

# DESIGN AND FABRICATION OF MAGNETIC GENERATOR USING NEODYMIUM MAGNETS

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**Abstract:** -Generally, a generator made of coils circuits powered by the current. But there is a generator that generates and stores energy in the battery without the help of initial current. This generator is made by using neodymium magnets to run and generate energy and store it in the battery. There is no effect on the environment while generating this kind of energy. We have used the 3D modeled roller to reduce the weight of the entire setup which in turn helps us gain more voltage. Such a generator can produce up to 5 volts that can be increased by a step-up transformer. The energy generated by this generator can be used for different purposes like to charge mobile phones, Laptops, to operate a table fan, etc. This generator can also be used as an electricity generator for electrical vehicles.

**Index terms:** - Magnetic Roller, Neodymium Magnets, Step-up-Transformer, Dynamometer

## Introduction:

More than 90% world's power is being generated using electromagnets based on the Faraday's law of electromagnetic induction. Many new technologies were discovered with time which led to a drastic change in the perception of electric energy. But at the same time, there is the misconception of FREE ENERGY. Energy becomes free only at a point after which we don't have to pay for power generation after commissioning the unit. By using magnets we can generate continuous motion (Energy) with help of the magnetic flux produced the poles of the magnets. The basic principle of power generation lies under the magnetic effect. It states that "When a conductor is rotated in a magnetic field, a voltage is induced in the conductor". So here we will be dealing with such conductors. Engine's powered by magnetic generator I governed by electrical energy. In a simple motor, the magnetic field is created by the electric coils generally Cu, Al coils. These motors continuously need an electrical supply to produce a magnetic field. There are a huge amount of energy losses. But the Magnetic Motor consists of no such coils. Hence there will be minimal losses according to Hysteresis Loop. It uses the permanent magnetic field of the magnets to generate the required force to move the motor. This concept of generating a magnetic field from the permanent magnets became practical only after introducing Neodymium magnets which are much powerful than the previous Ferrite magnets. The main advantage is that it does not require continuous electric supply <sup>[1]</sup>.

A neodymium magnet, the most widely used type of rare-earth magnet, is a permanent magnet made from an alloy of neodymium, iron and boron to form the Nd<sub>2</sub>Fe<sub>14</sub>B tetragonal crystalline structure. Developed independently in 1982 by General Motors and Sumitomo Special Metals, neodymium magnets are the strongest type of permanent magnet commercially available. They have replaced other types of magnets in many applications in modern products that require strong permanent magnets, such as motors in cordless tools, hard disk drives and magnetic fasteners. Neodymium is a metal which is ferromagnetic, meaning that like iron it can be magnetized to become a magnet, but its Curie temperature is 19 K (-254 °C), so in pure form its magnetism only appears at extremely low temperatures.

In this generator, the concept of like poles repel each other and unlike poles attract each other is been implemented as the base principle to create this Magnetic Generator. The principle helps us in generating enough magnetic energy for the continuous rotation to the shaft. Henceforth, the shaft connected to the generator produces electricity to run an electric engine.

## Magnetic Principle:

The magnetic lines of force connect the poles of permanent magnet. We remember the principle of magnetism as:

- Opposite poles are attracted to one another
- Like poles are repelled by each other

As we bring the magnetic poles close to each other we can feel the repulsion and attractive force of the magnets, even though the lines of force are invisible. **Motors also operate on this principle.**

## Materials and Experimental Methods:

Our model of Magnetic Generator has been done using two different materials for the roller.

- 1) Roller made of UHMWP material.
- 2) Roller made of PLA (Poly-acetic) material.

- i. Using UHMWP material as roller

The basic model of the “Magnetic Generator” consists of

1. UHMWP (Ultra-High-Molecular-Weight Polyethylene)Wheel
2. Aluminum Bar
3. Neodymium Magnets.

The UHMWP wheel is selected depending on the table below. It is first fixed to the lathe machine where the length of the wheel is reduced. Then the wheel is fixed to the drilling machine where the hole of diameter 25mm is drilled on the circumference of the wheel and also on the face of the wheel to reduce the weight of the wheel. Later the wheel is removed from the drilling machine and cleaned of the chips.

