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No_x Reduction by using Adsorption Technique

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Abstract: ***Automobiles and trucks consume a major portion of the energy used for transportation in the US. They generate a significant amount of the emissions that contribute to air pollution. During the past few years, research on cleaner burning alternate fuels has been aimed at improving engine efficiencies and decreasing emissions that pollute the environment. This research was devoted to the study of the performance of I. C. engines with enriched oxygen air fueled by gasoline and natural gas. we study the feasibility of gas separator to supply oxygen enriched air for vehicle applications. A single cylinder, 4-stroke, spark-ignition engine was used in the program to evaluate the effect of enriched oxygen air on engine performance and exhaust emissions. The oxygen content in the intake air was varied between 21% and 25%. The effects of oxygen enrichment are reviewed in terms of volumetric efficiency, power output, specific fuel consumption, fuel conversion efficiency, exhaust gas temperature, and exhaust emissions.***
Keywords: Adsorption, zeolite, emission, pollution control

I. INTRODUCTION

The separation of oxygen is usually done by oxygen concentrator setup. This setup is usually powered by using solar panels. The air after compressing is passed to the molecular sieve beds which can trap the other gases except Mostly the sieve is made of zeolite.

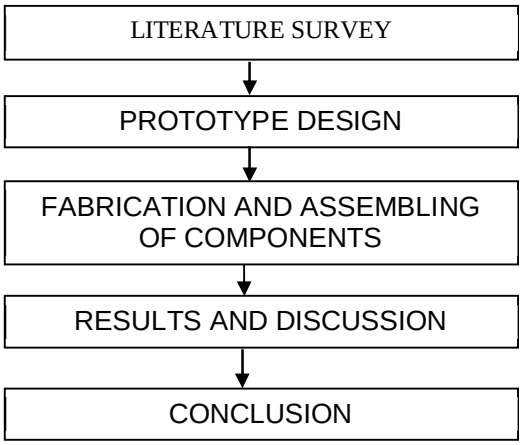
When the air from atmosphere is sucked and passed over the beds, the gases except oxygen will trap. The obtained oxygen is supplied to the engine to increase combustion of fuel resulting in the increment of engine's efficency. The reduction of NO2 emissions is a major goal of the clean air act amendments because of their known role in the formation of ground-level ozone.

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The facility that can reduce NO2 emissions from the combustion equipment, is using pressure swing adsorption. Nitrogen oxide causes major health issuses like lung cancer, asthma. NO2 also causes inflation of air ways at high levels nitrogen oxides also causes impact on environment like acid rain, ozone layer depletion.

Today the diesel engine is the one of the most exciting and promising technology in the world. The research efforts directed onwards improving the performance of CI engines. Hence it is necessary to study parameters of the engine. By increasing oxygen content with air leads to faster burn rates and ability to burn more fuel at the same stoichiometry. Added oxygen in combustion air leads to shorter ignition delay and offers more potential of burning diesel. Oxy-fuel combustion reduces the volume of fuel gases and reduces the greenhouse effect also. This paper presents how performance characteristics get improved by oxygen enrichment.

II. METHODOLOGY



III. LITERATURE SURVEY

The extensive literature review will help to understand the concepts, the theorems and the different factors that influence the machine's performance. Before starting our work we had viewed many research papers which indicates that for a production based industries machine installation is a crafty and a skillful task as many factor are associated with it such as power consumption, time required, maintenance cost, number of units produced per machine etc.

NOx reduction operation such as separating oxygen from NOx to enrich the performance of engine. Zeolite chemical is used for separation of oxygen Pressure gauge meter and tubes are used for measure and flow of air. Dimension specification of the frame model is cleared from studied journal paper. Selection of materials for the channel and tank is cleared for better performance.

IV. PROBLEM IDENTIFICATION

A. *Specification Of The Problem*

We ensure the correct performance of the system and the normal function of the test engine, it was initially operated for a few hours using both gasoline and compressed natural gas with normal air. During this initial run, the performance of the system was carefully observed. Malfunctioning of components and leakage in air, water and fuel lines were corrected before the actual tests were initiated. shows the conditions during the evaluation of the tests. During the preliminary tests at wide open throttle, the following parameters were monitored at various speeds:

1) The power output
2) Torque output
3) Fuel consumption
4) Inlet and exhaust temperatures and
5) Exhaust emissions

Variable speeds were obtained by loading the engine with the water flow rate in the dynamometer.

