

# “Generation of Electrical Energy from Railway Track”

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## Abstract

In this research paper I have come across the problem faced by many villages in India i.e. shortage of electricity. India is having the huge railway network connecting almost all the cities and villages of all the states, and with the help of railway tracks we have developed the system to generate the electricity from the moving train over the tracks. This system can be installed underground under the railway tracks where ever there is shortage of electricity. In India many villages still are not covered with the electricity supply. So to power those villages with the electricity our system can be the one solution which can be installed under the nearby railway tracks, and the system will generate the electricity. The system developed is also capable of storing the electricity for the later use. The system developed by us is strongly recommended for the solution to the problem faced by the India villages.

**Keywords** - Electric energy by railways, generation of electrical energy by railway track, production of electrical energy.

## I. INTRODUCTION

While undergoing survey on Indian railways the outcome of survey was “Indian railways” are called as lifeline of our country in which around 2.3 crore of passengers travels daily. We have seen that Indian railways. We have also seen that Indian railways is also improving their services, official website, modification in coaches, gaining in speed and other several criteria with their hundred percent effort day by day. We came to the research that there are several villages facing lack of electricity even though railway tracks passes through them. So by knowing such condition, we decide to build a type project which will provide electricity by use of those railway tracks with less cost which is named as “free energy from railway track”.

These projects include simple gear and pulley mechanism so there is no kind of complexity in it and once it's been installed it may long till many years but it will require slight maintenance.

Main reason beside this project was to provide such electricity facilities to those argotic people which will help them to run all the agricultural equipment's due to which net income of the farmer will increase.

Besides agricultural purpose, such electricity generated can also be used of several purposes.

## A. Expected Outcome Of Research Paper

1. Plan and identify materials, process and other resources optimally required for manufacturing of Pulley and Main shaft.
2. Developing creative and innovative ideas.
3. Develop leadership, interpersonal skill and team work to achieve the goal.
4. Develop sense of environmental responsibility.
5. Purchase raw material/Standard parts like gear, L Channel, Dynamo, Belt, Fixed wheel etc.
6. Interpret the drawings, manufacture, assemble, inspect & if necessary modify the parts/unit/assembly of the project work.
7. Familiar with fast change in technology.

## II. COMPONENTS

From our survey we identified the suitable material for all the above parts. Such mechanism is to be mounted on some base which is of wooden material. The entire frame such as Railway track, supports, C Channel is made from mild steel. Here the coach is made by galvanized steel. All the assembly is done through welding and some use of nuts. Gears and pulley used are of Cast Iron. Fan used here is made up of hard fiber.

- Wooden Ply
- Railway Track
- Train Coach
- Gear Mechanism
- Pulley Mechanism
- Fan
- Dynamometer
- Belt Drive
- C Channel
- Fixed wheel

**WOODEN PLY:** This is the one type of supportive member. It supports the whole mechanism. As itself name suggest it is made from wood.

**RAILWAY TRACK:** It is L-Section channel which include shaft mounted on its bottom side. Train coach run on such L-Section Channel which make contact with such mechanism.

**TRAIN COACH:** It is one type of box made by galvanized steel which runs on L-Section Channel. On its bottom side, C-Section channel is provided which make contact with fixed wheel mounted on shaft.

**GEAR MECHANISM:** It is rotating disc type structure having several teeth cut's on it. Here two gears are used made from Cast Iron. Big gear is mounted on main shaft and other pinion is mounted on counter shaft which continuously meshes.

**PULLEY MECHANISM:** It is a wheel on a shaft that is designed to support movement and change of direction of a belt, or transfer of power between the shaft and belt.

**FAN:** It is made of hard fiber material mounted on one side of main shaft. It is a type of Condenser fan. This fan rotates when vacuum is created when train passes nearby such mechanism.

**DYNAMOMETER:** It is one type of electrical motor which converts mechanical energy into electrical energy. Small pulley is mounted on shaft of dynamometer.

**BELT DRIVE:** It is mechanism in which power is transmitted by the movement of a continuous flexible belt. It is generally used to connect countershaft to shaft to motor.

**C Channel:** It is one type of C-Section channel which is made from mild steel. Generally it is fitted on the bottom of the coach.

**FIXED WHEEL:** It is one type hard rubber wheel which is mounted on main shaft which comes in contact with C Channel which rotates.

