**F.Y.B.Tech Student’s engineering design and innovation(EDAI-1) Project Paper, A.Y. 2022-23**

**Vishwakarma Institute of Technology, Pune**

**Power generation from Wind Turbine on Train**

Milind M. Patwardhan, Kapil Sangameshwar, Ved Kapre , Sahil Kapase, Aashish Kapase, Bhakti Kapase, Yogita Kapase.

**Department of Engineering, Sciences and Humanities (DESH)**

**Vishwakarma Institute of Technology, Pune, 411037, Maharashtra, India**

***Abstract-***

Energy is the need for the financial improvement of our nation. Energy exists in distinctive structures in nature however the most critical frame is electrical energy. Current society is such a great amount of ward upon the utilization of electrical energy that it has turned into a piece of our life. Energy is required as heat, light, motive power and so forth. The present-day progression in science furthermore, innovation has made it conceivable to change over electrical energy into any desired shape. It is also be operated the all of parts of the train to work the wind power.The main target of the generate electricity by wind turbine and store in battery then this energy discharge in electric vehical. fossil energy, coal etc. also be the shortage of this mechanical component, then it is a very use full system to be generate electricity by the wind turbine of the train. The all of system only the maintenance of the train by wind energy as well as remaining energy further passes to charge electric vehical.

***Keywords-***Energy, wind, train, Baterry, Electric vehical.

**F.Y.B.Tech Student’s engineering design and innovation(EDAI-1) Project Paper, A.Y. 2022-23**

**Vishwakarma Institute of Technology, Pune**

**I.*INTRODUCTION***

An important factor in development of human resource is the Energy. As conventional energy sources are exhausting rigorously, the development of inexhaustible and renewable energy resources, like wind, solar is essential for human life. The wind power been utilized by human being for a greater time period and the technology linked with it is more modified compared to other non-polluting energies. Today wind power is attracting the benefits of power sector and their application is entering into quicker development.

A fast moving train in long route to running fast, its travels in high speed and produce wind energy as a source of wind turbine and generator.The kinetic energy of the wind movement thus created can be used to generate electricity. Thus run high speed of the train they generate the very easily electricity by wind turbine source.

Usage of sustainable power source on moving train is very creative methodology. Especially, it should utilize the top of the train wagon for establishment of wind turbines. Be that as it may, there are a few difficulties, for example, extra air drag made by mounted turbine over the train rooftop. Speed of the air stream confronting the wind turbine cutting edges will be equivalent to speed of the train utilized for power generation . Recreation of the wagon with wind power system unit introduced on its rooftop will be directed. The unit incorporates on a level plane adjusted vertical wind turbine, gearbox, generator, and a battery storage unit introduced inside the wagon.

The wind force may be very strong. At the beginning of the twentieth century concept of electricity found its use and windmills got converted into wind turbines with the rotor coupled to an electric generator.

Design for the invention-

Wind Pressure

↓

Compressed Air

↓

Rotate Turbine

↓

Generate Electricity

↓

Store in battery

Once, this was a failure project because of improper design and position of the turbine which made it hit on the over bridges and electric lines. The other main reason which made it unrealistic is the drag force which affected the performance of the train. By taking these problems into consideration, we have designed our model to overcome these drawbacks.

**II.** ***METHODOLOGY***

***A. Materials-***

1.AutoCAD- It is used to design the model before making the prototype so that while making the prototype or the product no confusion is there .

2.DC Generator Motor- It is used to generate electricity from rotational motion of the rotary device attached to it.it converts rotational kinetic energy into electrical energy.

3.Battery- It is used to store the electrical energy produced by the generator.

**F.Y.B.Tech Student’s engineering design and innovation(EDAI-1) Project Paper, A.Y. 2022-23**

**Vishwakarma Institute of Technology, Pune**

4.Wires- It used to connect the various devices used to complete the circuit.

5.Fan (Rotary Structure)- It is attached to the generator and is used to create a rotational mechanical motion from the wind.

6.Stainless Steel Frame- It is create a sturdy structure to protect the internal circuit and make the product aesthetically more appealing.

7.Air Tight Structure- It is used protect the circuit from water and other substances that can damage the circuit

8.Water Insulation

9.BMS- It is used to regulate the voltage input and output into the Battery.

***B.Design-***

A drag is created due to impulse force created at the sharp edges of the duct. So, to remove this impulse force, the duct is designed with a smooth surface by neglecting the sharp edges all over the path at which the air pass through. Wind Turbine A wind turbine is a device that converts kinetic energy from the wind into electrical power. A wind turbine used for charging batteries is widely known as wind charger. Generator A generator is a device that converts mechanical energy into electrical energy. Here the generator is coupled with the wind turbine through belt. So, as the turbine rotates, generator also rotates. As the generator rotates, gradually electric current is produced. Belt A belt is a loop of flexible material used to mechanically link two or more rotating shafts. Belts may be used as a source of motion to transmit power efficiently or to track relative movement.

Setup The whole setup which includes a duct, turbine, generator and belt are placed on the hollow place at the roof top. A small portion is made open on the roof for the air to enter into duct. The setup is placed in such a way that it is fitted within the maximum height of the train, so that it does not hit on the over bridges and electric lines on the pathway of the train.