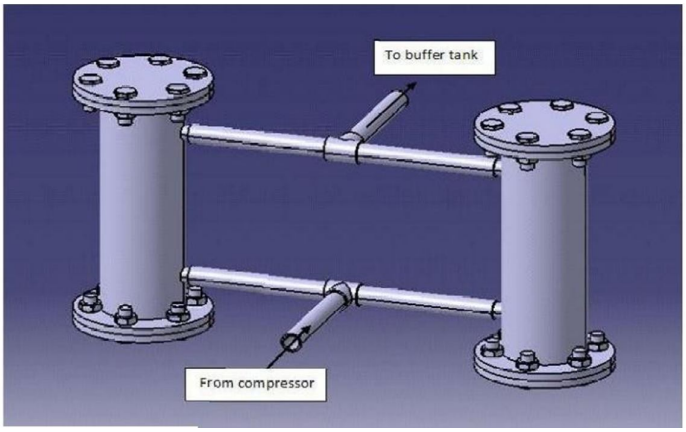
B. *Objectives*

1) The aim of the project is to reduce the pollution.
2) By enriching the oxygen we can increase the thermal efficiency of an engine.
3) In this experiment we can reduce harmful gases such as carbon dioxide and some other gases.
4) The increase in power output may be also utilized to provide some of the benefits of a super charger and turbo charger.
5) An increased in engine power input.
6) Essential reduction of CO & HC are reduced successfully.

V. PROCEDURE

The Zeolite stone is kept in the cylinder for reduction of NOx in atmosphere air. The enriched oxygen from the cylinder by using adsorption technique is entered into the air intake of diesel engine. The air intake provides the necessary air for diesel engine. Due to the increased oxygen in the air the burning efficiency of the engine increases. The exhaust gas emission of poisonous gas is reduced and make the engine more eco friendly.

VI.DESIGNPROTYPE



Design

VII. DESIGN CALCULATION

Efficiency = work done \ heat absorbed

% = Q1 –Q2 \ Q1

Q1 – Fuel efficiency [35]

Q2 – Thermal efficiency[15]

% = 35 -15 \35

= 1.5% (app)

A. Fabrication Model

The fabrication work is done by the mechanical process known as welding for joining different lengths of mild steel rod for obtaining the structure of frame .Two cylinders of same height and breadth is taken and a steel box was fixed inside the cylinder for performing NOx reduction operations.

VIII. RESULTS AND DISCUSSION

The following results can be analyzed

A. This technique is used in generator based industries

B. The thermal efficiency of the engine has been increased

C. Pollution have been decreased.

IX.CONCLUSION

This research was undertaken to test the performance and emissions of a spark ignition engine fuel system by both liquid and gaseous fuel using oxygen enriched air. An attempt was made to examine the practicability of using a membrane gas separator to supply oxygen enriched air. The results of oxygen enrichment experiments lead to the following conclusions. An increased in engine power output. The use of natural gas in S.I. engines results m reduced volumetric efficiency due to displacement of air in the intake manifold. The results from the experiment indicate that oxygen enrichment can be used to increase the power output of an engine fueled by natural gas to levels equal to or higher than that achieved using air/gasoline mixtures. The increase in power output may also be utilized to provide the some of the benefits of a supercharger or turbocharger at higher altitudes. Substantial reduction in CO and HC were achieved. This is one of the most important benefits of the oxygen enrichment .

X. FUTURE SCOPE

A. By editing the structure, this system can be implemented to BS - VI engines.

B. By reducing the size of the system in future It can be used in two wheeler engines.

C. While implementing into BS VI engines there is a chance of reduction in pollution.

REFERENCES

[1] M.SenthilKumar, K .Arul,N.Sasikumar, Impact Of Oxygen Enrichment On The Engines Performance , Journal Of Theenergy Institute, Vol.92, Issue 2019.

