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Fabrication of Power Production Exhaust Gas of an Engine

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ABSTRACT: In this research work the modification of spark ignition engine for producing power using turbine. Nowadays in automobile field many new innovating concepts are being developed. We are using the power from vehicle exhaust to generate the electricity which can be stored in battery for the later consumption. In this project, we are demonstrating a concept of generating power in a stationary single cylinder engine by the usage of turbines. Here we are placing a turbine in the path of exhaust near the silencer. The turbine is connected to a dynamo, which is used to generate power. Depending upon the exhaust flow the turbine rotates, and this causes the dynamo to rotate. A dynamo is a device which is used to convert the mechanical energy into electrical energy. The generated power is stored to the battery. It can be stored in the battery after rectification. The rectified voltage can be inverted and used in various forms of utilities.

KEYWORDS: turbine, cylinder engine, silencer

I.INTRODUCTION

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 socioeconomic 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. Being one of the promising new devices for an automotive waste heat recovery, thermoelectric generators (TEG) will become one of the most important and outstanding devices in the future. A thermoelectric power generator is a solid state device that provides direct energy conversion from thermal energy (heat) due to a temperature gradient into electrical energy based on “Seebeck effect”. The thermoelectric power cycle, charge carriers (electrons) serving as the working fluid, follows the fundamental laws of thermodynamics and intimately resembles the power cycle of a conventional heat engine[2,3]. One potential solution is the usage of the exhaust waste heat of combustion engines. This is possible by the waste heat recovery using thermoelectric generator. Thermoelectric generator converts the temperature gradient into useful voltage that can used for providing power for auxiliary systems such as air conditioner and minor car electronics. Even it can reduce the size of the alternator that consumes shaft power. If approximately 6% of exhaust heat could be converted into electrical power, it will save approximately same quantity of driving energy. It will be possible to reduce fuel also. For example, the heat of the car's exhaust can be used to warm the engine coolant to keep the engine running warm, even when the motor has been turned off for a significant length of time. A vehicle's exhaust can actually be used to generate electricity. Although these technologies can be used in any car, truck or SUV with an internal combustion engine, they're particularly important to hybrid vehicles, which need to produce maximum fuel efficiency. About 35% of the fuel is converted to useful crankshaft work, and about 30% energy is expelled with the exhaust.

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II. LITERATURE REVIEW

POWER GENERATION FROM EXHAUST GAS OF AN IC ENGINE[1]In this project, we modify a stationary diesel engine for producing power using turbine. Nowadays in automobile field many new innovating concepts are being developed. We are using the power from vehicle exhaust to generate the electricity which can be stored in battery for the later consumption. In this project, we are demonstrating a concept of generating power in a stationary multiple cylinder diesel engine by the usage of turbines. Here we are placing a turbine in the path of exhaust in the silencer. The turbine is connected to a dynamo, which is used to generate power. Depending upon the airflow the turbine will start rotating, and then the dynamo will also starts to rotate. A dynamo is a device which is used to convert the kinetic energy into electrical energy. The generated power is stored to the battery. It can be stored in the battery after rectification. The rectified voltage can be inverted and can be used .

UTILIZATION OF EXHAUST GAS OF VEHICLE FOR ELECTRICITY[2]Energy means capacity to do work. There are various types of energy available in the environment which is made by conventional and non conventional energy sources. The all forms of energies are required for doing various mechanical operations, But now there is large problem of electricity due to low availability energy resources. So in villages there is no maximum electric supply for doing simple operations such as mobile charging power for lamps etc. By taking above factors we made the model which can produces electric power by using kinetic energy of exhaust gas of vehicle specially by two wheeler. When the model is in working condition, the runner rotates due kinetic energy of exhaust gas. This runner is attach to large gear by using shaft which further attach to small gear, placed on dynamo finally dynamo produces electric power. This is simple in construction due to it made by local available material.

