IJIREEICE

ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING
Vol. 4, Issue 4, April 2016

Eco Friendly Power Generation using Turbo Ventilator for Industrial Lightning

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Abstract: This paper attempts to explain an innovative method of generating free electricity for general use, by the free rotation of Turbo Ventilator. This is achieved by coupling a gear mechanism to the shaft of turbo ventilator which drives a dynamo. By coupling more such dynamos to the gear system and by feeding the outputs of all these dynamos systematically to a line we can feed all the energy produced to a battery. The dc dynamos are so coupled that it does not affect the free rotation of Turbo Ventilator. This paper deals with the design and construction of ecofriendly power generation using turbo ventilator.

Keywords: Turbo Ventilator, Gear Coupled Ventilator, System Lightening, Power Generation.

I. INTRODUCTION

Industries are high power consumers, consume most of the generated electricity and are functional all throughout. All industries have a big plant for its production and a lot of power used in the plant for 24x7. The lighting requirements are met by the energy from the supply mains. In this proposed system the production plant itself produce electricity for lighting system and no fuels are used. The exhaust fans or the Turbo ventilators are powered by the wind to create effective ventilation for different industries. This product works on wind assisted ventilation. Turbo ventilators are round metal vents with fins in them. Even just a little bit of wind can be just enough for the turbo ventilator to rotate. The mechanics involved in the air movement is very simple. The hot air inside the shed tends to rise up. When the turbines rotate, they suck the warm air out through the vent, thereby, bringing out a drop in temperature in the shed and allow supply of fresh air through doors and windows. The faster the wind, the faster the turbine will rotate and exhaust the heat, smoke, fumes, humidity, etc. They are not powered by electricity, and are located such that they exhaust the hottest air first, they do not cause any harm what so ever to the environment. They tend to save a lot of money because there is no operating cost plus they are maintenance free.

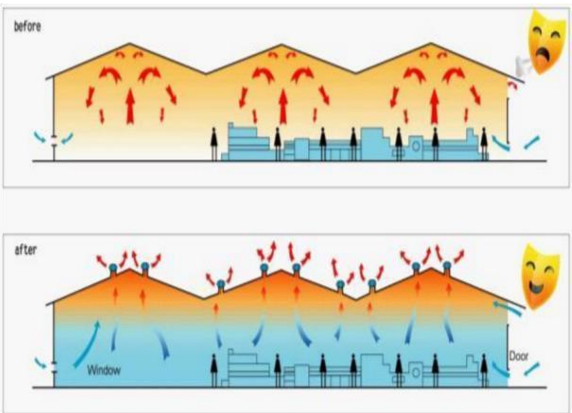

Fig 1: Heat reduction through ventilator

In this proposed system we couple this free running turbo ventilator to generator thereby producing electricity and using this for lighting the industry. Since there are very few regions in the world that experience windy conditions throughout a year, this method is not restricted to few chosen regions. Here the ventilator rotates not only with the wind energy but also the the heat that produced inside the industry. Turbo ventilator sucks the heat and it transferred to outside by its rotation.

Both energy is consumed here for the rotation. The same concept is used in this project, but here the room temperature and outside wind is used. So the continuous rotation of ventilator can be achieved of energy in many countries of the world. The wind from any direction is sufficient to rotate the ventilator in clockwise direction[4].This wind if tapped efficiently over a duration of time can lead to production of substantial amount of power. And generate free electricity for general use through, wind energy the heat sucks. The ventilator blade is so designed that the wind from any direction and a small amount of wind is only needed for generation of optimum electricity.

II. METHEDOLOGY

Wind turbine ventilators are exactly as the name implies, they are a ventilator that is powered by the wind to create effective ventilation for different industries. This product works with the energy which absorbed from the wind. Turbine ventilators are round metal vents with fins in them. A small velocity wind can be just enough for the turbo ventilator to rotate. The faster the wind, the faster the turbine will rotate and exhaust the heat, smoke, fumes, humidity etc. The suction of hot air from the industry is simple. The hot air inside the shed tends to rise up. When the turbines rotate, they suck the warm air out through the vent. The size, number and installation all depend on different factors which include wind velocity, temperature differential, environment conditions, and the size of the building. Turbine vents have been vastly used for many