Mechanical and electrical features of the model were designed in order to optimize the existing engineering decisions and maximize the efficiency of the wind power generation system. It is realized that amid the train development the air vacuum will be created along the edges and the back of the wagon. In this way an air with the speed equivalent to moving vehicle's speed will race to these vacuums so as to fill that vacuum. The rooftop of the train was picked for establishment indicates due higher wind speed and less obstructions.

Every coach consists of a single turbine generator setup at its middle portion on the roof. The blade of the turbine is designed by considering the direction of rotation. Here, the duct and blades are designed symmetrically, so that in whatever direction the wind flows, the blades can rotate and generate electricity.

***C. Characterization-***

Capturing and routing wind induced by moving train: Wind energy is also be generated the kinetic energy by turbine in high route train in India. It also is captured by the wind by the rotor part and then rotate the turbine then generates the kinetic energy and the generator converts the electrical form of energy.

**F.Y.B.Tech Student’s engineering design and innovation(EDAI-1) Project Paper, A.Y. 2022-23**

**Vishwakarma Institute of Technology, Pune**

1.Main bearing & shaft: It is not contain any problem but they do not usually experience many problem besides normal wear & tear over time. It is also be the help of location of a turbine & help ensure that the rotation of blades smoothly & shaft is a rotational part.

2. Gear box & brake: Rotor locks are used in the wind turbine luxury trains and are also be mounted to the turbine main is the rotor shaft, between gear box & generator .A rotor brake is also intended by for use as safety brake using emergency stop under high wind conditions.

3. Generator: The wind generator is also be the used in wind power generation of the wind turbine to operate the energy in wind turns in three blades around a rotor, its convert mechanical energy into the form of electrical energy. The rotor is also be connected the main shaft rotate a generator to create useful energy.

The generator is utilized to change over mechanical energy into electrical energy. The turbine blades exchange the kinetic energy from the wind into rotational energy and the wind turbine is utilized to exaction of generator. With the assistance of turbine exaction generator produce the electrical power. The wind turbine combined with generator. This power is create utilizing generator. Furthermore, this power is put away in DC battery. What's more, this created power is utilized to run electrical hardware inside the train.

**III.*RESULTS AND DISCUSSIONS***

Mechanical and electrical features of the model were designed in order to optimize the existing engineering decisions and maximize the efficiency of the wind power generation system. It is realized that amid the train development the air vacuum will be created along the edges and the back of the wagon. In this way an air with the speed equivalent to moving vehicle's speed will race to these vacuums so as to fill that vacuum. The rooftop of the train was picked for establishment indicates due higher wind speed and less obstructions. Additionally, the territory of the top is adequate to find all segments of the system, including wind turbines, gearboxes and generators, along these lines diminishes the need of long wiring. It is proposed to introduce five lines of turbine-pair on the train, each having tallness of 30 cm and length of 1 meter. Wagon length is 26 meters and the separation between each unit is adequate to keep up the favoured air speed at every unit.

**F.Y.B.Tech Student’s engineering design and innovation(EDAI-1) Project Paper, A.Y. 2022-23**

**Vishwakarma Institute of Technology, Pune**

***CONCLUSION***

This system helps in effectively utilizing the wind energy and generating electrical energy at low cost with less maintenance. With the Indian railways network of thousands of kilometers running across the length and breadth of our nation, by implementing this system of power generation, we can generate power to supplement the requirements of rail passengers such as audio facilities, Wi-Fi facilities, lighting facilities, etc.

The technology is expected to contribute to the cause of the environment as it helps to reduce carbon emissions and also assists the government in saving on fuel too. It can be concluded that an effective system can be installed in rail coach to generate power which is purely environment friendly and cost effective.

***ACKNOWLEDGMENT***

We are highly thankful to our guide Prof. M.M.PATHAWARDHAN for guiding us to get through the bottleneck encountered during the work and Principal AND He Is also responsible for inspiring us in the field of power generation.

***REFERENCES***

[1] S. Bharathi, G. Balaji, and M. Manoj Kumar, “A Method for Generating Electricity by Fast Moving Vehicles”.

[2] S.M. Tupe, D.P. Chavan, C.P. Avhad and A.K. Pathak. ‘‘Power generation through wind created by moving train.’’ International Journal of Advance Research and Innovative Ideas in Education. 2(2), 2016, pp. 852-855.

[3] <https://www.ijert.org/research/design-and-simulation-of-wind-turbine-on-rail-coach-for-power-generation-IJERTV6IS020381.pdf>

[4] <https://www.sciencedirect.com/topics/engineering/wind-turbine>

[5] <https://www.researchgate.net/>

[6] <https://doaj.org/>

[7] <https://youtu.be/e6IpOcztJ50>

[8] M. Bagheri, B.T. Phung, T. Blackburn, ‘‘On-line transformer Frequency Response Analysis: Moisture and temperature influences on statistical indicators’’, IEEE International Conference on Smart Instrumentation, Measurement and Applications (ICSIMA)

[9] S. Bharathi, G. Balaji and M. Manoj Kumar “A Method for Generating Electricity by Fast Moving Vehicles” The International Journal of Engineering And Science (IJES) Volume2 Issue112013 , pp 28-31