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Power Generation form Ac Exhaust

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ABSTRACT

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 to generate power. The turbine is placed in the exhaust path of the AC exhaust. The generated power differs, depending upon the airflow in the exhaust path. And for increases the velocity of the flow we design the venture duct. The dynamo starts to rotate using turbine and converts kinetic energy into electrical energy. The battery stores the generated power. The voltage has to be inverted, to be used in the equipment's. We can use the stored power depending upon our comfort.

Key word: Turbine, Dynamo, Generator, Battery, Venture Duct, AC exhaust.

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I. INTRODUCTION

The aim is to develop a system using silencer for rural electrification. The system controls the whole setup. Air blowers the generally use centrifugal force to propel air forward. Inside a centrifugal air blower is wheel with small blades on the circumference and a casing to direct the flow of air into the centre of the wheel and out toward the edge. The design of the blade will affect how the air is propelled and how efficient the air blower is. The project makes use of a Silencer setup, turbine and DC Generator. The energy obtained is stored to a battery. The battery supply is fed to pulse generator and in turn to a MOSFET which is capable of generating ON/OFF pulses of different frequency. This is fed to a step up transformer to generate a low voltage AC. This AC is fed to electrical appliance. The study "Power Generation Using Exhaust Gases" can be done using MOSFET, Mono stable multi vibration, DC motor we can generate voltage with inverter using energy through silencer The paper explain the implementation of "Power Generation Using Exhaust Gases ".

II. LITERATURE SURVEY

1. Dr.S.V.Rode1, Ganesh Damdhar1, Chinmay Gadhikar1, Vipul Dhumale1, Mandar Deshpande1, Tejas Ratnaparkhi1 "ELECTRICITY GENERATION USING ROOFTOP VENTILATOR"International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 5, Issue 4, April 2016

In this Project, after the objective and introduction of the rooftop ventilator and DC motors which we have used, one typical generator is practically design successfully. Afterwards the generator elements analysis, some of parameters of generator was calculated, after the electricity generation using rooftop ventilator is experimentally calculated. When the airs flow of heat air (Hot Air) present under the roof, it will help to rotate or turns the rooftop ventilator. When roof ventilator moves, motors get operated and hence electricity gets generated. Based on the practical experiments the results of the output voltage is at 18V with 70mA (series connection) and 4V with 270mA (parallel connection).The output power achieved at 1.26Watt.For the above results after fixing the ventilator on roof of buildings, it able to charge12V battery. And this prototype is relatively small and no more expensive. After fabricating and testing of this prototype the system has been practically applicable.

2. ARCHIT PATNAIK, S.M.ALI "INDUSTRIAL EXHAUST FANS AS SOURCE OF POWER "International Journal of Electrical, Electronics and Data Communication, ISSN: 2320-2084 Volume-1, Issue-9, Nov-2013

The energy demand of the world has become unbridled in the past years and is augmenting by leaps and bounds. With increase in energy demand, the conventional sources

of energy(fossil fuels, nuclear) are encumbered with monumental pressure and hence, the unremitting use of it, leads to dearth of fossil fuels. This has provoked an extensive research into the area of non-conventional energy sources like hydro, wind, thermal energy, etc. Out of these, the wind energy is being discussed in this paper. Wind energy has a lot of potential and advantages but its utilization is restricted due to its irregularity, geographical conditions and its availability. Our primary goal is to suggest an idea that can surmount these conundrums and utilize the wind energy to its maximum extent. This paper deals with the wind energy that can be derived from the wasted wind energy from industrial exhaust fans. The wind force from an exhaust fan can drive a small windmill and the energy generated from it will be stored in energy storage unit. The power stored in the battery can be transmuted into ac with the help of an inverter and then it can be supplied to the load and hence, this wasted power from exhaust fan can be utilized to meet the growing energy demand.

3. Venkatesh .J1, Karthik Kumar. R2, Karthikeyan .G3, Kavin .R4, Keerthi raja S.V.G5 "Generating Electricity by Using Exhaust Gas" ISSN XXXX XXXX © 2018 IJESC

This paper explains how we can generate electricity using exhaust gas. The turbine use waste exhaust gas and produce electricity. We use silencer for both power generation and rural electrification. The turbine produces electricity and it is stored using battery. Both turbine and battery are carefully placed in their respective places. The stored electricity can be used for our specific purposes. Thus the project is successfully finished and implemented.