➤ **SPECIFICATIONS OF COMPONENT:**

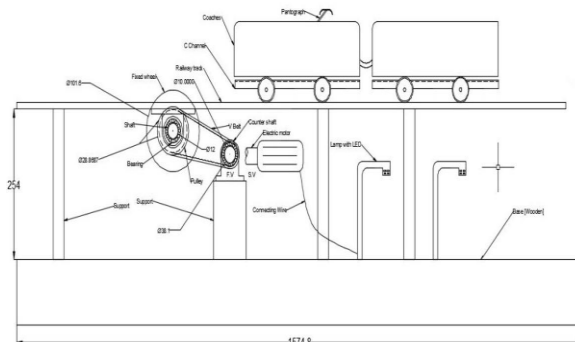
<b>Wooden ply Dimension</b>	<b>1574.8 × 457.2 × 18mm</b>
<b>Distance Between L Channel And Wooden ply</b>	<b>254mm</b>
<b>No. Of Coaches</b>	<b>2</b>
<b>Dynamo Output</b>	<b>12 Volt</b>

<b>Diameter Of Main And Counter Shaft</b>	<b>12mm &amp; 10mm</b>
<b>Pitch Circle Diameter Of Big Gear And Pinion &amp; No. Of Teeth</b>	<b>Big Gear:- 101.6mmø {53 Teeth} Pinion:- 38.1mmø {20 Teeth}</b>
<b>Diameter Of Big And Small Pulley</b>	<b>85mm &amp; 18 Mm</b>
<b>Diameter Of Fan</b>	
<b>Net Weight</b>	<b>16.5 Kg</b>
<b>Diameter Of Shaft Of Dynamo</b>	<b>6mm</b>

**III. EXPERIMENTAL WORKING**

This Research Model includes simple gear and pulley mechanism. Here on the main shaft fixed wheel is mounted and C Channel is fitted on bottom part of coach. When the train passes near such mechanism, C Channel comes in contact with fixed wheel which rotates. Hence, the gear mounted on one side of the main shaft also rotates. Small pinion is provided which is mounted on countershaft which continuously meshes with big gear. Hence such Countershaft also rotates. Here one big pulley is mounted on one side which rotates as the Countershaft rotates. Thus, the small pulley is provided on shaft of Dynamo which is connected through belt drive. As the shaft of Dynamo rotates mechanical energy of the shaft get converted into electrical energy.

Here main drawback of such project was the friction between contacted parts. To overcome such problem, necessary modifications has been made in such project. Here instead of rotating main shaft through fixed wheel, here a special type of fan is used to rotate the main shaft. Such fan rotates due to vacuum developed when train passes near such mechanism with greater pace. Due to which whole operation become frictionless and becomes more efficient compare to previous design.



**Fig: 1 Assembly Drawing (2D)**

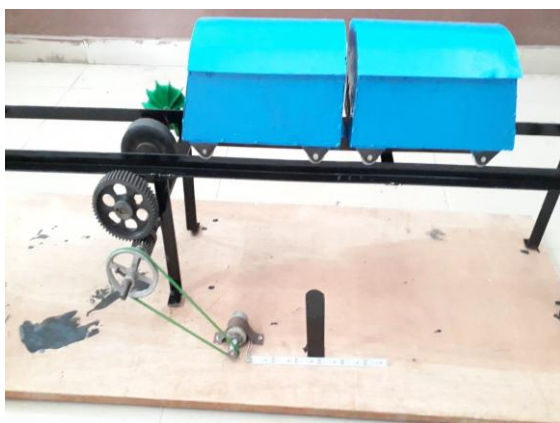


Fig: 2 Assembly Drawing (3D)

### WORKING OF THE SYSTEM:

- Whenever the train passes near to the system , the system gets activated due to the vacuum created from the track
- The impeller starts to rotate and the pulley is rotated with the help of rotating impeller.
- The pulley is attached to the dynamometer and the rotating pulley runs the dynamometer.
- Then the electricity is generated from the dynamometer, motor is also connected to the dynamometer.
- The motor is producing the D.C. current and the developed electricity is then stored in the battery type storage.
- The battery used for the storage is the lithium-ion type which stores the excess amount of electricity generated and that can be used whenever needed.
- The ammeter and voltmeter are also connected to the battery and are displayed above the ground.
- The meters show the current level and also shows weather the electricity is being generated or not.
- The stored electricity has the output above the ground, so that whenever there is need of the electricity, the stored power can be directly transferred to any place in very short period of time.

