Exhaust Gas Power Generation 2-May 2018

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Abstract- *In this paper, a continuous induction of hydrogen in the air inlet manifold of a multi cylinder, compression ignition engine is adopted to investigate engine performance and exhaust gas emission constituents experimentally under different hydrogen induction rates and loads. Hydrogen shows considerable promise as a primary energy carrier in the future. First, it can be produced directly from all primary energy sources, enabling energy feedstock diversity for the transportation sector.*

Keywords- turbine, dynamo, battery, electrical generator

I. INTRODUCTION

Now-a-days technology is moving at a very faster rate. The conventional sources of energy are on a verge of extinction. So scientists are merging towards the use of non-conventional energy resources. But it also requires some kind of energy to convert it into another form. Our project is related in utilizing the kinetic energy of exhaust gases of vehicle which is of no use. These alternative energy resources include wind, solar power, and biomass (plant material), which are all renewable fuel sources. Electricity produced from nuclear fission, or fusion, has also been mentioned with increasing frequency as a possible source of hydrogen (H2) production through electrolysis of water or thermo chemical cycles. A major benefit of increased H2 usage for power generation and transportation is that all of these sources minimize our dependence on nonrenewable fossil fuels and diversify our energy supply for utilization in end-use energy sectors. In recent years the scientific and public awareness on environmental and energy issues has brought in major interests to the research of advanced technologies particularly in highly efficient internal combustion engines. Viewing from the socio-economic perspective, as the level of energy consumption is directly proportional to the economic development and total number of population in a country, the growing rate of population in the world today indicates that the energy demand is likely to increase .Substantial thermal energy is available from the exhaust gas in modern automotive engines. Two-thirds of the energy from combustion in a vehicle is lost as waste heat, of which 40% is in the form of hot exhaust gas. The latest developments and technologies on waste heat recovery of exhaust gas from internal combustion engines (ICE). These include thermoelectric generators (TEG), Organic Rankine cycle (ORC), six-stroke cycle IC engine and new developments on turbocharger technology

II. LITERATURE REVIEW

M.Loganathan [01], In this experimental work the single cylinder two stroke air cooled SI engine was used for investigation. The intake manifold was modified for LPG induction and gasoline injection. The engine is operated at 3000 rpm on various throttle positions. The LPG kit is used to supply the gas to the engine. The flow control valve is used to vary the LPG flow. The engine was operated for 20%, 40%, 60%, 80% and 100% throttle condition. At each throttle position the best brake thermal efficiency value was selected. This LPG manifold induction results were compared with gasoline manifold injection and carburetion.

Duraid F. Maki [2], Diesel engines are major contributors of air pollution by its exhaust gasses such as particular matter, carbon oxides, oxides of nitrogen, and sulfur compounds. Also, the diesel as a fossil fuel is threatened to decay with depletion of its sources. Hydrogen as a renewal energy and promising fuel might use to solve that troubles and crisis. A multi cylinder, natural aspiration, four stroke, compression ignition, and water cooled engine is tested under hydrogen diesel different blends and at different operating conditions. A hydrogen induction set up is built in the lab with all of the acquitting sensors and measuring instruments. The safety rules are considered. A continuous hydrogen induction in the inlet manifold is selected technique for this investigation. Experimental tests are done to investigate engine thermal performance and exhaust emission constituents under those blends circumstances.

P. Prabhakaran [3], A hydrogen induction set up is built in the lab with all of the acquitting sensors and measuring instruments. The safety rules are considered. A continuous hydrogen induction in the inlet manifold is selected technique for this investigation. Experimental tests are done to investigate engine thermal performance and exhaust emission constituents under those blends circumstances. The optimum operating conditions and optimum parameters for those blends are found. The investigation led to find that, the optimum rate of hydrogen induction is 7.5 lpm. This optimum rate reduced

the diesel fuel consumption by 20 % and increased the brake thermal efficiency by about 8-9%. The NO_X emission is reduced.

III. CORE CONTENT

3.1 Design of turbine wheel

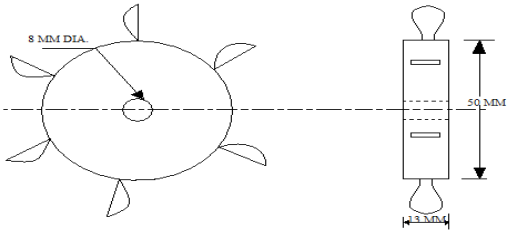

Fig. Turbine Wheel

The wheel (or turbine) is a tangential flow impulse turbine. The exhaust air strikes the bucket along the tangent of the runner. Figure2.1 shows the runner of a wheel. It consists of a circular disc on the periphery of which a number of buckets evenly spaced are fixed. The shape of the bucket is of a cup or bowl. The high velocity air of exhaust gases strikes on the cup of the runner. The buckets are made of stainless steel spoons.

