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Design and Fabrication of Electricity Generation from Bike Exhaust Gas

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Abstract-*Here we are modifying an automobile for producing power using vehicle exhaust. 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 moving vehicle by the usage of turbines. Here we are placing a turbine in the path of exhaust in the silencer. An engine is also placed in the chassis of the vehicle. The turbine is connected to a dynamo, which is used to generate power. 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 in various forms of utilities. The battery power can be consumed for the users comfort.*

Keywords: Petrol engine, dynamo, exhaust and turbine, revolutions per minute (r. p. m)

1. INTRODUCTION

In recent years, energy shortages and environmental issues become increasingly prominent, clean new energy technologies have been gradually attracted social attention. With the development of thermoelectric generation, thermoelectric generation, as a kind of green energy technology used in a wide range and meeting the environment requirement, has been paid more and more attention. The thermoelectric generation is a kind of all static clean power generation, which converts the heat into electricity though they see back effect of semiconductor.

The thermoelectric generation is a solid component which has no rotation and many advantages, such as compact structure, high reliability, no noise in work, no wear, no leaks, good anti-radiation and flexible movement, etc. It can generate electromotive force in case of temperature difference.

For the total fuel combustion heat of vehicle engine, power output accounts for 30% to 42%(diesel engine) or 25% to 30%(gasoline engine), the remaining energy discharged by the way of waste heat through the engine cooling water and tail gas accounts for 58% to 70%(diesel engine) or 70% to 75(gasoline engine).

It is not only a waste of energy, but also causes a certain degree of thermal pollution of atmosphere. For improving the vehicle energy efficiency and reducing the exhaust pollution, thermoelectric generations are arranged around the automotive exhaust tube to recovery the exhaust heat. their performance parameters in different sizes were grasped. Then the adaptive thermoelectric module was chose and the best option of the exhaust heat power system model was determined. The model of automotive exhaust waste heat power generation system was designed and processed.

The output of the model was estimated by use of heat transfer model, which provides theoretical basis for the system. Finally, a test platform based on the model of power generation system was built, by which the output performance of the model was tested. Through the test, the performance and the energy conversion efficiency were obtained, and a real sense of energy recovery was achieved

2. WORKING AND DESIGN

Power is generated by using automobile exhaust gas is very simple and easy non-conventional process. Energy generation using vehicle silencer needs no fuel input power to generate the output of the electrical power.

This project using simple mechanism same as wind energy power generation. For this project the main Working Principle is Conversion of the forced kinetic energy into electrical energy. In this the exhaust gases released from the automobile Silencer is used to rotate the turbine (fan blades) by arranging it is very conveniently.

The nozzle is attached to the silencer is used to proper flow of exhaust gases with high velocity and steady flow with uniform direction to rotate the turbine. The dynamo attached to the turbine with shaft is used to convert the forced kinetic energy (K.E) into electrical energy (E.E) is by rotating dynamo. And the design of project was given as following picture. That picture was shows the concepts

PROJECT DSIGN

The main components used in this process is

- Engine
- Turbine
- Dynamo
- Battery
- Nozzle
- Exhaust pipe

2.1 ENGINE:

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 "four-stroke 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. In these engines there is a sequence of following processes:

1. Suction
2. Compression
3. Expansion
4. Exhaust

- Four strokes of the piston- hence the 4-stroke engine, or

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- Two strokes of the piston- hence2-strokeengines.

PETROL ENGINES:

A petrol engine (known as a gasoline engine in American English) is an internal combustion engine with spark-ignition, designed to run on petrol (gasoline) and similar volatile fuels. In most petrol engines, the fuel and air are usually mixed after compression (although some modern petrol engines now use cylinder-direct petrol injection). The pre-mixing was formerly done in a carburetor, but now it is done by electronically controlled fuel injection, except in small engines where the cost/complication of electronics does not justify the added engine efficiency. The process differs from a diesel engine in the method of mixing the fuel and air, and in using spark plugs to initiate the combustion process.

In a diesel engine, only air is compressed (and therefore heated), and the fuel is injected into very hot air at the end of the compression stroke, and self-ignites

2.2TURBINE

A steam turbine is a mechanical device that extracts thermal energy from pressurized steam, and converts it into rotary motion. It has almost completely replaced the reciprocating piston steam engine primarily because of its greater thermal efficiency and higher power-to-weight ratio.