ANALYSIS OF POWER GENERATION FROM EXHAUST GAS ON 4 STROKE 4 CYLINDER PETROL ENGINE USING THERMOELECTRIC GENERATOR [4]Currently, a great deal of the automotive industry's R&D effort is focused on improving overall vehicle efficiency. Almost every type of internal combustion engine work on the principle of heat engine. It converts the chemical energy into thermal energy and in the form of pressure of air carrying the heat, piston movement is done. Traditionally, only 25 to 30% of energy is begin utilized to run the vehicle and accessories mounted on the engine and left amount of energy is wasted in various ways likes in the form of exhaust and cooling of engine component. The useful engine is used to run the engine as well as generator. So the efficiency of those engine were very low. But one method to improve the efficiency is to develop methods to utilize waste heat that is usually wasted. One of the promising technology that was found to be useful for this purpose were thermoelectric generator. Therefore, this project involved making a bench type, proof of concept model of power production by thermoelectric generator and heat from exhaust emission of engine. In this study we investigated the use of thermoelectric generator for power production. The output energy checked by increasing of cylinder one by the help of morsh test. Power develop on the engine is checked by the morsh test. Thermoelectric generator so to impart stream of exhaust gas on surface of it and to generate small electric D.C. type of current developing upon temperature difference across intercooler or heat exchanger is installed in path of exhaust gas on seebeck effect. An output Voltage of 200mV was generated using a single Bi2Te3 thermoelectric module for a temperature difference of about 40o C. So can be able to change battery, tail lamp, head lamp, parking light, door light, indicator lump, G.P.S. system, night vision camera etc. So as to reduce frictional power against alternator can save fuel and also in automotive industry to increase the efficiency of engine

POWER GENERATION FROM EXHAUST GAS OF SINGLE CYLINDER FOUR STROKE DIESEL ENGINE USING THERMOELECTRIC GENERATOR[5]utilized further for power generation. The related problems of global warming and dwindling fossil fuel supplies has led to improving the efficiency of any industrial process being a priority. One method to improve the efficiency is to develop methods to utilize waste heat that is usually wasted. One of the promising technologies that was found to be useful for this purpose were thermoelectric generators. Therefore, this project involved making a bench type, proof of concept model of power production by thermoelectric modules and heat from the exhaust emissions of engines. The experimental results showed that temperature difference obtained and external loading

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had an empirical relation with the power generated. An output voltage of 200mV was generated using a single Bi2Te3 thermoelectric module for a temperature difference of about 40oC. The proposed system can be used for waste heat recovery from the industry where thermal energy is used in their daily process and also in automotive industry to increase the efficiency of engines

GENERATING ELECTRICITY BY USING EXHAUST GAS [7]There are many innovative methods for generating electricity. This project defines how we can generate electricity using exhaust gas. The turbine and dynamometer are used in this project. Dynamo is connected to the turbine which is used togenerate power. The turbine is placed in the exhaust path of the silencer. The generated power differs, depending upon the airflow in the exhaust path. Thedynamo starts to rotate using turbine and converts kinetic energy into electricalenergy. The battery stores the generated power. The voltage has to be inverted, tobe used in the equipments. We can use the stored power depending upon ourcomfort

No.	Paper Title	Author Name	Key Points	Remark
1	Generation of electricity by using exhaust gases from bike.	International Journal of Innovative Research in Science, engineering and technology.Vol.4, Special issue 6, May 2015.	We are using the power from vehicle exhaust to generate the electricity which can be stored in battery for the later consumption[1]	Need to Improves the performance
2	Power generation by exhaust gases on diesel engine	Kranthi Kumar Guduru, YakkobKolIpak	There are many innovative methods for generating electricity. This project defines how we can generate electricity using exhaust gas. [3]The turbine and dynamometer are used in this project. Dynamo is connected to the turbine which is used togenerate power.	Resulting station power efficiency low.
3	Waste heat harvesting using thermoelectric generator	Balaji D, Gowrishaknar D	Thedynamo starts to rotate using turbine and converts kinetic energy into electricalenergy. [6]The battery stores the generated power	Need more storage battery and also ne rechargeable.
4	The study of thermo electric generator with various thermal conditions of exhaust gas from diesel engine	Byungdeok In, Hyung IK Kim, Jung wook Son, Ki hyun Lee.	utilized further for power generation. The related problems of global warming and dwindling fossil fuel supplies has led to improving the efficiency of any industrial process being a priority. [10]One method to improve the efficiency is to develop methods to utilize waste heat that is usually wasted.	the charging voltage must be more than the battery e.m.f. Approximately 2.5 per cell are enough to over the cell e.m.f.

