

Power Generation by Using Railway Track

¹Mayur S. Khaladkar, ²Omkar C. Jadhav, ³Abhishek P. Pal, ⁴Pratik D. Kore, ⁵Prof. Amol D. Sable

¹Student, ²Student, ³Student, ⁴Student, ⁵Guide & HOD

Department of Mechanical Engineering,
Jaywantrao Sawant Polytechnic, Pune, India

Abstract: In the present work, generated power by energy harvesting arrangement simply running on the railway track for power applications. 1. As the demand generated power by energy harvesting arrangement simply running on the railway track 2. To build a power generation system such that it can contribute to the present power generation system as the need of energy is growing day by day. 3. The generated power is eco-friendly as well as inexhaustible means the power can be generated as long as the railways are in function. 4. To produce electricity without any pollution. Today there is a need of Non-conventional energy system. The energy obtain from railway track is one source of to generate non-conventional energy because there is no need of fuel as an input to generate the output in the form electrical power and this is done by using simple gear drive mechanism. These mechanism carries rack and pinion, freewheel, cam and follower, chain and sprocket, alternator. The main focus of this arrangement is the harvesting large amount of power from railway track which can be used to power the track side infrastructures.

Keywords: Power Generation, Railway Track, Dynamo

I. INTRODUCTION

The main objective of the proposal is to generate electricity without any pollution. The widespread use of energy has led to an energy crisis over the years. Therefore, to overcome this problem we need to apply the techniques of good utilization of traditional sources for energy conservation and identify new sources for renewable energy generation. Conventional energy sources are usually renewable sources of energy, which have been in use for a long time. Unconventional technologies have been invented to improve power generation technologies and make them more durable. Unconventional energy generated by the use of biomass, including wind, waves, solar, groundwater heat and agricultural and animal waste. All of these sources are natural, renewable or non-renewable and do not cause environmental pollution and are environmentally friendly. Plus, they don't have to cost a lot. Unconventional energy sources are abundant in nature. Our idea is to generate electricity from the train tracks, and we just modeled and got it through the rack and pinion system.

The proposed technique is usually related to the generation of electricity and in particular to the method and mechanism for generating electricity on railway lines. Many well-known railroad systems use a variety of railway equipment as well as a variety of road equipment. In the network, railroad tracks are often scattered in rural and suburban areas, and thus powering Wayside equipment in remote areas can be a daunting and expensive task. At least some of the known railway systems start electric lines for remote road side equipment. However, depending on location, installing and maintaining such power systems can be expensive. That is, an automated device receives operating power that is generated at a remote location and is distributed over a power grid, and connecting the grid to a device can be an expensive proposition, especially in remote areas. In certain cases, local power sources such as batteries have been used. Therefore, in the context of the railway system, a system and method is needed to improve the electric power generation.

II. LITERATURE REVIEW

P. B. Chaitanya, G. Gowtham et al. (1) This paper aims at production of electricity by using the concept of the rotation of wind turbine due to the wind caused by the moving train and also by using an electrical power generation system. The idea is to design a wind turbine that can be installed between the sleepers on a track, and as the train passes overhead, the wind drives a turbine to generate electricity. This device could be placed along railway or subway lines, and make good use of an otherwise wasted resource. By alternately priming the variable capacitor using charge from the power source and discharging it at a later time in a cyclic manner to change the capacitance, a significantly large amount of electrical energy is produced due to change in capacitance. Increasing the electrical potential of the variable capacitor also increases the electrical energy of the system, as the mechanical energy of separating the plates is converted into electrical energy.

M. E. Amiryar and K. R. Pullen et al. (2) Energy storage systems (ESS) provide a means for improving the efficiency of electrical systems when there are imbalances between supply and demand. Additionally, they are a key element for improving the stability and quality of electrical networks. They add flexibility into the electrical system by mitigating the supply intermittency, recently made worse by an increased penetration of renewable generation. One energy storage technology now arousing great interest is the flywheel energy storage systems (FESS), since this technology can offer many advantages as an energy storage solution over the alternatives. Flywheels have attributes of a high cycle life, long operational life, high round-trip efficiency, high power density, low environmental impact, and can store megajoule (MJ) levels of energy with no upper limit when configured in banks. A high-power capability, instant response, and ease of recycling are additional key advantages. Given the demand for ESS is expanding substantially, and that FESS has these unique attributes, the future for FESS remains very bright, even in a time when the cost of Li-ion and other chemistry battery technology continues to reduce. Future work will include the detailed modelling and analysis of a flywheel system for backup power and grid support applications.