3.2 FRAME

Fig. Frame

The casing is design as shown in the figure. Two hose clips of 116mm diameter is taken so that it can be mounted easily on the silencer and can be tightened as per the requirement using nut and bolt arrangement. Four rods of 6mm diameter and 240 mm in length are welded of the periphery of both the hose clips so that it can form a rigid casing for mounting of other accessories.

3.3 SUPPORTING COLUMN

These are two wooden blocks of dimension 115 *35*20 mm as shown in the figure. Grooves are cut on both sides of the column so that it can be easily mounted on the casing and are fixed with the help of araldite. The column is made such that, the bearings and the motor can be easily mounted on it.

3.5 D.C GENERATOR

An electric D.C Generator is a machine which converts mechanical energy (or power) into electrical energy (or power).

Principle

It is based on the principle of production of dynamically (or motionally) induced e.m.f (Electromotive Force). Whenever a conductor cuts magnetic flux, dynamically induced e.m.f. is produced in it according to Faraday's Laws of Electromagnetic Induction. This e.m.f. causes a current to flow if the conductor circuit is closed.

3.6 Principles of operation

There are at least six common principles of operation

- plain bearing, also known by the specific styles: bushings, journal bearings, sleeve bearings, rifle bearings
- rolling-element bearings such as ball bearings and roller bearings
- jewel bearings, in which the load is carried by rolling the axle slightly off-center
- fluid bearings, in which the load is carried by a gas or liquid
- magnetic bearings, in which the load is carried by a magnetic field
- Flexure bearings, in which the motion is supported by a load element which bends.
- Bearings of standard dimension of no. Z82g are directly purchased from the market.
- No. Of bearings required are two as the turbine is mounted between the bearings so as to rotate freely without friction.

3.9 WORKING

The whole assembly is mounted on the silencer of the vehicle at the end of muffler so as it will not be affect the efficiency of the engine. The assembly is tightened on the silencer with the help of nut and bolt arrangement provided. When the vehicle starts, the Turbine wheel also starts rotating

which in turn rotates the generator. The output of the generator at various RPM of the engine can be calculated.

TESTING OF PROPOSED MODEL

Sr. No.	Speed in km/hr	Output of Generator in Volts	Current in Ampere	Power Develop in Kw
1	20	2.17	0.06	0.1302
2	30	3.75	0.10	0.375
3	**40**	**4.98**	**0.19**	**0.9462**
4	50	5.10	0.26	1.6328

IV. ADVANTAGES

1. It requires no external power to drive the generator.
2. Increased efficiency of the engine with the same input.
3. Its weight does not have any effect on the efficiency of the engine.
4. Can be easily carried along with the vehicle.
5. It is simple in construction so as to fabricate locally with least available resources and skills.
6. It is of low cost, simple in construction and maintenance.

V. APPLICATIONS

It is basically designed to generate electricity this electricity we can be use it

1. To charge cell phone.
2. To operate the vehicles various accessories such as head and tail lamps, side indicators, horn IR sensors etc.
3. Above certain speed of engine the generator gives large output than required. So this extra output can be stored using a battery and can be used at times when the speed of the engine is low and the output required is less.
4. It can also be use to charge digital cameras, I-Pod etc.

VI. FUTURE SCOPE...

By further modification, of this set up can be also be used for various purposes as follows:

- To operate the vehicles various accessories such as head and tail lamps, side indicators, horn etc.
- Above certain speed of engine the generator gives large output than required.

VII. CONCLUSION

It has been identified that there are large potentials of energy savings through the use of waste heat recovery technologies. Waste heat recovery entails capturing and reusing the waste heat from internal combustion engine and using it for heating or generating mechanical or electrical work. It would also help to recognize the improvement in performance and emissions of the engine if these technologies were adopted by the automotive manufacturers.

The study also identified the potentials of the technologies when incorporated with other devices to maximizepotential energy efficiency of the vehicles.The project carried out by us made an impressing task in the field of mechanical department. It is used for to produce the current in vehicle exhaust unit. This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement which also be provided.

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