III.METHODOLOGY OF PROPOSED SURVEY

A working fluid contains potential energy (pressure head) and kinetic energy (velocity head). The fluid may be compressible or incompressible. Several physical principles are employed by turbines to collect this energy:

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Impulse turbines change the direction of flow of a high velocity fluid or gas jet. The resulting impulse spins the turbine and leaves the fluid flow with diminished kinetic energy. There is no pressure change of the fluid or gas in the turbine blades (the moving blades), as in the case of a steam or gas turbine, all the pressure drop takes place in the stationary blades (the nozzles). Before reaching the turbine, the fluid's pressure head is changed to velocity head by accelerating the fluid with a nozzle.

Pelton wheels and de Laval turbines use this process exclusively. Impulse turbines do not require a pressure casement around the rotor since the fluid jet is created by the nozzle prior to reaching the blades on the rotor. Newton's second law describes the transfer of energy for impulse turbines. Impulse turbines are most efficient for use in cases where the flow is low and the inlet pressure is high.

Reaction turbines develop torque by reacting to the gas or fluid's pressure or mass. The pressure of the gas or fluid changes as it passes through the turbine rotor blades. A pressure casement is needed to contain the working fluid as it acts on the turbine stage(s) or the turbine must be fully immersed in the fluid flow (such as with wind turbines). The casing contains and directs the working fluid and, for water turbines, maintains the suction imparted by the draft tube.

Francis turbines and most steam turbines use this concept. For compressible working fluids, multiple turbine stages are usually used to harness the expanding gas efficiently. Newton's third law describes the transfer of energy for reaction turbines. Reaction turbines are better suited to higher flow velocities or applications where the fluid head (upstream pressure) is low.

In the case of steam turbines, such as would be used for marine applications or for land-based electricity generation, a Parsons-type reaction turbine would require approximately double the number of blade rows as a de Laval-type impulse turbine, for the same degree of thermal energy conversion. Whilst this makes the Parsons turbine much longer and heavier, the overall efficiency of a reaction turbine is slightly higher than the equivalent impulse turbine for the same thermal energy conversion.

In practice, modern turbine designs use both reaction and impulse concepts to varying degrees whenever possible. Wind turbines use an airfoil to generate a reaction lift from the moving fluid and impart it to the rotor.

Wind turbines also gain some energy from the impulse of the wind, by deflecting it at an angle. Turbines with multiple stages may utilize either reaction or impulse blading at high pressure. Steam turbines were traditionally more impulse but continue to move towards reaction designs similar to those used in gas turbines. At low pressure the operating fluid medium expands in volume for small reductions in pressure. for the same degree of thermal energy conversion. Whilst this makes the Parsons turbine much longer and heavier, the overall efficiency of a reaction turbine is slightly higher than the equivalent impulse turbine for the same thermal energy conversion.

A two-stroke (or two-cycle) engine is a type of internal combustion engine which completes a power cycle with two strokes (up and down movements) of the piston during only one crankshaft revolution. This is in contrast to a "fourstroke engine", which requires four strokes of the piston to complete a power cycle during two crankshaft revolutions. In a two-stroke engine, the end of the combustion stroke and the beginning of the compression stroke happen simultaneously, with the intake and exhaust (or scavenging) functions occurring at the same time.

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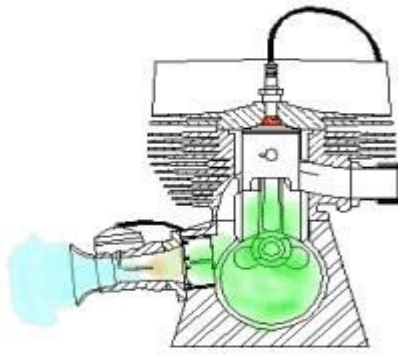

Figure 1 :Two Stroke Petrol Engine

IV.CONCLUSION AND FUTURE WORK

From this project, 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 andusing it for heating or generating mechanical or electrical work. It would also helpto recognize the improvement in performance and emissions of the engine if these technologies were adopted by the automotive manufacturers. The study alsoidentified the potentials of the technologies when incorporated with other devicesto maximize potential energy efficiency of the vehicles. The project carried out by us made an attempt to generate electricity in engine exhaust unit. This project has also reduced the cost involved in the concern.

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