# Energy Extraction from Permanent Magnet

Rupesh Kumar Choudhary
Diploma Scholar, Chhattisgarh Swami Vivekananda Technical University *(Bhilai) Chhattisgarh*

## Abstract

This paper presents way to extract energy from permanent magnet. Experiment done by using plane disk and magnet. Work done on the disk to reach unbalance point of magnetic field and rotational energy of disk after unbalance position is calculated. It is found that rotational energy is greater than work done which means extra energy is coming from magnet.

***Keywords;*** work done, energy, energy amplifier and magent.

## 1. Introduction

The recent change in environment conditions such as global warming and rapid increase in demand of energy lead to a need of a new energy source that is cheaper and sustainable with less carbon emission. Permanent magnets having ability to provide that type source of energy without emitting any harmful gases and for long time until it does not lose its magnetic property. Magnet having capability to provide pushing and pulling force in presence of other magnet but till date we don't have any method by which we can extract energy from magnet.

The potential energy of magnet is unlimited source of energy which depends on strength of magnetic field. So it's necessary to make a complete utilization of magnetic potential energy in available time.

Present experiment is done to prove that by unbalancing the magnet in other magnetic field we can extract energy from it. In that way we can use permanent magnets as energy source.

## 2. Experiment

### *2.1. Apparatuses*

The experimental apparatuses shown in Figure 1. A solid disk 230 mm diameter and hollow permanent magnet OD 52 mm, ID 25 mm and height 12 mm is used. Apparatuses made of two basic parts one is magnetic disk as shown in Figure 1 having two opposite pole magnets N and S, this disk is placed in rotable base other one is fixed magnet base. Distance between fixed magnets is 30 cm. An angle chart placed bellow magnetic disk to know angular displacement. A digital torque meter was used to measure torque to rotate magnetic disk in fixed magnetic field. A stop watch used to measure time taken for angular displacement.

### *2.2. Experimental procedure*

Magnet disk and fixed magnets is in equilibrium when all in one centre line as shown in Figure 2 (a) and (b). For doing this experiment magnet disk placed as shown in Figure 2 (b) and little pushing given towards clockwise (it can give anticlockwise also). Magnet disk starts rotate clockwise and it travels $\boldsymbol{\theta_2}$ degree in time t second. After $\boldsymbol{\theta_2}$ degree displacement it stops as shown in Figure 2 (c) and work is done to move disk $\boldsymbol{\theta_1}$ degree as shown in Figure 2 (d) to get it in unbalance condition. Work done for $\boldsymbol{\theta_1}$ degree displacement and rotational energy of disk after $\boldsymbol{\theta_1}$ degree is calculated.

Experiment is done for 0.25, 0.5, 0.75, 1 and 1.25 Kg of disk.

