

DESIGN OF TWIN POWER BELT CONVEYOR SYSTEM FOR SMALL SCALE INDUSTRIES BY USING RENEWABLE ENERGY SOURCES.

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Abstract - Wind and solar power is a renewable energy that can be applied to a broad range of uses, such as water heating, household air conditioning and electricity generation, since wind and solar are clean energy without any damage to the atmosphere. Wind and solar power is one of the forms of renewable energy and does not cause pollution. As a result, the technological development of applying wind and solar energy for the electricity generation and by combining this two energy sources together to run a conveyor belt driven by pneumatic air motor is the main concept of the paper in this system electricity is generated by means of two sources one is roof top ventilator wind turbine which rotates with help of the wind and another one is a series of solar arrays this systems are the two sources of energy this energies are stored in the batteries and further combined in power switching board .As a result this energy is used to run the air compressor which drives the air motor to run the conveyor belt

Key Words: Roof top wind turbine, solar arrays, air compressor, air motor

1. INTRODUCTION

The solar ,wind, water, ocean waves can play important role in production of electricity But the some problems arises in the development of energy power generation like, high construction cost, difficulties in maintenance, space for plant installation and power distribution. Wind energy is a renewable energy which can be adapted for many uses such as water Pumping, domestic air ventilation, and electricity generation because wind is clean energy without any pollution to environment. All countries have becomes interested in the renewable energy sources. The solar ,wind, water, ocean waves can play important role in production of electricity .But the some problems arises in the development of energy power generation like, high construction cost, difficulties in maintenance, space for plant installation and power distribution. There are many technology developments to adapt the wind energy to generate the electric current in India and foreign countries to replace the energy from fossil, which is affecting the environment, such as oil, or coal, etc. Especially in European countries, there are windmills to be the great equipment to generate the electric current with many capacities (Megawatt: MW). The India is in the tropical zone. There is high humidity and warm weather present in all of year. Specially march, April, may .The day time temperature may be increasing because of high intensity of sunlight and high room temperature the ventilation is necessary in workshop's, industries or factory building .Therefore the rooftop ventilator's are used for ventilation purpose because this ventilator are work on without using electric energy. This technology is popularly installed on the roof in workshop's, industrial buildings, ware houses and also in residences

2. OBJECTIVE

The main objective of this project is to design a twin power belt conveyor which utilizes the solar and wind energy as the source of energy to run the Air compressor

3. WORKING PRINCIPLE

The solar arrays and roof top wind turbines which generates the electricity by using solar and wind power .The generated energy is stored in the two separate battery systems and further this energy from the battery is transferred to power switching board in which we can switch the power as per our requirements (i.e if we need solar we can switch to solar or if need wind power we can switch to wind power by means of a lever) and further this energy is used run the air compressor in which a high pressurized air is produced and this pressurized air is used to the run the air motor and this air motor is connected to the conveyor belt sprocket as a result the conveyor belt starts rotating and the speed of the air motor is

completely controlled by solenoid and electrical control unit.