DOI 10.17148/IJIREEICE.2016.4479

years in residential, agriculture, industrial buildings and warehouses. When it comes to roof top ventilators, they have several advantages which include that they do not need to be powered by electricity, they are located such that they exhaust the hottest air first, they do not cause any harm what so ever to the environment, they tend to save a lot of money because there is no operating cost plus they are maintenance free. There are different sizes of wind turbo ventilators that range from 14” to 36”. Due to the fact that they are located at the highest point of the roof, they are able to give off optimum ventilation. They also have to be strong and anticorrosive. As they are installed on the top of the roof and would come in contact with rain and birds the ventilators are made to be rainwater and bird proof. The ventilators are also designed in a way that prevents leakage and down draft into the building allowing air entry from the side openings. Ultimately wind turbine ventilators are pleasant looking, and tend to enhance the architectural looks of the building. The primary feature of the installation process is to provide the small turbines maximum chances of harnessing electricity by installing them in such a manner that they are exposed to the most suitable windy conditions around the turbo ventilator shaft. The motors are installed on the shaft that the free rotation and starting of ventilator does not affect. This concept requires complete analysis of the motor friction and the ventilator study.

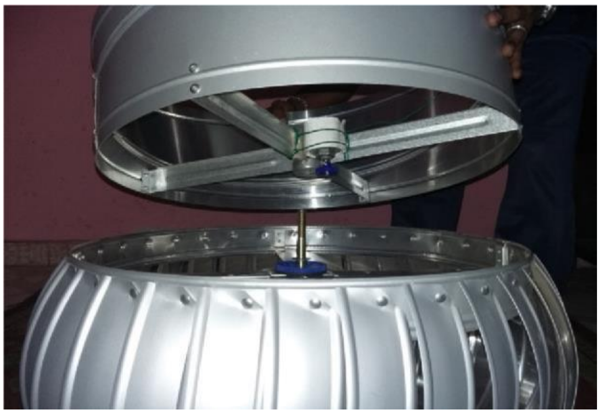

Fig. 2: Gear coupled ventilator

The ventilator are placed on the roof that the maintaining and error correction is little bit difficult. It should start without any friction. The motor gear coupling system should be so connected that the alignment and free movement does not interfere. Here the direction of rotation of fan movement is not depend upon the direction of wind. The wind from any direction can start and rotate the turbo ventilator only in clockwise direction. So the polarity changing of dynamo will not happens.

III. THE PROPOSED SYSTEM DESIGN

The turbo ventilators are placed on the roof of building. The windswept volume of each ventilator is different according to the geographical features of that area. The dimension of ventilator plays a major role for the positions of different type of dynamos. The rotating speed of the turbo ventilator will be 60 rpm for average velocity of wind. Here we need a gear system for coupling and we provide a gear ratio of 1: 2.5. The gear ratio can be increased by providing big size gear to the shaft. The ventilators designed by different industries are different in structure. The internal design of the systems is different, so that the gear should couple the shaft without affecting the heat sucking fan and the bearing joint. The driving gear and the small gear that are coupled is so selected that the maximum utilization of free energy should occur. At the same time it should not affect the main working of ventilator.

Two dynamos are connected on the shaft for experiment. A single dynamo is capable of generating 6-7V, 0.5A for an average velocity wind and 5-6V, 0.3A for a low velocity wind. Project emphasizes on cost effectiveness, simplest and cheapest means of storage such as DC rechargeable battery is used. Charging time will be relatively long; if the current or keeping cost as well as efficiency in mind any battery voltage is high then the charging time will be short. Around the range of 12V, 0.6A will fit the requirement.

