PRODUCING ELECTRICAL ENERGY BY USING WASTAGE WIND ENERGY FROM EXHAUST FANS OF INDUSTRIES

Prof.(Ms) Shital Yende[1], Priyanka Gaurkhede[2], Rahul Dekate[3], Ashish Polke[4]
Tushar V. Diyewar, Suraj B. Patil , Pratigya C. kolhatakar, Kalpana R. Pudke,

[1234]*Assistant Professor, Department of Electrical Engineering. Suryodaya College of Engg. & Technology, Nagpur, Maharashtra, India, 81497 32269*

[5678] *UG Student, Department of Electrical Engineering. Suryodaya College of Engg. & Technology, Nagpur, Maharashtra, India,*

1. Abstract

Crisis of an electric power may be a common phenomenon in a developing country. Day by day it's become serious issue thanks to various factors, such as increasing demand, lower production capacity and transmission losses, etc. As a developing country. Many industries are running on in our surrounding & also so many are being installed every day. We can see numerous exhaust fans are getting used to stay the working environment at a moderate temperature of an industry. These fans circulate air from inside to outside. From outside we will consider it as a high velocity wind source. In this paper, we will show a process to use this wastage energy source. In this process, wind from all exhaust fans are going to be collected and driven through one tunnel which cn provide a huge wind flow to the wind turbine. And then wind turbine will convert it into effective electrical energy. cWe will measure the velocity by using anemometer. This paper also consist of analyzed data of the wind velocity of the different industries of Bangladesh. We also analyze these product electricity are weather profitable ar not from the existing system. Thus we can utilize the wastage wind energy from the exhaust fans of the industries and producing electricity we will reduce the load of national grid.

Keywords: Exhaust fan, wind energy, wind turbine, electrical energy, duct system.

2. Introduction

The interest in renewable energy has been revived over last few years, especially after global awareness regarding the ill effect of fossil fuel burning. The use of renewable energy technology to satisfy the energy demands has been steadily increasing for the past few years. For this purpose we have worked on a different idea. We considered exhaust fans using in industries as a high velocity & high velocity wind, we can rotate a turbine to produce a reasonable amount of electrical energy. This paper will show you a statistical analysis of velocity of exhaust fans, mathematical analysis, and model design with calculation, rate of production & economic analysis etc.

In this paper, the authors really like to present a completely unique application of wind turbine to recover wasted energy so as to market the the vision of energy saving and emission reducing. Thus, an innovative idea on hamessing unnatural wind resources for electrical power generation is introduced by installing an exhaust air energy recovery system above an exhaust air system (cooling tower). The feasibility of implementing the proposed system is investigated by conducting a laboratory test on a scaled model of a cooling tower. An on-site clean energy generation without causing negative effects on the performance of the original exhaust air system.

3. Exhaust air system-

EXHAUST FAN

Exhaust Fan are heat removal devices used to transfer waste heat to the atmosphere; large office, buildings and Industries premises typically install one or more exhaust fans for building ventilation system. This type of Exhaust fans relies on power-driven fans to draw or force the air through the blades. Most air-conditioning systems and industrial processes generate heat that has got to be removed and dissipated. Water is usually used as a heat transfer medium to get rid of heat from refrigerant condensers or process heat exchangers.

Cooling towers are heat removal devices wants to transfer waste heat to the atmosphere; large office buildings, hospitals and schools typically install one or more cooling towers for building ventilation system.

The exhaust fan in big industries can play a seminal role in producing electricity which may surmount the energy demand.

Table: the Details of the fan -

Variables	**Measured Value**	**Variables**	**Measured Value**
K.W	2.2	Fan Diameter	900mm
H.P	3	Fan Air Flow	15.38m/s
Voltage	415V	U phase Current	5.5A
Current	5.1A	V phase Current	5.5A
P.P.M	935	W phase Current	5.4A