4. Representation of the proposed design flow chart

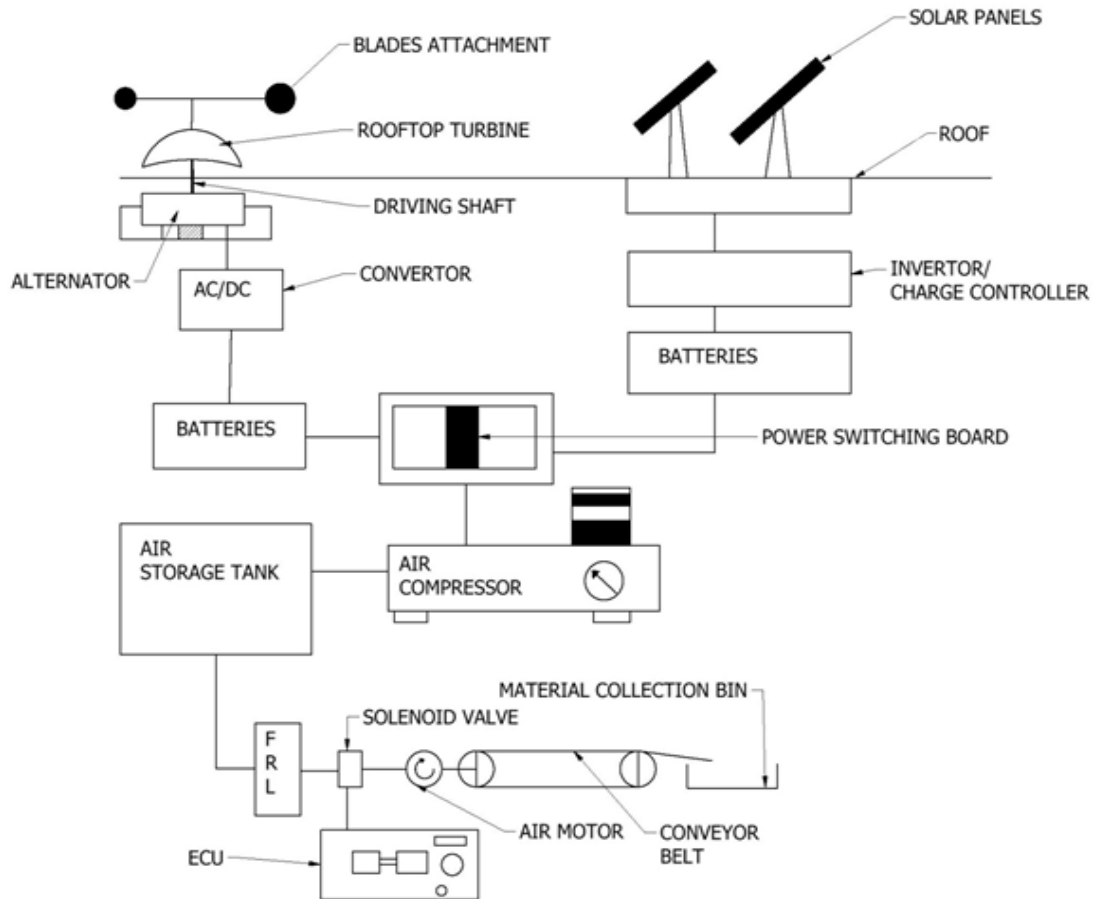


Fig.1 design of the system

5. Various parts used in the system

A . Roof top wind turbine ventilator



Fig-2 roof top wind turbine ventilator

Wind turbine ventilator is a wind-powered ventilator that is mounted on the roof of the building to provide efficient ventilation. It is used in many kinds of industries, laboratories, warehouses. Air ventilation operates on the simple principle of wind-assisted rotating and stack effect. The main function of free spinning is to provide fresh air in the roof and living area. Air is free about 24 hours of a day on all year. The material also has the added purpose of supplying the electrical energy from the roof ventilator that will move the air.

B. Solar panels



Fig-3 solar panels

Solar photovoltaic panels consume sunlight as a source of energy for direct electricity generation

C. Alternator



Fig-4 alternator

An alternator is a device which converts mechanical energy into electrical energy in the form of alternating current

D. Batteries



Fig-5 batteries

Batteries are a series of one or more cells that produce a flow of electrons in a circuit by chemical reactions. All batteries consist of three basic components: an anode (the '-' side), a cathode (the '+' side), and some form of electrolyte (a material which interacts chemically with the anode and cathode)

E. Invertors



Fig-6 invertors

An inverter changes DC power from a source into conventional AC power or vice versa that you can use to operate all kinds of devices

F. Air compressor



An air compressor is a device which compresses atmospheric air to a high pressure air this portable air compressor runs with a 12v dc battery and air outlet is further connected to the air storage tank and this system plays a vital role by supplying compressed air to the air motor which used to drive the conveyor belt

G. Electric-control-Unit(ECU)



Fig-7 ECU

Using the converter, switch, voltage regulator, resistor, bridge rectifier, the electrical driver module is used to regulate the speed under the micro controller and two rechargeable batteries.

F. Solenoid valve



Fig-8 Solenoid valve

Solenoid valve is a control device that either shuts down or makes fluid flow once electrically energized or de-energized. The actuator is an electromagnet in the shape. Once energized, a magnetic field builds up that pushes against the movement of a spring a plunger or pivoting armature.

G. Air motor



Fig-9 Air motor

A pneumatic motor is a mechanism by which compressed air is taken and converted into energy that is then used for mechanical work. Pneumatic motors are also capable of rotating motion in addition to linear motion.

H. Conveyor Belt System.



Fig-10 Belt conveyor system

A conveyor belt (often simplified to belt conveyor) is the holding medium of a belt conveyor system. The conveyor belt system is one of many types of conveyor system and the conveyor belt is a material processing system that uses continuous conveyor belts for conveying goods or items. The belt is stretched in an endless loop between the two end pulleys.

6. Merits

- System completely runs on renewable sources of energy
- Suitable for small scale industries
- System is economical all over the year
- Electricity usage can be reduced

7. De-merits

- System occupies more space
- Installation cost is more
- Regular check and maintenance of battery is required
- Due to the air compressor the system is noisy
- The system is not flexible

8. Conclusion

Although the system is in early development stages it has numerous advantages and with addition of quality engineering to the system its efficiency and performance can be improved which makes system more flexible.

9. Future scope

In the future with small changes the system can be employed for large scale industries also and in future there may be a chance to integrate the systems with IoT's and smart systems which make the entire system effective.

10. References

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BIOGRAPHIE



BANDARI VISHNU VARDHAN student of SVNE of Department of mechanical engineering 2017-2020 My current research is undertaken on Experimental investigation on conversion and blending waste plastic oil with fuels and finding alternative fuels for operation of Ic engines. Published 3 papers on various International conferences and with one journal publication.