[2] A.Senthilkumar&P.Baskar Experimental Investigation On Performance Characteristics Of A Diesel Engine Using Diesel-Water Emulsion With Oxygen Enriched Air,Vol.57,Isuue2016

[3] Karen Cacua, Andres Amellfrancisco Cadavid. Effects Of Oxygen Enriched Air Onthe Operation And Performance Of A Diesel-Biogas Dual Fuel Engine. Dual Fuel Engine Effects When Increasing The Oxygen

[4] Nidhiand K.A.Subramanian. Experimental Investigation On Effects Of Oxygenenriched Airon Performance,Combustion And Emission Characteristics Of Methanol Fuelled Spark Ignition Engine. Performance And Investigation On Effects Of Oxygen In Spark Ignition Engine

[5] Yasuyukiyamamoto. Ultra – Low NO2 Oxygen – Enriched Combustion System Using Oscillation Combustion Method

[6] T .Mohan Raj,S.Krishnamani. Experimental Investigation On Performance, Combustion And Emission Characteristics Of A Low Heat Rejectionengine Using Rapeseed Methyl Ester And Diethyl Ether. Indian Journal Of Science Andtechnology

[7] Bharath.Pkamalakannan. Analysisof Brake Thermal Efficiency And Oxygen In Exhaust Using Oxygen Enriched Air In Compression Ignition Engine. IOSR Journal Of Mechanical And Civil Engineering.

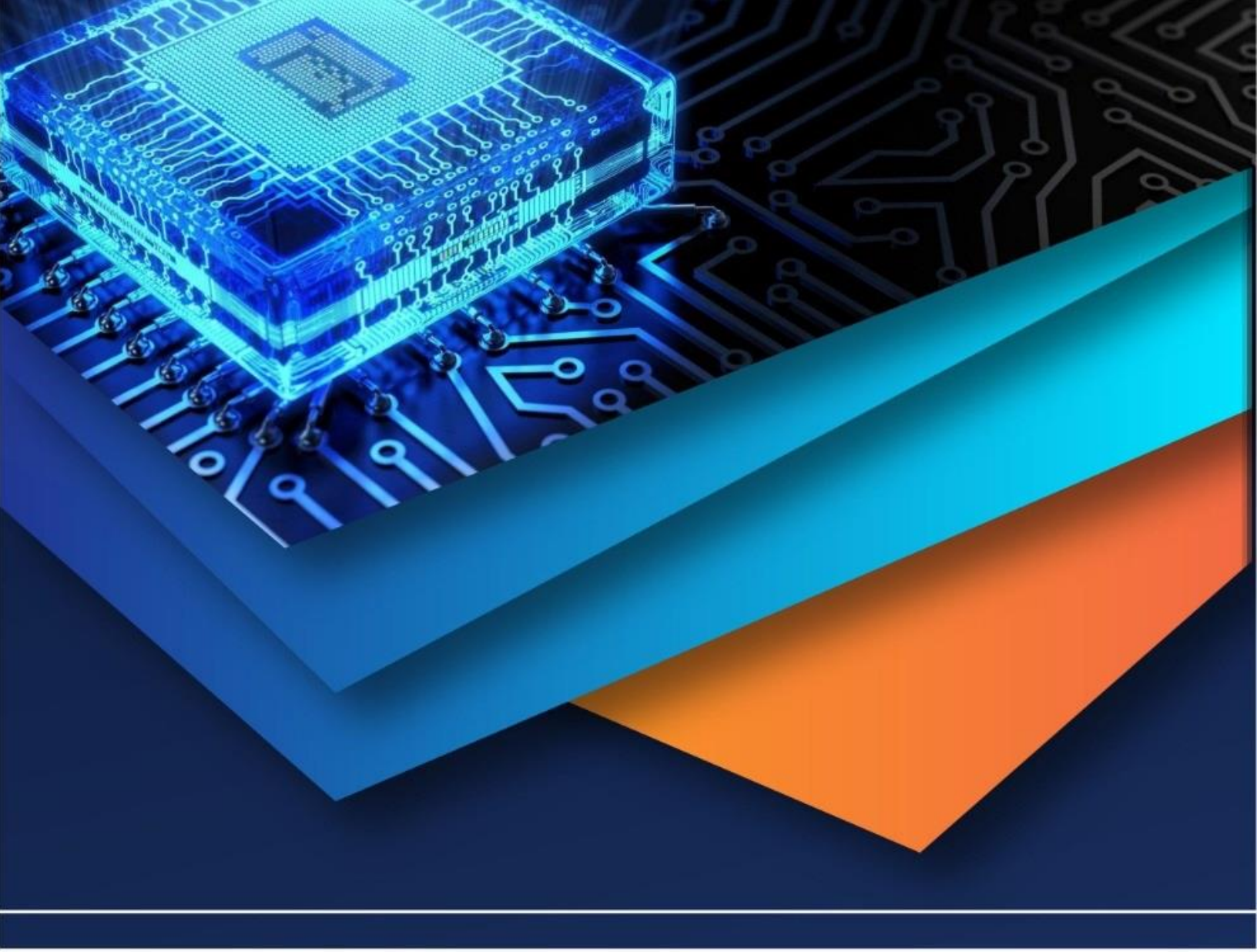
[8] Gadkrsagar, Deshmukhmanish. International Engineeringresearch Journal Enhancing Performanceofinternal Combustion Diesel Engine By Oxygenenriched Air Combustionby Membrane Technology. International Engineeringresearch Journal.