Because the turbine generates rotary motion, it is particularly suited to be used to drive an electrical generator – about 90% of all electricity generation in the United States is by use of steam turbines. The steam turbine is a form of heat engine that derives much of its improvement in thermodynamic efficiency through the use of multiple stages in the expansion of the steam,

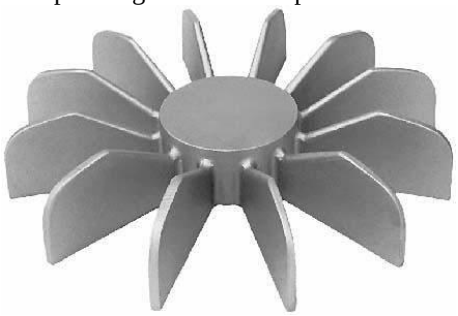

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Fig.2.Turbine

2.3 DYNAMO:

Dynamo is an electrical generator. This dynamo produces direct current with the use of commentators. Dynamo was the first generator capable of the power industries. The dynamo uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing direct electric current. A dynamo machine consists of a stationary structure, called the stator, which provides a constant magnetic field, and a set of rotating windings called the armature which turn within that field. On small machines the constant magnetic field may be provided by one or more permanent magnets, larger machines have the constant magnetic field provided by one or more electromagnets, which are usually called field coils.

Fig.3.Dynamo

2.4 NOZZLE:

Jet nozzles are also use in large rooms where the distribution of air via ceiling diffusers is not possible or not practical. When the temperature difference between the supply air and the room air changes, the supply air stream is deflected upwards, to supply warm air, or downwards, to supply cold air. Nozzles can be described as convergent or divergent (expanding from a smaller diameter to a larger one).

A de Laval nozzle has a convergent section followed by a divergent section. And is often called a convergent divergent nozzle.

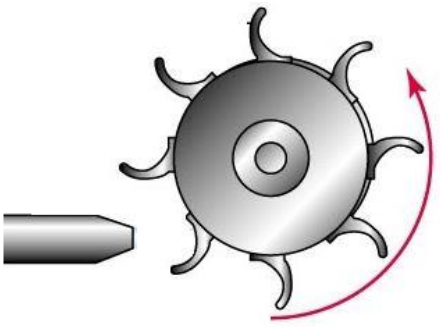

Fig.4. Nozzle and Turbine

2.5 BATTERY:

It is a device user to store the power. The power is stored in the form of DC current only. There are many types of batteries are used Lead acid, lithium fluoride and in this work 8Amp current and 12 voltage specification is used.

Fig.6. Battery

2.6 EXHAUST PIPE

The exhaust pipe is the passageway for the exhaust gases to flow from the manifold to the muffler. It is a heavy steel tube, usually flanged at both ends, and attached to the muffler. The diameter of the exhaust pipe is usually determined by the size of the engine. On a small, one-cylinder engine, a pipe no larger than a household water pipe is enough to do the job. Larger engines may require exhaust pipes 80-100 mm in diameter to carry the larger amount of exhaust gases.

The length of the exhaust pipe is determined by the design of the vehicle. If the engine is in the front of the vehicle and the muffler is mounted in the rear, the pipe will be long. (Often, long pipes will be made in two sections.) To provide as much road clearance as possible, pipes are formed in odd shapes that fit well up under the vehicles without touching other components. Pipes are supported from the vehicle frame by hangers

3. ADVANTAGESANDAPPLICATIONS

3.1 ADVANTAGES

- Power is stored ; we have to use other application like lighting,
- Waste heat is converted into use full energy(electrical energy).
- Compact in size
- Affordable and easily install

3.2 APPLICATIONS

Power generation using vehicle exhaust gas system can be used in most of the two wheeler‘s and four wheelers

- It is applicable for all stationary and moving vehicles.
- It is applicable for all Automobiles.
- The generating power is applicable for house hold uses.
- Auxiliary uses like indicators, horn etc.
- No problems of discharge in the batteries.
- It is a simple non – conventional energy process.
- This generating power can reduce the need of power.
- To generate the power no need of fuel input.
- It is used in vehicles.

4. CONCLUSION

From the study, 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 [7, 8, and 9]. 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 maximize potential 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.

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