

Electricity Generation from Exhaust Hot Gases

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Abstract— Now a days in automobile new innovating concept are being developed .In this project by using power from vehicle exhaust for generation electricity which can be store in battery for the later consumption .In this project we are demonstrating a concept of generating power in a moving vehicle by usage of turbines. Here we are placing a turbine in a path of exhaust in a silencer. An engine is also placed in chassis of vehicle. The turbine is connected to dynamo, which is used to generate power .Depending upon air flow turbine start to rotating, and then dynamo also start to rotate. A dynamo is a device which is used to convert the kinetic energy into electrical energy. The generator power is stored in battery. It can be stored in the battery after rectification. The rectified voltage can be inverted and can be used in various form of utilities. The battery power can be consumed for the user comfort. Air blowers generally use centrifugal force to propel air forward. Inside a centrifugal air blower is a wheel with small blades on the circumference and casing to direct the flow of air into the center of wheel and out towards the edge. The design of blade will affect how the air propelled and how efficient the air blower is. The setup use of silencer setup, turbine and DC generator. The energy obtain is store in battery.

Keywords: Turbine, Dynamo, Battery, Electrical Generator

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 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. 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.

II. PROBLEM STATEMENT

We know that exhaust system of vehicle consist of more amount of carbon. Exhaust gases of vehicle contains carbon dioxide, monoxide. As compare to this gases Nitrogen is produce this will produce pollution in the environment .As we know requirement of energy is more .For production of energy the cost is more .So it not possible to produce energy in low cost. Modern science and technology has been taken many positive steps for emission control. The Battery of electrical bike can be charge easily. They have less running cost and emission free. But they very less load carrying capacity and not suitable for long run.

III. OBJECTIVE

- 1) Creating an device for vehicle which will capable to convert kinetic energy into mechanical work and further mechanical work into electricity generation.
- 2) Exhaust gas coming out of silencer is eliminated by use of device
- 3) There is zero air pollution
- 4) The energy generated by the exhaust gases can be use to various applications
- 5) Making simple in construction to produce energy
- 6) To make vehicle engine more efficient

IV. LITERATURE SURVEY

- 1) Shubham V.Lasankute – In this project work the modification of engine for producing power using turbine. Nowadays in automobile
- 2) M.S.Triantafyllou,et.al - Gives proper idea about turbine flow and electricity generation
- 3) Shubham Shrivastav, et,a- Increase engine efficiency by utilizing exhaust gas system
- 4) Muhhamad Fairuz Remeli ,Balij sing - This will give idea about ho exhaust gases kinetic energy is produce
- 5) Mahidzal Dahari, Towhid - Essential solution for to overcome the economic and environmental problem with help of utilizing exhaust gases
- 6) Zirui wang, Ziwen Wang, Youfu Ma - Evaluation of the novel hot air recirculation process from exhaust heat recovery

A. Components:

The generation of electricity using the velocity of vehicle exhaust gases of following component to fulfill the requirement of complete operation of machine:

- 1) Dynamo
- 2) Turbine
- 3) Battery
- 4) Engine

B. Electromagnetic Generator Dynamo

A dynamo is an electrical generator that produces direct current with the use of a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter. Today, the simpler alternator dominates large scale power generation, for efficiency, reliability and cost reasons. A dynamo has the disadvantages of a mechanical commutator. Also, converting alternating to direct current using power rectification devices (vacuum tube or more recently solid state) is effective and usually economic.

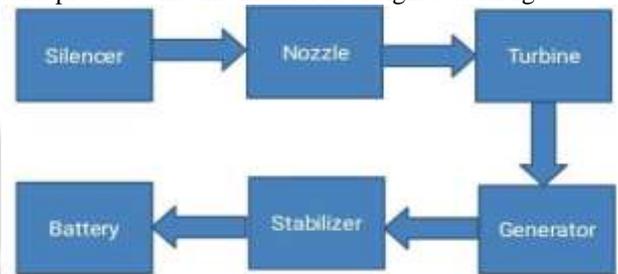
C. Alternator

Without a commutator, a dynamo becomes an alternator, which is a synchronous single fed generator. Alternators produce alternating current with a frequency that is based on the rotational speed of the rotor and the number of magnetic poles. Automotive alternators produce a varying frequency that changes with engine speed, which is then converted by a rectifier to DC. By comparison, alternators used to feed an electric power grid are generally operated at a speed very close to a specific frequency, for the benefit of AC devices that regulate their speed and performance based on grid

