

Power Generation Using Two-Wheeler Silencer

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ABSTRACT

There is an ever-increasing demand for energy in the present age and most conventional sources of energy like coal, oil and natural gas used today are non-replenish able. This experimentation model, power generation using vehicle silencer is a simple and innovative method of non-conventional energy generation. Electrical power is generated using the waste gases emitted by the vehicle silencer, that are otherwise emitted into the atmosphere using a simple mechanism such as DC generator and silencer. The power thus generated may be stored in a re-chargeable battery and can be used for other purposes. This method can be implemented on all two-wheelers and four-wheelers. This model is simple and very cost effective.

Keywords: Vehicle Silencer, DC Generator, Re-chargeable battery, Turbine

I. INTRODUCTION

Mankind has needed and used energy at an increasing rate for sustenance and well-being ever since they began to inhabit the earth a few million years ago. Primitive man's energy requirements have been confined to deriving energy to sustain his physical self, in the form of food. As fire was discovered, an important form of energy came into existence and man continued to exploit the power of fire to develop and sustain himself and communities. He began to make use of wood and other naturally available sources to generate fire and energy to meet the needs of cooking as well as for keeping themselves warm. With the passage of time, as man started to cultivate land and began to live in larger communities, their energy requirements have been rapidly increasing and power or energy generation has been a defining factor for successful civilizations.

But, as civilizations began to travel and widen horizons, the demand for energy began to increase exponentially. Conventionally, wood, coal, petroleum and natural gas was used for meeting energy requirements. These sources, while contributing to rapid industrial development, could be exhausted and are non-replenish able. Hence, these fuels are also called fossil fuels. However, solar energy, wind power and the force of falling water have been other sources of energy and to

that extent, the sources have been from a renewable source.

With increasing population, exponential growth of industry and rapid urbanization, the demand for energy has increased at an alarming rate. Conventional energy sources, mostly non-replenish able, are fast getting exhausted which is a matter of grave concern. Man's dependency on energy is inevitable and the only viable alternative is to look for non-conventional methods of producing energy. In this project, a serious attempt is made to convert the energy available through the exhaust gases of the two-wheeler into electric energy, which is an innovative and useful method of productively utilizing waste gases.

This setup requires no additional input fuel to generate the electrical power because the energy of the exhaust gases is utilized as input energy without letting it out as waste. The output electrical energy thus produced can be stored in a rechargeable battery and the energy can be used for various purposes like powering the headlight, indicator, parking lamps of the two-wheeler.

II. EXPERIMENTATION

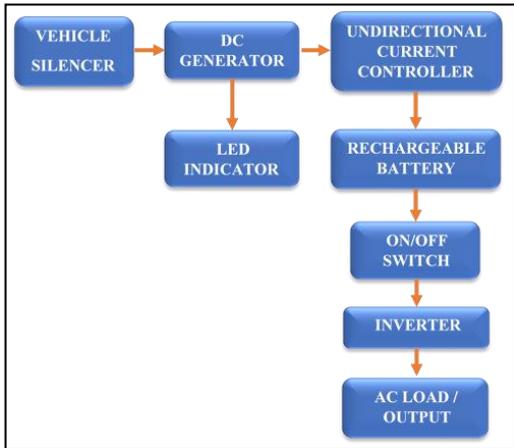
- ✓ The turbine is fixed to the shaft of the generator. Aluminium is the preferred material for the turbine.

because of its high heat conductivity. This aids faster cooling and less weight

- ✓ The fixture is enclosed within an aluminium frame. Turbine is placed at the exit of the silencer. The turbine blades are placed in a position where the exhaust gases from the silencer hits the blades directly
- ✓ As the turbine spins along the shaft, the generator produces electricity. The ideal capacity of the generator, considering its size and weight, would be 12V
- ✓ The produced current is passed through a regulator, which would be stored in a DC rechargeable battery of matching capacity (12V, 1.3AH)
- ✓ Inverter is used to convert the DC stored in the battery to required AC output i.e. 230 v
- ✓ If necessary transformer is used to regulate the voltage to meet the demand of the output

The entire experimentation model is to be housed on the silencer.

BLOCK DIAGRAM OF THE SEQUENCE OF ENERGY CONVERSION



EXPERIMENTATION MODEL



SPECIFICATIONS OF MATERIALS USED

A. Turbine

- Material used: Aluminium
- Diameter: 100mm
- Width: 15mm
- Thickness: 1mm

B. Voltage Regulator

- LED Indicator
- Resistor(330Ω)
- Bug Strips
- Diode(1N4007)

C. Battery

- Type: Rechargeable
- Capacity:12V
- Charging Time: 5 -6 hr.
- Discharge Time: 14hrs

D. Inverter

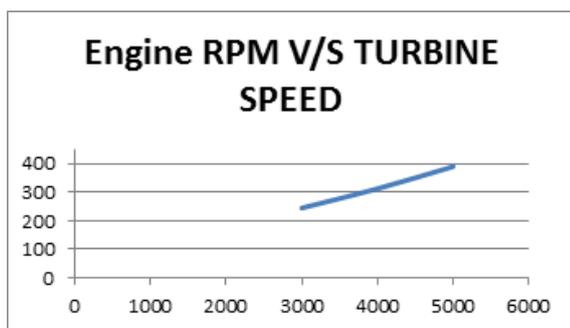
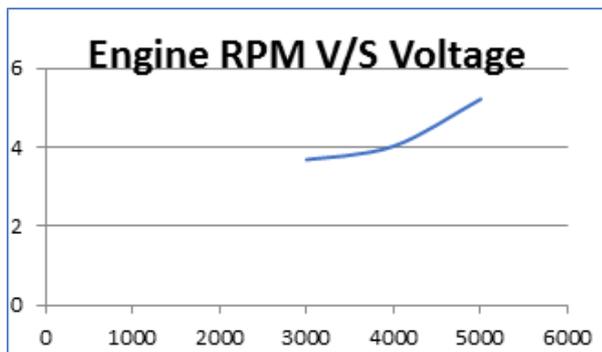
- Input: 12V (DC)
- Output: 230V (AC)

E. Output

- Voltage: 230V
- Wattage: 10W-20W

III. RESULTS AND OBSERVATIONS

S. no	Engine speed (rpm)	Turbine speed (rpm)	Turbine velocity (m/s)	Voltage (V)	Turbine Power (W)
1	3000	245	1.28	3.69	7.91
2	4000	313	1.64	4.03	17.88
3	5000	390	2.04	5.22	32.02



The following results were obtained by following the above method of producing power

1. For an engine speed of 3000 rpm, 4000 rpm & 5000 rpm, the turbine speed obtained was 245 rpm, 313 rpm, 390 rpm respectively.
2. The power obtained at the turbine from calculations was 7.91W, 17.88W, & 32.02W respectively.
3. This power obtained was passed through a regulator, which was stored in a DC rechargeable battery of capacity (12V, 1.3AH).
4. The power thus stored was successfully used for powering up the headlight, indicators & parking lights of the Two-wheeler.

IV. CONCLUSION

The experimentation model of power generation using two-wheeler silencer by converting the energy of the exhaust gases of the two-wheeler into electric energy has been designed, tested and successfully implemented on a two-wheeler. This method of energy conversion was found to be easy and cost-effective.

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