4. Block Diagram:

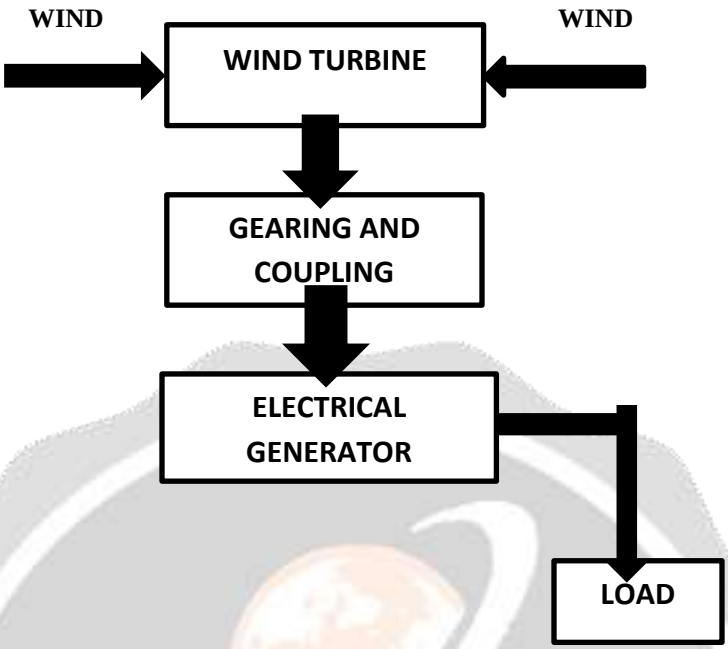
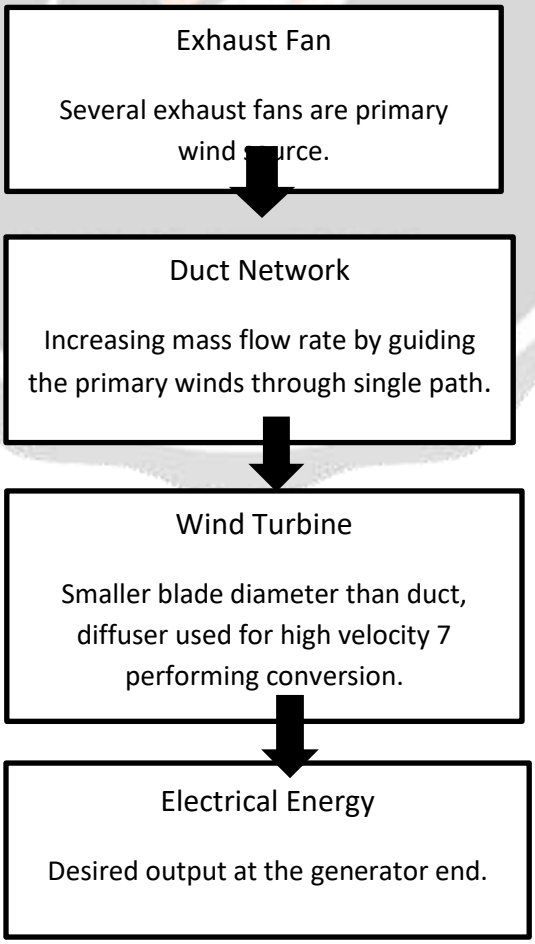


Fig : Block Diagram of Wind Power Generation.

5. Flow chart :-



6. Design Description

1. **Duct Design –**
   As far as concern is to carry out the wind from exhaust fan to turbine, proper duct network is very essential. To minimize the losses duct design consideration need to maintain. Such as using round duct, avoiding sharp edge (Tee, elbow), noise and fire isolation, abundant reinforced to stop collapsing at any static pressure and most significantly duct length must be as shortage as possible with minimum numbers of fittings in order to economize on energy cost material and 4space.

2. **Diffuser Design-**
   With a simple momentum theory, developed along the lines of , momentum theo258ry for bare wind turbines, it was shown that power augmentation is proportional to the 00mass flow rate generated at the nozzle of the diffuser augmented wind turbines (DAWT). Such mass flow augmentation can be achieved through two basic principles: increase in the diffuser exit to inlet area ratio and /or by decreasing the negative back presser at the exit.

7. Wind Energy

Today, wind energy is that the most mature of the renewable energy technologies aside from hydro. This wind technology is far safer than other renewable energy source. In the wind mill a wind turbine is employed where wind turbines - capture the air flow by converting it into a rotational movement, which subsequently drives a standard generator for electricity

- **Wind Energy Equation**

When air mass is flowing through an area A with speed v, the power of that air movement at time t is given by:
Where ρ is the density of air, which is around 1.22kg/m³. The energy (kWh) is the product of power and time:

$$E = PT = \frac{1}{2}\rho A\,\Delta t \sum_{i=1}^{N} v_i^{\,3}$$

To take account of wind fluctuations, the energy from an air flow over a time period P is formed from the sum of wind speeds of small time intervals. Often, average hourly wind speeds are measured, thus providing 24 time buckets per day.

While the air density is more or less constant, the two parameters to observe out for are the wind swept area A and therefor the wind speed v. The latter is even more critical, because it is cubed. A location with double average wind speed has 8 times the facility for an equivalent area.

So, we will see from the info that velocity is that the most vital factor of wind energy equation. Higher velocity gives us higher power.

8. CONCLUSION

Till now, this paper is a theoretical idea to install a windmill in an industry. But we may have an excellent success from this assumption. Though the output power is not quite enough in quantity because of some factor but step by step improvement can make a dynamic change in energy resources. Our future work

might be focused on how could the speed be increased as we see that the power production is essentially depend upon the speed of air. The wasted wind from exhaust fan can be efficaciously utilized to generate power if proper implementations are done.

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