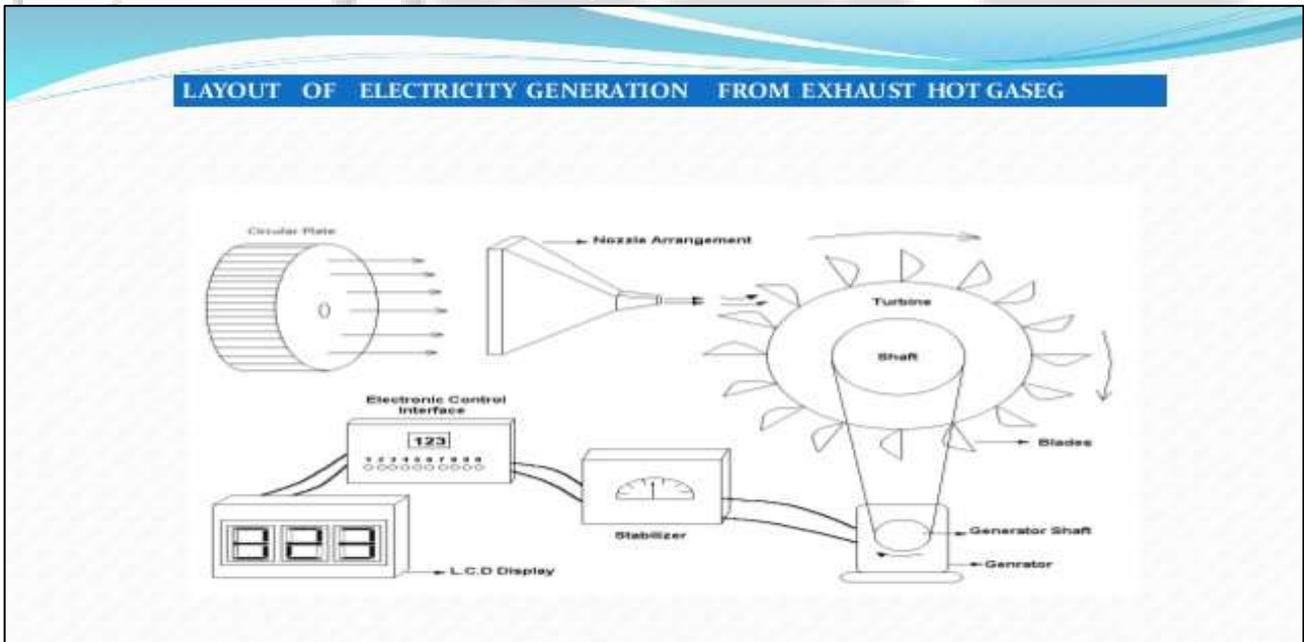
frequency. Some devices such as incandescent lamps and ballast-operated fluorescent lamps do not require a constant frequency, but synchronous motors such as in electric wall clocks do require a constant grid frequency.

D. Silencer

A muffler is a device for reducing the amount of noise emitted by the exhaust of an internal combustion engine. Mufflers are installed within the exhaust system of most internal combustion engines, although the muffler is not designed to serve any primary exhaust function. The muffler is engineered as an acoustic soundproofing device designed to reduce the loudness of the sound pressure created by the engine by way of Acoustic quieting. The majority of the sound pressure produced by the engine is emanated out of the vehicle using the same piping used by the silent exhaust gases absorbed by a series of passages and chambers lined with roving fiber glass resonating chambers harmonically tuned to cause destructive interference wherein opposite sound waves cancel each other out. An unavoidable side effect of muffler use is an increase of back pressure which decreases engine efficiency. This is because the engine exhaust must share the same complex exit pathway built inside the muffler as the sound pressure that the muffler is designed to mitigate.



Flowchart



Design of Equipment and drawing



Turbine

V. APPLICATIONS

Rechargeable batteries are used for automobile starters, portable consumer devices, light vehicles (such as motorized wheelchairs, golf carts, electric bicycles, and electric forklifts), tools, and uninterruptible power supplies. Emerging applications in hybrid electric vehicles and electric vehicles are driving the technology to reduce cost and weight and increase lifetime.

Traditional rechargeable batteries have to be charged before their first use; newer low self-discharge NiMH batteries hold their charge for many months, and are typically charged at the factory to about 70% of their rated capacity before shipping. Grid energy storage applications use rechargeable batteries for load leveling, where they store electric energy for use during peak load periods, and for renewable energy uses, such as storing power generated from photovoltaic arrays during the day to be used at night. By charging batteries during periods of low demand and returning energy to the grid during periods of high electrical demand, load-leveling helps eliminate the need for expensive peaking power plants and helps amortize the cost of generators over more hours of operation.

VI. ADVANTAGES

- 1) This system helps in energy generation through silencer
- 2) The electricity can be use in electric equipment in the vehicle and to charge the Battery
- 3) No need of fuel input
- 4) Low power consumption
- 5) Easy to operate and simple construction

VII. DISADVANTAGES

- 1) Some modification done on silencer
- 2) The system will require periodic monitoring
- 3) At heavy load less performance
- 4) Operator device status not known

VIII. FUTURE SCOPE

Power Generation Using Exhaust Gases is mainly intended to design a silencer based energy generation system based inverter. Air blowers generally use centrifugal force to propel

air forward. Inside a centrifugal air blower is a wheel with small blades on the circumference and a casing to direct the flow of air into the center of the wheel and out toward the edge. The design of the blades will affect how the air is propelled and how efficient the air blower is. The energy obtained is stored to a battery.

This system is ecofriendly, it can reduce the pollution produce by the gases coming out from the exhaust. This system produce energy which is not compare with electrical vehicles.

IX. 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. 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 impressive 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 task which has also been provided.

Power Generation Using Exhaust Gases was designed such that which makes use of silencer for power generation and also for rural electrification. The system was also used to control the devices.

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit.

Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

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