustion (IC) engines environmental friendly, and also beneficial for cost.

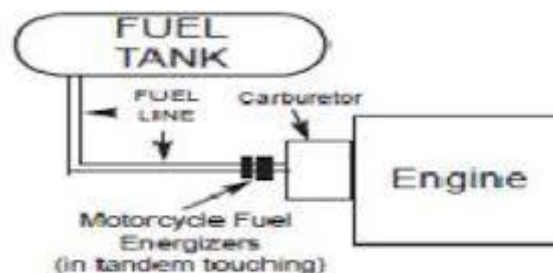


Fig. Schematic diagram for magnetic fuel energizers installation

Application of the magnetic field is important in many aspects of research and practical applications. Magnetic field can affect fluids that can exhibit paramagnetic and diamagnetic behaviour. Magnetic field applied to fuel line atomizes fuel properties, which get adhere to more oxygen molecules and enhances fuel air mixture. This provides peak engine performance while extending engine maintenance and filters change intervals thus reducing harmful emissions and carbon deposits and also we can ensure more complete combustion. This is a small investment as compared to savings during the exploitation of the vehicle and extending life of engine

II. LITERATURE REVIEW

The purpose of this paper to review the critical points of the project from the referred works.

Vivek Ugare, Ashwin Phobale, Sandeep Lutade [1], “ Performance of internal combustion (CI) engine under the influence of strong permanent magnetic field”, have worked on influence of unpaired electrons is transmitted through space to affect other electrons in other bodies. The magnetized iron bar magnet creates a magnetic field.

P. Govindasamy and S. Dhandapani [2], “Reduction of NOX Emission in Bio Diesel engine with Exhaust gas Recirculation and Magnetic Fuel Conditioning”, presents experimental results of reduction in exhaust gas emissions in I.C. engine using magnetic field. Permanent magnets with different intensity installed on the fuel line show eye catching results. The exhaust gas emissions such as CO and HC are measured by using exhaust gas analyzer. The magnets help to disperse the hydrocarbon cluster into smaller particles which will improve the efficiency of combustion. This will maximize the combustion and thus reduce the unburned hydrocarbon in the emission.

Ali S. Farisa, Saadi K. Al-Naserib [3], “Effects of Magnetic Field on Fuel Consumption and Exhaust Emissions in Two-Stroke Engine”. In this paper, the energy of permanent magnets was used in this research for the treatment of vehicle fuel (Iraqi gasoline), to reducing consumption, as well as reducing the emission of certain pollutants rates. The experiments in current research comprise the using of permanent magnets with different intensity (2000, 4000, 6000, 9000) Gauss. For the purpose of comparing the results necessitated the search for experiments without the use of magnets. Different intensities of magnetic field was measured and compared with these without magnetization.

Talal M. Al-Momani and Amjad D. Al-Nasser [4], “ Emission Rate of Gases Emitted from Private Gasoline Vehicles in Irbid – Jordan” analyzed different types of pollutants; carbon monoxide (CO), carbon dioxide (CO₂) and hydrocarbon (HC) based on the Jordanian emission standards with special reference to three different vehicles' manufacturing countries; namely: Korea, Japan and Germany. The analysis results indicated that Korean made vehicles gave better results than Japanese and

Rongjia Tao, worked on [5], “Investigate Effects Of Magnetic Fields On Fuels”. Particulate Matter (PM) is one of the major harmful substances in diesel exhaust gas. Technologies like the Diesel Particulate Filter (DPF) and Diesel Oxidation Catalyst (DOC) have been positioned at the exhaust to reduce the quantity of harmful substances released to the environment. This paper highlights the factors that affect combustion in diesel engines and the potential of the introduction of electromagnetic field in the combustion chamber on the improvement of the diesel engine efficiency and reduction in the quantity of Particulate Matter.

Shweta Jain¹, Prof. Dr. Suhas Deshmukh [6], “Experimental Investigation of Magnetic Fuel Conditioner (M.F.C) in I.C. engine”, described the mechanism of MFC, objectives & the parameter which affects the efficiency of MFC. Further, in this report one case study is presented in which ferrite magnets are used as MFC which improves efficiency and emission. A permanent magnet mounted in path of fuel lines. Mounting magnets in fuel line enhance fuel properties such as it aligns & orients, hydrocarbon molecules, better atomization of fuel (Proper mixing of air with fuel) etc. Use of such fuel conditioners improves mileage & better emission of vehicle. Finally this article also review about new emerging technology i.e. fuel conditioners, developments done across the globe.