[9] Mohammad Nazrybin Rosley. Emission Characteristicsof Hydrogen Enrichment In Light Duty Single Cylinder Diesel Engine. ARPN Journal Of Engineering And Appliedsciences.

[10] Prof.Dhananjaygupta. Tostudy The Performance Of Oxygen Enriched Diesel Engine By Varying Compression Ratios. International Research Journal Of Engineering Andtechnology.

[11] Hardik Patel. Opportunityto Improve The Engine Performance And Emissioncharacteristics By Using Oxygen Enriched Combustion. International Journal Of Innovative Research In Advancedengineering.

[12] Sangeetasingh,P.N.Kondekar. Analytical Modeling Of Sehottky Tunneling Source Impactionization MOSFET With Reduced Breakdown Voltage. Engineering Science And Technology An International Journal.
[13] Mrs. Charulah.Patel. Efficiency Improvement Of Diesel Engine Pump Sets Through Oxygen Enrichment By Vacumswing Adsorption Method SSRG International Journal Of Mechanical Engineering.
[14] Mrs. Charulah.Patel. Efficiency Improvement Of Diesel Engine Pump Sets Through Oxygen Enrichment By Vacumswing Adsorption Method SSRG International Journal Of Mechanical Engineering.
[15] R.Sindhu,G.Ambaprasadrao,K.Madhumurthy. Effective Reduction Of NO2 Emissions From Diesel Engineusing Split Injections.
[16] Richabarsainya,Tarunkumarrawat, Rachitmahendra. A New Realization Of Wave Digital Filters Using GIC And Fractional Bi-Lineartransform. Engineering Science And Technology ,An Internationaljournal
[17] G. Sujesh,S. Ramesh. Modeling And Control Of Diesel Engine . A Systematic Review. Alexandria Engineeringjournal.
[18] B.Rajeshkumar,S.Saravanan,K.Rajaram. Combined Effect Of Oxygenates Andinjection Timing For Low Emissions And High Performance In Diesel Engine Using Multi –Response Optimisation.Alexandria Engineering Journal.
[19] Dr.K. Ashokreddy. Pre Evaluation Of Emulsion Fuel Used In IC Engine Performance. Scientific Journal Of Impactfactor.
[20] P.Baskar,A.Senthilkumar. Effect Of Oxygen Enriched Combustion On Pollution And Performance Characteristics Of Diesel Engines. Engineering Science And Technology And Internationaljournal.
[21] Marwar.Mishrif, M.S.Gad, Mohammed Keshawy. Performance And Exhaust Emissions Of Engine Using Diesel Nano Emulsions As A Alternative Fuels. Egyptian Journal Of Petroleum.
[22] P.Baskar,A.Senthilkumar.Experimental Investigationon Performance Characteristicsof A Diesel Engines Using Diesel Water Emulsion Withoxygen Enriched Air. Alexandria Engineeringjournal.
[23] Bhavin Mehta* ,Hardikpatel , Pushpak Patel . Opportunity Toimprove The Engine Performance And Emission Characteristics By Using Oxygen Enriched Combustion.International Journal Of Innovative Research In Advanced Engineering
[24] Bhavinmehtahardikpatelpushpakpatel. Opportunity To Improve The Engine Performance And Emission Characteristics By Usingoxygen Enriched Combustion.International Journal Of Innovative Research In Advanced Engineering(IJIRAE).
[25] Abhishek waghmare,Peeyooshtekale, Abhijeetpadolkar, Ravikiran, Panchal, P.P.Patunkar.Performance Analysis of oxygen enriched multi cylinder s. i. engine. international journal Of Advanced Research.



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