### IV. SPECIFICATION OF COMPONANTS

SR. NO.	COMPONENT	QTY	SIZE	MATERIA L
1	Gear	1	101.6 mm	Cast Iron
2	Pinion	1	38.1 mm	Cast Iron
3	Big pulley	1	85 mm	Cast Iron
4	Small pulley	1	18 mm	Cast Iron
5	Dynamometer	1	12V	Steel
6	Fan	1	101.6 mm	Hard fiber

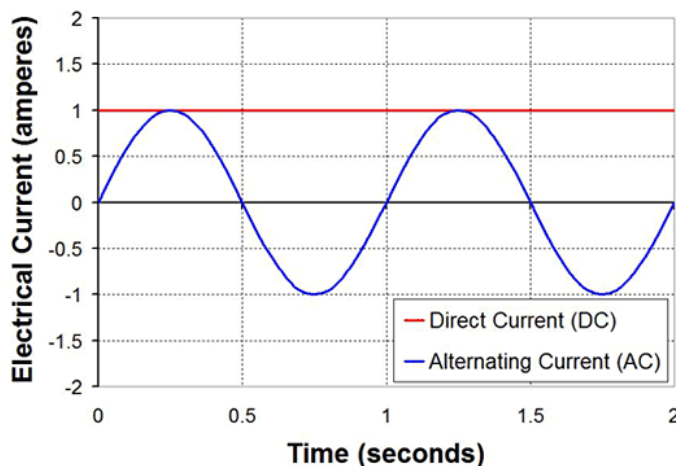


Fig: 3 Current Produce by dynamometer

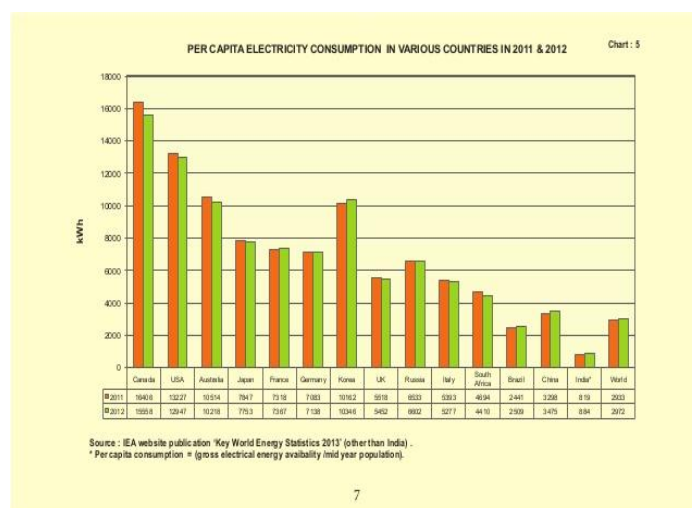


Fig: 4 Electricity consume in different countries

### MAINTAINANCE OF SYSTEM COMPONENTS:

- After sometime (1 or 2 year), Lubrication of gear and other moving is to be carried out.
- Periodically Maintenance is to be carried out for it's smoothly operation.
- The mechanism should be checked once in 6 months
- Must see whether the belt used is loose or not.
- Check whether there is misalignment of the shaft.
- Check whether fan is being damaged or not due to striking of stones.
- Carryout the maintenance of dynamo in regular premises.

### V. COSTING OF SYSTEM

SR .N O	COMPO -NENTS	MATERIA L	QUAN	TOTA L PRICE (Rs)
1	Wooden ply	Wood	1	200
2	L Section	M.S	1	500
3	Gear	C.I	2	400
4	Shaft	M.S	3	240
5	Electric motor	Steel	1	250
6	Sheet metal	G.S	1	120
7	Fixed wheel	Rubber	1	250
8	LED lights	-	4	60
9	Belt	Rubber	1	200
10	Pulley	C.I	2	200
<b>TOTAL</b>				<b>2420</b>

#### ➤ TROUBLESHOOTING:

PROBLEM	POSSIBLE CAUSE	ACTION
Gear Not Work	Arrangement Of Gear Is Wrong	Set Gear Properly On Shaft
Loosening Of Belt	Power Loss Due To Slip	Set Proper Tension And Tighten The Belt
Misalignment Of Shaft	Failure Of The Shaft	Proper Alignment
Improper Construction	Improper Operation	Proper And Planned Construction

### VI. CONCLUSION

From our above research we conclude that the system developed will run with the help of vacuum created near the track while the train is passing over the track. The system is very compact in size and can be installed very near to the railway tracks. This system runs with the help of dynamometer installed inside the system, which generates the electricity from the vacuum created by the train. This system also stores the electricity in the battery type storage installed just under the ground. The cost of the system is very cheap and the amount of electricity generated by the system is in very huge amount.

The stored energy can be used whenever necessary and wherever needed. This system comes with the negligible maintenance which is just once in two years, and that too just the lubrication of components is required. I conclude with strongly recommending this system to be the one of the greatest solution to the problems faced by the Indian villages.

### REFERENCES

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