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D.R.Gaikwad, H.M.Dange [7], “ Experimental Investigation Of Four Stroke Si Engine Using Oxyrich Air Energizer For Improving Its Performance”, investigated performance and emission characteristics of a four stroke multi cylinder spark ignition engine (MPFI: Multi Point Fuel Injection) operating with oxyrich air energizer. The aim of this paper is to increase fuel efficiency and to reduce exhaust emission levels

Piyush M Patel¹, Prof. Gaurav, worked on [8], “Effect of magnetic field on performance and emission of single cylinder four stroke diesel engines”. The effect of magnetic field on the engine performance parameters such as specific fuel consumption, break thermal efficiency, exhausts emissions etc. by applying the magnetic field along the fuel line immediately before fuel injector. The strong permanent magnet of strength 2000 gauss is applied to fuel line for magnetic field. At different engine load conditions the experiments are conducted. An exhaust gas analyzer is used to measure the exhaust gas emissions such as CO, CO₂, HC and NO_x. the effect of magnetic field.

Willard W. Pulkrebek [9], “Engineering Fundamentals of the internal combustion engine.” This paper explores the undesirable emissions generated in the combustion process of automobile and other IC engines. These emissions pollute the environment and contribute to global warming, acid rain, odors, and respiratory and other health problems. The major causes of these emissions are non-stoichiometric combustion, dissociation of nitrogen, and impurities in the fuel and air. The emissions of concern are hydrocarbons (He), carbon monoxide (CO), oxides of nitrogen (NO_x), sulfur, and solid carbon particulates. Ideally, engines and fuels could be developed such that very few harmful emissions are generated, and these could be exhausted to the surroundings without a major impact on the environment.

Komal L. Jadhav¹, Kalyani R. Chapadgaonkar [10], “Improving Performance of Diesel Engine with Reduction of Emissions by Applying Magnetic Field”, made use of Magnetic Fuel Conditioner (MFC)”. The research report describes the mechanism of MFC, objectives & the parameter which affects the efficiency of MFC. The effects of magnetic field on the engine performance parameters such as specific fuel consumption, break thermal efficiency, exhaust emissions etc. are analyzed by applying the magnetic field along the fuel line immediately before fuel injector.

P Vijaya Kumar, Santosh KumarPatro and VedesamhitaPudi [11], “Experimental Study Of A Novel Magnetic Fuel Ionization Method In Four Stroke Diesel Engines,” deals with fuel ionization by using magnetic field which will ensure complete combustion of air fuel mixture. An attempt is made in this work to improve the combustion efficiency of internal combustion engines by adopting a magnetic fuel ionization method in which the fuel is ionized due to the magnetic field. The magnetic fuel ionization method establishes improved fuel burning criteria not only ensures increased thermal efficiency and reduced emissions levels in an I.C engine but also environmental friendly nature of an I.C engine with further experimentation in near future.

Nilesh T. Dhokane, Anand R. Nadgire and Savita U. Shinde [12], “Performance Evaluation of Four Stroke SI Engine with and without Oxyrich Air Energizer at 1000 rpm ,” have done study of engine performance parameters with addition of H₂ or O₂ and with turbocharger & supercharger. So this research to improve the performance of SI engine & reduces the amount of fuel consumption & due to complete combustion the pollution of SI engine is also reduced. Therefore the research may be done on oxyrich air for combustion of fuel in SI engine.

Dr A.R.A.Habbo, RaadA. Khalil, Hassan S. Hammoodi [13], “ Effect of magnetizing the fuel on the performance of an S.I. engine” , investigated use of thermal or catalytic converters and particulate traps. A hydrocarbon fuel consists of molecules made from atoms of carbon and hydrogen, which are collected by what are called covalent bonds. In such bonds an individual atom will share a pair of electrons with a neighbouring atom. Two carbon atoms might share two electrons and by doing so they are held together. Each carbon atom can be connected in four different directions. For example, a given carbon atom might form a sharing partnership with two other carbon atoms in order to be a link in a chain. At the same time this same carbon atom will form a sharing partnership with two hydrogen atoms.

III. DISCUSSION

From literature survey, depth study has been conducted to comprehend the interaction between magnetic fields and fuel diffusion. Magnetic field on the fuel behaviour was assessed by investigating changes in fuel structure, the non dimensional numbers governing the interactions, variation in the temperature distribution within the fuel. The researcher's study of study methodology involved collecting the requisite set of data by subjecting the fuel flow to a gradient magnetic field and comparing data to applied magnetic field.

IV. CONCLUSION

When fuel is exposed to a magnetic field, following conclusions are made.

- Change in properties of the fuel by using the magnetic field is to increase the efficiency of engine and reduce fuel consumption.
- The brake power increased due to placing magnetic coil before the engine carburettor to magnetize the fuel before entering the engine cylinder. The power increases as the intensity of magnetic field increases too.
- The Brake thermal efficiency was improved relatively with the magnetic field intensity.
- Reduce the amount of environmental pollutants in the exhaust gases.

Finally, it can be concluded that using magnetic field with high intensity has a positive effect on petrol engine performance and emission. Further study should be done to find solution for increase engine efficiency and reducing fuel consumption.

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