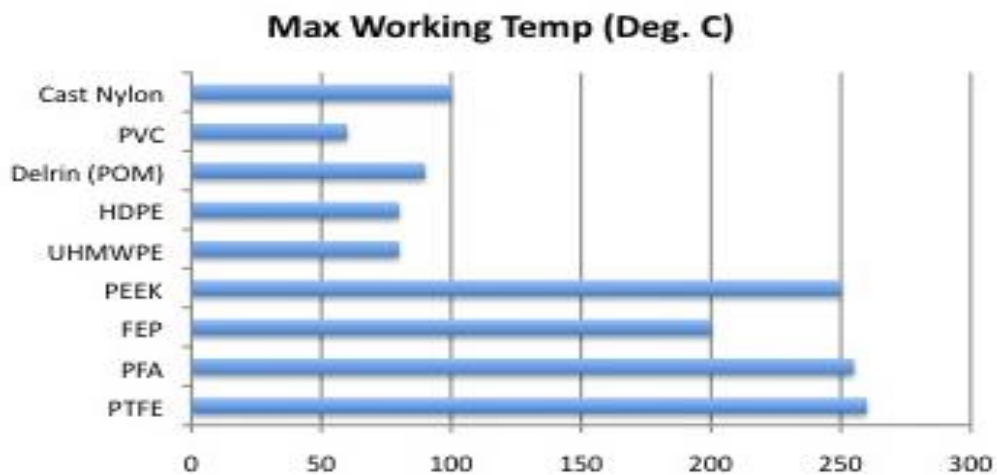


Fig.1

Figure 1 shows the maximum working temperature

Table 1

Sl No.	Material	Cost(per kg)
1	UHMW	300
2	PVC	250
3	HDPE	450
4	Delrin	545

Table 1 shows the different cost of different materials. of different materials.

The neodymium magnets of grade N52 is selected depending on the parameters from the table given below. The magnets are attached on the circumference of the roller.

Table 2

SL No	Type of Grades	RemanencemT (kGs)	Max. energy Product kJ/m <sup>3</sup> (MGOe)	Max. Operating Temp
1	N35	1170-1220	263-287	80C
2	N38	1220-1250	287-310	80C
3	N40	1250-1280	302-326	80C
4	N42	1280-1320	318-342	80C
5	N45	1320-1380	342-366	80C
6	N48	1380-1420	366-390	80C
7	N50	1400-1450	382-406	80C
8	N52	1430-1480	398-422	80C

**Table 2** shows the difference values of different neodymium magnets.

The magnets will also be fixed on the follower where it will be having the opposite pole respective to the magnets fixed on the roller circumference. As the roller rotates the due to the magnets force of repulsion.



Fig.2

**Figure 2** shows UHMWP roller with magnets fixed on it

ii. Using PLA material for Roller:

The roller is first designed to required shape and size in the SOLIDWORKS software. The roller which is designed in the software is saved and is printed using the 3D printer. The roller which is printed then is fixed with the magnets using the glue gun.