4.Akshay.S.Zagade, Rahul.P.Sadagar, Sonali.J. Naiknaware Pravin S. Phutane4 "ELECTRIC POWER GENERATION BY USING ROOF TOP TURBINE VANTILATOR" International Journal of Current Trends in Engineering & Research (IJCTER) e-ISSN 2455–1392 Volume 2 Issue 4, April 2016

Wind energy is one types of renewable energy and it does not cause pollution. Therefore, presently, there is the technological development of applying wind energy for the electricity generation. Wind energy is used to replace fossil energy such as oil and coal, causing environmental pollution. This paper presents the electric power generation by using Rooftop Turbine Ventilator (R.T.V).Various methods have been presented previously [1-4] like Axial Flux Permanent Magnet (AFPM),Permanent Magnet Synchronous Generator(PMSG),AC-Generator and AC Synchronous Generator which are driven by Rooftop Turbine Ventilator (R.T.V). This paper proposed the roof ventilator system equipped with a small AC electric generator. A ac generator was installed in 24-inch roof ventilator and carry around rotation of the generator by belt and pulley mechanism to the rotation axis of roof ventilator. The results of the study were found that roof ventilator would begin to generate a voltage of 10 - 12 volt at wind speed of 285-300rpm.

5. Vaibhav Lavhale†, Ashwin Nair†, Shubham Pawar†, Ritesh Mahajan‡ "Generation of Electric Power using Turbo Ventilator" International Journal of Current Engineering and Technology E-ISSN 2277 – 4106, P-ISSN 2347 – 5161 ©2016

In this world of depleting resources, renewable energy plays an important role. Wind energy is one of the major renewable energy sources. In this paper we intend to study and review various research papers on generating electricity from wind energy using turbo ventilators. This method is economical and feasible by applying various electrical and mechanical techniques. In this paper we also intend to improve the efficiency of the system by using various materials for the fabrication of turbo ventilators. We have reviewed the papers on this topic published by various authors. We have compared their designs and concluded into an efficient model by combining all the designs into one.

III. WORKING PROCESS

- It will be installed in Exhaust system. It will be a mechanism of axial high pressure turbine and backward curved fan blades with a electrical generator.
- The air will strike on high pressure reaction turbine and the pressure energy will convert into mechanical energy.
- This shaft will also be rotate fan blade that will increase the discharge rate.
- The improvement in discharge rate will increase the engine power because high pressure discharge means low pressure drop in exhaust system. If the pressure drop will Be low the power will increase of the engine.
- The electrical generator will rotated by the same shaft and the electricity will be produced by Generator.

Design calculation

Consideration:

Capacity (kW) x Capacity Factor x 8760 hrs/yr. = Estimated annual energy production (kWhr/yr)

Large turbines located at good wind sites can achieve capacity factors of 40% or more. Small wind turbines located at poor sites can have capacity factors of 20% or less. Remember that the rated power is a property of the wind turbine, while the capacity factor is a property of the location of the wind turbine (a measure of the available wind energy at this location). An example calculation of the estimated annual energy production of a wind turbine with rated capacity of 10 kW located on a site with a capacity factor of 25% is as follows:

10 kW Capacity x 0.25
Capacity Factor x 8,760 hrs/yr
= 21,900 kWhr/year

RESULT:

In this project, energy generation is directly proportional to speed of system. As the speed of system increases system

voltage also increases. Voltage is the parameter that is dependent of speed.