Fig 3: Proposed system lightening

Battery of basically any specification can be used, but keeping cost as well as efficiency in mind any battery around the range of (12V1.2A) will fit the requirements. To charge any battery, it must be supplied with an initial trigger voltage slightly higher than its specification and a current of at least 10 percentage of its initial specified value. Therefore for the (12V, 1.2A) battery used in this project the minimum trigger requirements to charge the battery are roughly (15V) and (200mA). These minimums can be effectively met by developing an integrated parallel and series network of all the dynamo outputs [1]. Firstly to achieve the minimum voltage requirements, 2 dynamos outputs are connected in series network, hence considering an average 5 volts as the cost effectiveness, simplest and cheapest means of the dynamo shaft is provided with an additional small gearing system that can increase the input speed of the dynamo. Here the system consists of a small additional gear coupling of 1000:1500 type. Providing 12V dynamos for the generation of electricity here. The booster is to be provided for voltage rising. LM2577 DC to DC booster circuit is used and 12V Zener diode as voltage regulator. The rotational motion that acquired from the wind is provided to the gearing system and then it transferred to the dynamo with an increased speed. The system generates 6-7 volt and then it boosted by dc to dc booster and then stored to a battery by a trickle charging circuit. The system provides an output of 15 volt with .5A.

IV. RESEARCH ANALYSIS

Research involved measurements for voltage and current produced by a single dynamo due to the motion of single turbo ventilator [1]. After a detailed study of the readings obtained from over frequent velocity of wind vs power generation, it came to a conclusion that on an average a single turbine is capable of generating (67Volts), (1.8 2.5mA) for a high velocity range wind area, and (3-4V), (0.51.5 mA) for a low velocity wind. There can produce 15 volt from a single Turbo ventilator and for a small industry there have minimum of more than 20 Turbo ventilators for reducing heat. The energy thus produced from have to be stored efficiently for future use. Since this project emphasizes on storage such as DC rechargeable battery is used to store the electricity produced. The time taken to recharge any battery is dependent on the voltage and current applied. If the recharge current or voltage is too low, then the output of each respective and the resultant summation of all the respective outputs with providing a boost age the output will be of (15V). The current in all these series network of 2 turbines each will be the original current which is an average of .5mA.For an industry there will be more than 10 Turbo ventilators. To achieve the minimum current requirements, all these series networks of 2 dynamos and is treated as 1 ventilator. Each are now connected in parallel to each other so that currents (200mA) in each individual series set gets added to each other. All these complex networks of connections are then fed to a centralized storage or to individual storage. Though the number looks staggering, This system can be easily applied to an industry without affecting the heat suction of ventilator. The usage of Turbo ventilators are increased rapidly in market within a few years. So this system has future that the hybrid usage of single system is happened here.

V. RESULT

After a rigorous survey and measurements. Our research came to a conclusion that on an average single ventilator is capable of generating 5-7V for an average high velocity wind and 3- 4V for a low velocity wind. The boosted output can produce a maximum of 15volt from a single system. In order to charge the battery we have already seen that we require around 2 dynamos. These turbines required to charge the battery can be easily installed within this ventilator structure and can produce a single system having heat sucking system and voltage output port. Because of the intermittent nature of the charging of the battery depending on the frequencies of wind that obtained, the battery will take a prolonged amount of time to get completely charged which can be approximately taken to be 5hrs.

VI. EFFICENCY AND APPLICATION

In this project the availability of wind energy for generation of electricity through small turbines is a key factor which decides the efficiency of the entire project. It is important that the best suitable and compatible environments be chosen, especially if the research is governed by external factors. Here, the ventilator does not need a much more velocity of air, it rotates not only [2]the wind from outside environment but also the heated air that from inside the industry. This system will provide positive results when more frequency of air circulation and more number of ventilators are occurred. The power generation and efficiency of the system depends upon the air from outside and heat from inside. This project has wide range of application. It not limited to metropolitan city. The project can also use in rural area. This system provides a hybrid use with a low installation cost. By installing only one ventilator in here can provide a constant single light without any running cost. Here the intermittent nature of the charging of battery depending on the frequencies of air, the battery will take a prolonged time for its charging. The application of this project can be further extended, there can provide additional motor that can use for rotating the ventilator if the velocity of air is not sufficient .There can provide a reverse process if the heat inside the industry is high.

VII.CONCLUSION

Free accessible energy can be created with the help of this work, which can cater to the growing demands of energy all around the world. The net approximate monthly power of 200kW which can be supplied by the battery can be used to light many powerless homes in the long run. Thus an alternate means of renewable energy is provided by this project, which will not only help solve the energy problems, but will also to an extent reduce the load on major sources of energy production like thermal power plants and nuclear power plants, which generally consume much of the treasured depleting resources. Therefore positive ramifications of this entire research are manifold and will tend to alleviate the major energy crisis problem faced all over the world.

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