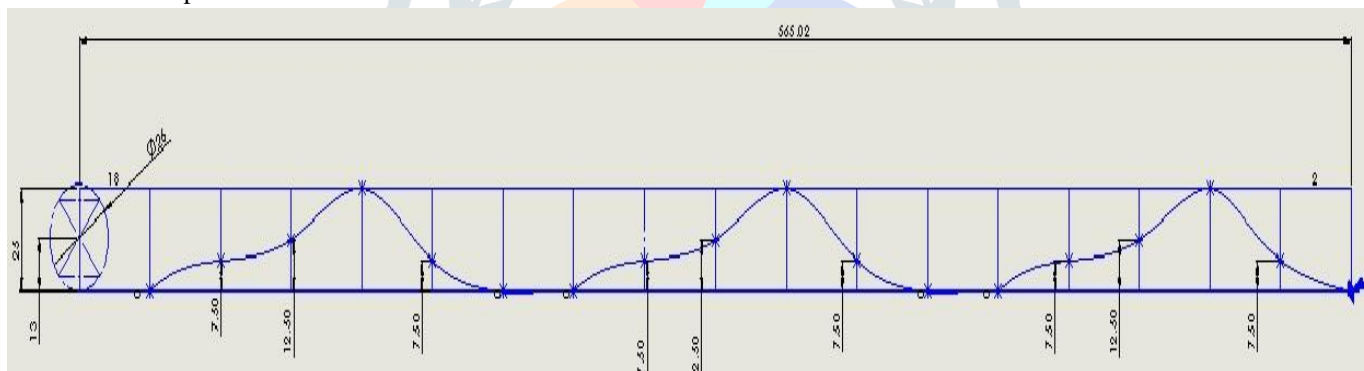


**Fig.3**

**Figure 3** shows 3D printed roller with magnets fixed on it

**Fabrication of CAM:**

In this the CAM sizes is determined by drawing the CAM profile and finding the path of the roller to move on. **Figure 4** shows the CAM profile



**Fig.4**

After getting to know the path the CAM is designed the CAM is designed in Solid works and is given to 3D printing.

**Repulsion Force value:**

Diameter	==	25mm
Thickness	==	05mm
Distance between two magnets	==	35mm
Grade	==	N52

Repulsive value of the magnet is determined by the formula:

$$F = \frac{\mu p_1 q_2}{4\pi R^2}$$

Where:

- F is the force in Newton's (N)
- $\mu$  is the magnetic permeability of the intervening medium in Tesla-meters/ampere (T-m/A), Henry/meters (H/m), or Newton/ampere squared (N/A<sup>2</sup>)
- $q_1$  and  $q_2$  are the magnitudes of magnetic poles in ampere-meters
- $\pi$  is the Greek letter pi ( $\pi = 3.14$ )
- R is the separation in meters
- The permeability of a vacuum is  $\mu = 4\pi \times 10^{-7}$  H/m.

The force of the magnet when kept in certain distance is

$$F = 94 \text{ Gauss or } 0.0094 \text{ amperes (one gauss is equal to } 10^{-4} \text{ Ampere or } 10^{-4} \text{ Tesla)}$$

### Working methodology:

The roller with magnets hooked on its circumference is mounted on a supporting structure with bearings at its both ends to provide frictionless rotation. The Follower structure is made of opposite pole magnets and is made to maneuver over roller's CAM structure. The CAM and Roller is held at same axis to provide synchronous continuous motion. As the follower maneuvers over the CAM structure it moves up and down i.e. to and fro. This to and fro movement produces a repulsion force to make the continuous rotation of the roller. The shaft fixed to dynamo, internally produces the required amount of electric energy. The electric energy produced is boosted with the help of step-up transformer and this energy is utilized to charge Lithium-Polymer Batteries or a Lead-Acid Batteries.