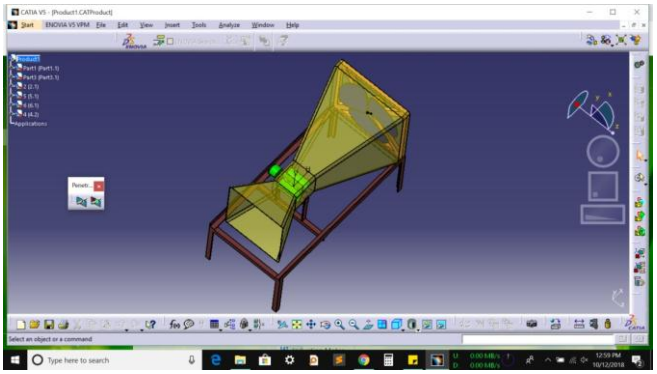
Speed (rpm)/ Voltage (V)

1- 60 /1.87.
2- 80 /2.1
3- 100/ 2.4
4- 200/4.4
5- 300 /4.8

Measurements of operating speed and obtained voltage values.

IV. RESULT AND DISCUSION

Catia Design:



MODEL CALCULATION:

ON BATTERY

Measuring device: Tachometer

Input :
Exhaust fan (rpm) =500rpm
Torque, T1 = 2 Nm

Output :
Exhaust fan (rpm) =300 rpm
Exhaust fan = Power generation
Torque = 2 Nm

$$velocity = \frac{2\,\pi N}{60}$$

i. Velocity of input fan:

$$velocity = \frac{2\,\pi N1}{60}$$
$$velocity = \frac{2\,\pi * 500}{60}$$
$$velocity = 52.35\ m/s$$

ii. Power consumption:

$$P = V*T$$
$$P = \frac{2\,\pi N1T1}{60}$$
P= 104.7 W

iii. Velocity of power generation fan:

$$velocity = \frac{2\,\pi N2}{60}$$
$$velocity = \frac{2\,\pi * 300}{60}$$
$$velocity = 31.41\ m/s$$

iv. power generation:

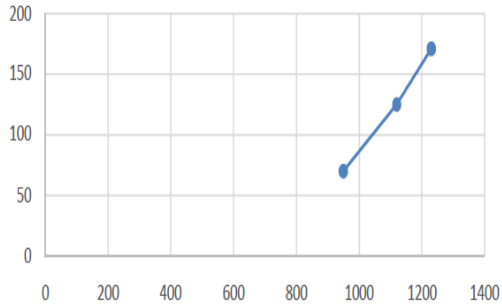
$$P = V*T$$
$$P = \frac{2\,\pi N2T2}{60}$$
P= 62.83W

v. Total power generation

P1 - P2= 104.7-62.83
=41.87 W

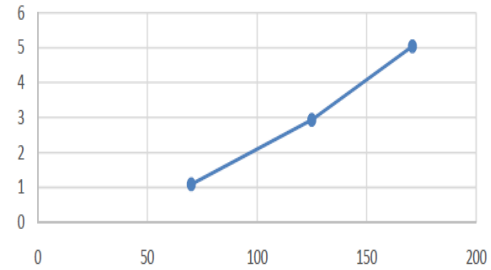
Graphs

Turbine speed v/s Exhaust fan speed



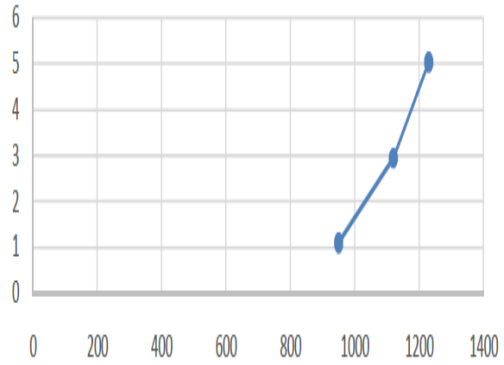
(Turbine speed in rpm and exhaust fan speed in rpm)

Power generated v/s turbine speed



Power generated (Watts) v/s turbine speed (rpm)

Power generated v/s Exhaust fan speed



Power generated (Watts) v/s Engine speed (rpm)

V. CONCLUSION

It is observed that the wind from the exhaust can work as a very good source of electricity. The wind speed is sometimes more than the natural air speed and hence can generate even more electrical power than what is produced from natural air. As it is discussed earlier that wind from exhaust fan may get dispersed after some time, there should be some kind of directors/connectors that will guide the wind from the exhaust fan directly to wind turbines without getting the average speed of the wind decreased as the velocity of the wind is most important factor in the system.

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