W. M. Kaufman et al. (3) A system for extracting energy from the passing wheels of a railcar, converting the energy to into rotation of a shaft in first and second directions, converting the rotation of the shaft into electrical energy and storing any excess generated electricity. A pivoting member includes a shaft, first and second arms extending from the shaft, and contact elements at the ends of the arms. The vertical reaction force imparted to the wheel of a passing railcar may be minimized by among other techniques, orienting the pivoting member so that the contact elements moves in a horizontal plane and by coupling the contact elements to the ends of the pivoting member arms via respective journal bearings.

III. PROBLEM STATEMENT

Power is the primary need for the existence of human life. Large amounts of electricity are generated from renewable energy sources compared to non-renewable energy sources. The widespread use of available resources in recent years has created a demand for future generations. To overcome this problem we need to use renewable energy sources for electricity generation and conservation. Therefore, we will design and develop electric power generation from trains.

IV. OBJECTIVE

1. The goal is to create an energy generating system that can contribute to the current energy generation system as the demand for energy is increasing day by day.
2. Electricity can be generated as long as the energy generated is environmentally friendly and renewable so that the railway is working.
3. Generate electricity without any pollution.

V. METHODOLOGY

- 1: -We started this project through a literature survey. We collected a number of research papers related to this topic. After these papers we learned about the power measurement system.
- 2: - Then the components needed for my project are fixed.
- 3: - After the components have been decided the 3D model and draft will be done with the help of CREO 2.0 software.
- 4: - Components will be manufactured and buy then assembled.
- 5: - The test will be conducted and then the results and conclusions will be drawn.

VI. COMPONENT USED

1. CAM FOLLOWER

A cam and follower mechanism is a profiled shape mounted on a shaft that causes a lever or follower to move. Cams are used to convert rotary to linear motion. As the cam rotates, the follower rises and falls in a process known as reciprocating motion. The range of movement of the follower will depend on the distance from the shaft supporting the cam to the upper and lower points of the rotation circle. Cams are commonly used in engines to control valves (in which the valve is the follower), sewing machines, children's toys and many other mechanical applications.

2. CHAIN

Chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles. It is also used in a wide variety of machines besides vehicles.

Most often, the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system.

3. SPROCKET

A sprocket or sprocket-wheel is a profiled wheel with teeth, or cogs, that mesh with a chain, track or other perforated or indented material. The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth.

4. FLYWHEEL

A flywheel is a mechanical device specifically designed to efficiently store rotational energy. Flywheels resist changes in rotational speed by their moment of inertia. The amount of energy stored in a flywheel is proportional to the square of its rotational speed. The way to change a flywheel's stored energy is by increasing or decreasing its rotational speed by applying a torque aligned with its axis of symmetry,

5. DYNAMO

A dynamo is an electrical generator that creates direct current using a commutator. Dynamos were the first electrical generators capable of delivering power for industry, and the foundation upon which many other later electric-power conversion devices were based, including the electric motor, the alternating-current alternator, and the rotary converter.

6. RACK AND PINION

A rack and pinion is a type of linear actuator that comprises a circular gear (the *pinion*) engaging a linear gear (the *rack*), which operate to translate rotational motion into linear motion. Driving the pinion into rotation causes the rack to be driven linearly.

7. SPRING

Spring is a mechanically flexible machine component capable of deflecting under load and recovering its initial size when unloaded. When the spring is wound up for use as a power source. The helical spring, in which wire is wrapped in a coil that resembles

a screw thread, is probably the most commonly used mechanical spring. It can be designed to carry, pull, or push loads. Twisted helical (torsion) springs are used in engine starters and hinges.

VII. WORKING PROCEDURE

When a train crosses the track, the train's bogie carries heavy loads and the track returns in a downward direction. The deflection of the track is a deflection cause to move the cam under the track and therefore the follower is moving downwards. With the follower moving downwards, the spring connected to the follower compresses downward, and so the rack also moves downward. These racks and pinions are then transferred to the flywheel by means of chains and sprocket arrangements. This will help rotate the flywheel as both are mounted on the same shaft. The flywheel is connected to the shaft of the alternator so if the flywheel rotates, the alternator has a rotation shaft and the power is stored in the alternator. It is used near the train station for purpose of light bulb, fan and other source



Fig. 1 working model

VIII. RESULT

Sr. No.	Deflection of flap (in cm)	Voltage produce(volt)
1	5	7
2	7	9
3	8	12
4	9	13
5	10	15

IX. CONCLUSION

It is observed that the step-by-step Demand for electricity is troubling. We need to find new idea for power generation. We should transform power in system use to store power in batteries and that can be used for the purpose of use for nearby railway stations equipment light, fan, signal light etc. This arrangement can be used in different applications like in foot step or speed breaker at school, colleges and highway for generations ways of electrical energy.

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