### Block diagram of magnetic generator:

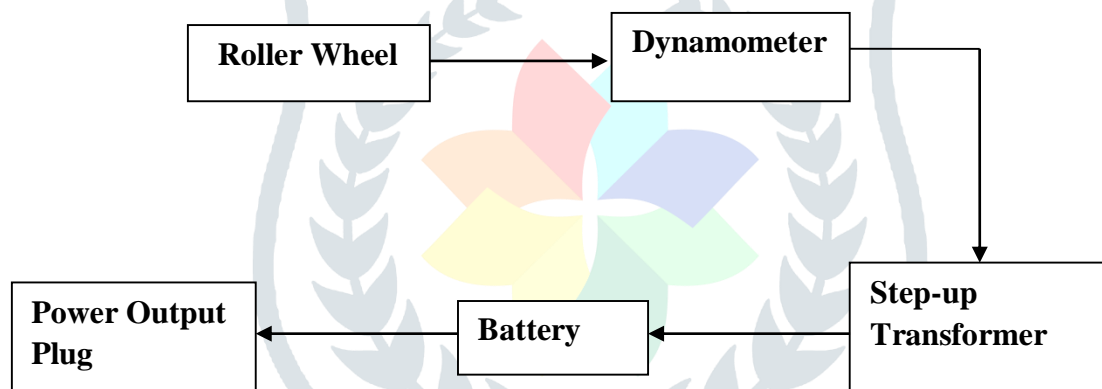


Fig.5

Figure 5 displays the block diagram of the magnetic generator

### Result and Discussion:

The UHMWP wheel which was used earlier to make the roller structure was dropped down due to its weight factor. Hence we had to come up with material that is rigid in structure as well as weightless hence we used PLA over UHMWP to make the roller structure. The roller was first designed in SOLIDWORKS software. The roller and other supporting structure was completely build 3D printer. With help of PLA material the weight and the gain was more proportionate over UHMWP material. The roller was then fixed with the magnets. The roller with magnets fixed on it was able to rotate. The roller was fixed with dynamometer which generates electricity and it is connected to voltmeter which gives the voltage generated. Again the voltage generated is passed through the step up transformer to increase the voltage output, it is measured by the voltmeter which is fixed after step up transformer. About 8.5 volts of voltage was generated.

## Observation Table:

Table No 4

- Table 4 shows the voltage value generated by the device

Sl. No	Revolutions per minute (rpm)	Voltage generated(volts)
1	60	5.6
2	50	3.2
3	40	1.5
4	30	0.27
5	20	0.1
6	10	0

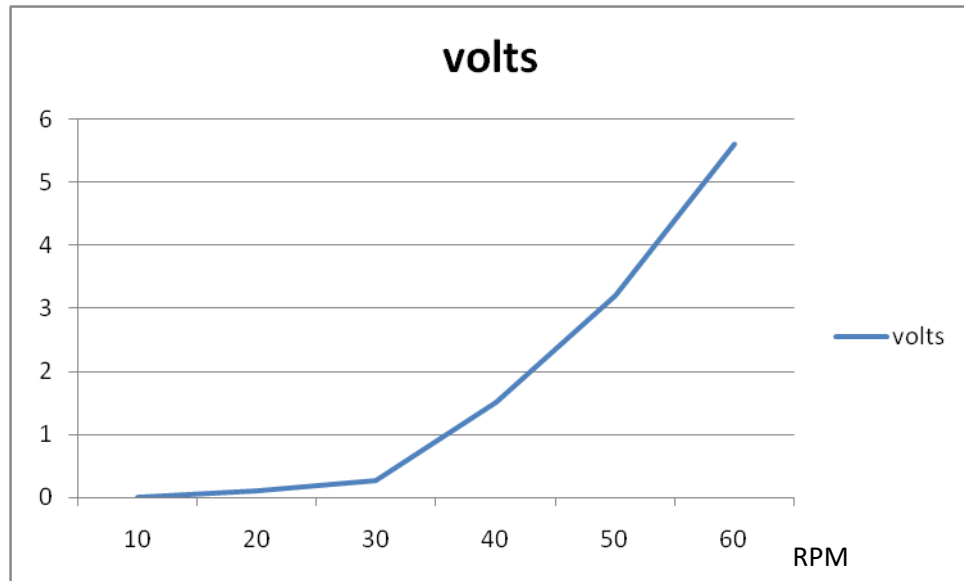


Fig.6

Figure 6 shows the increase of the voltage with respect to rpm. In this figure the voltage that is generated by the roller is shown in the table 4. The values obtained in the table are generated by the roller at respective speed. The generated values is then applied in the M S Excel and graph is plotted for voltage generated.

Table No 5

- Table 5 shows the voltage value that has been increased in step up transformer

Sl. No	Revolutions per minute (rpm)	Voltage generated(volts)
1	60	8.5
2	50	5.6
3	40	4.1
4	30	1.2
5	20	0.5
6	10	0

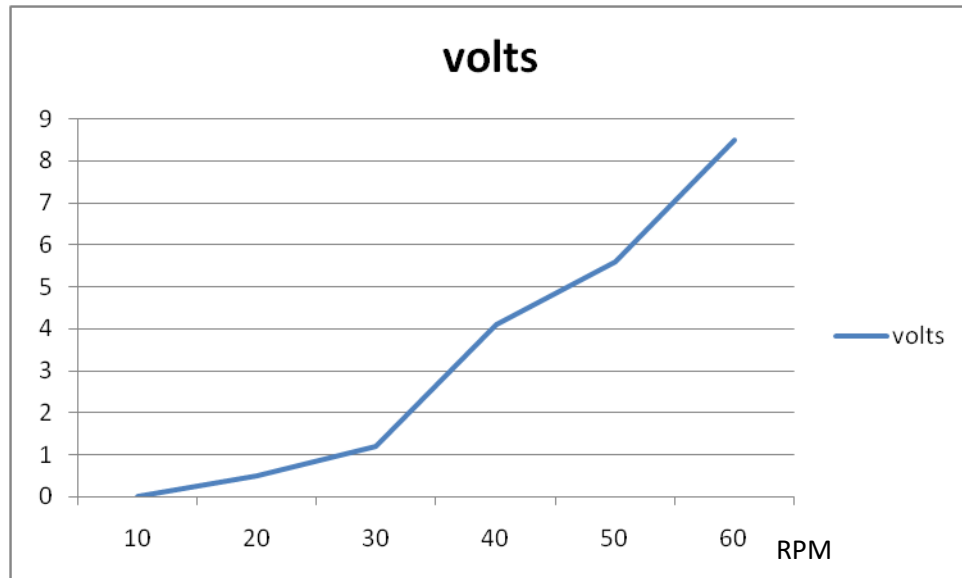


Fig. 7

**Figure 7** shows the rise of volt after passing through step up transformer. The voltage generated is then sent through the step up transformer where the voltage is increased. **Table 5** shows the increased values of the voltage after the voltage is passed through the step up transformer. The value is then used to plot the graph in M S Excel.

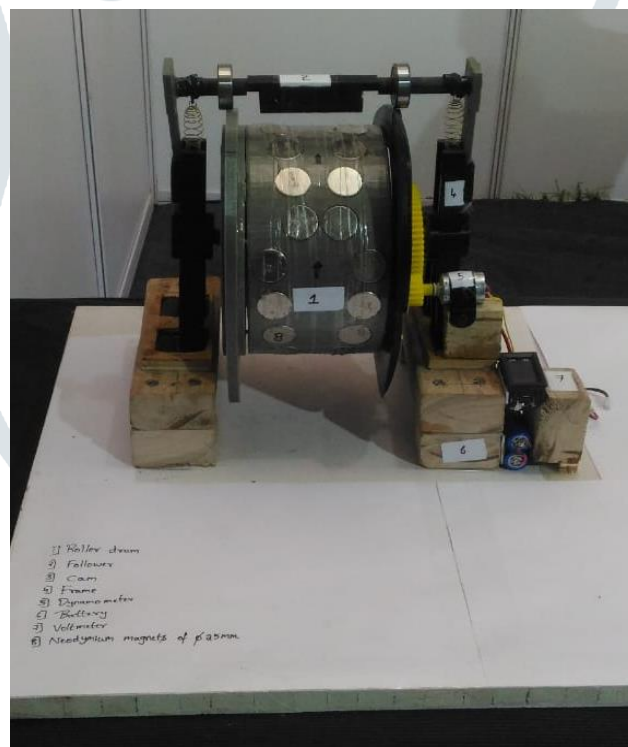


Fig.8

**Figure 8** shows the working model of the Magnetic power generator

### Conclusion:

It is a basic prototype which is used to generate energy without any external electric supply. As the weight of the UHMWP roller is more it is better to use even more light weight roller to gain more rotation hence weight plays a major role in gaining more RPM and voltage. This is basically a prototype which runs at an rpm of 80rpm and generates a voltage of about 8.5 volts through which a mobile phone can be charged. With suitable materials and a bigger model even more current can be produced. This product can also be used to generate electricity for vehicles. This prototype can replace alternative source of energy and renewable energy in the future.

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