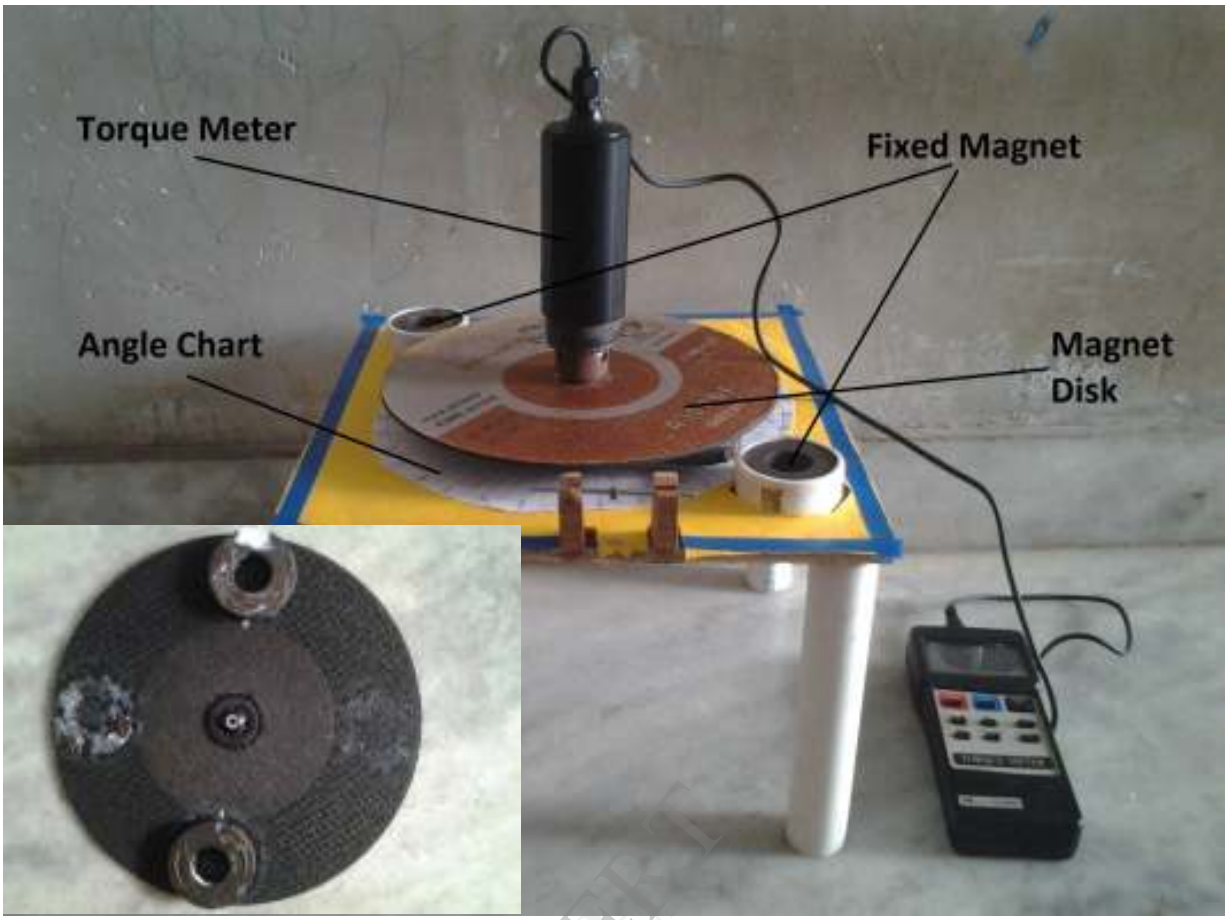
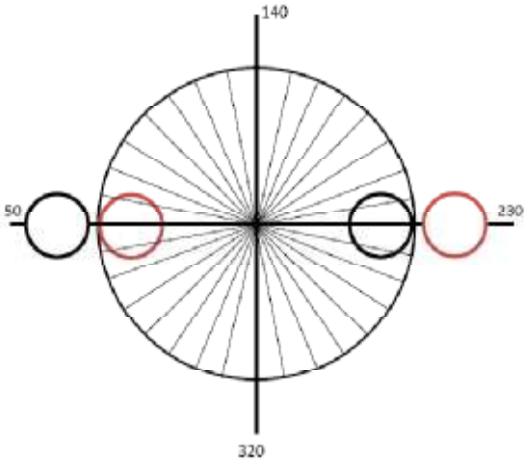
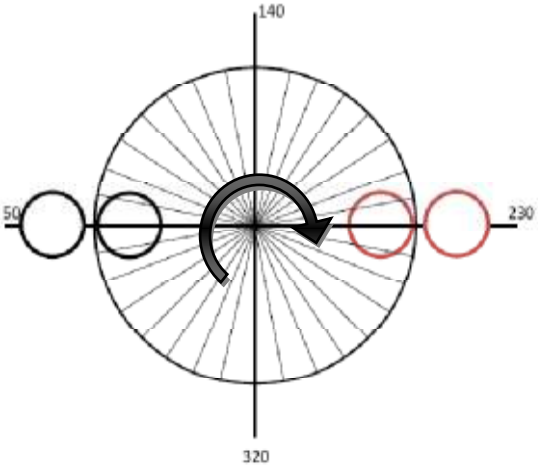



**Figure 1 Experiment Setup**

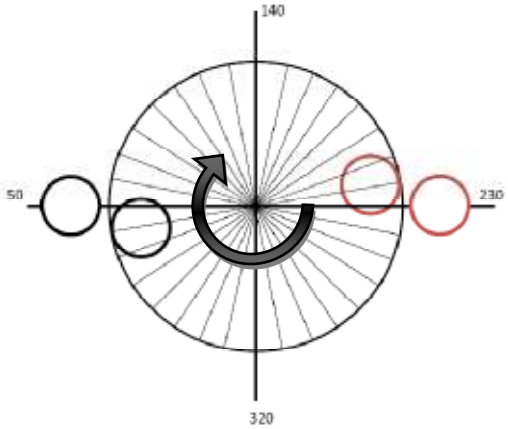




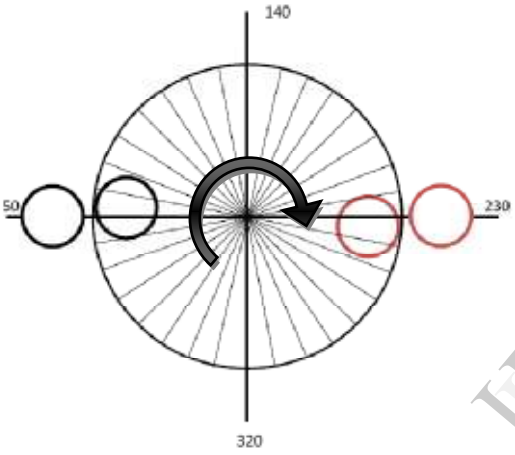

(a) Magnetic disk is in equilibrium position and magnets make series of N-S-N-S.




(b) Magnet disk is in equilibrium position and magnets in series of N-N-S-S.




(c) Magnet disk position after $\Theta_2$ degree displacement.




(d) Magnet disk is displaced $\Theta_1$ degree

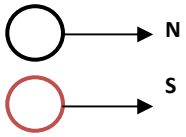



**Figure 2 Various position of disk with respect to fixed magnet**

*2.3 Calculations*

If disk rotates $\boldsymbol{\theta_1}$ degree with help of mean torque $\boldsymbol{\tau_{mean}}$ then work done can calculate using following formula,

$$\mathbf{W_1 = \tau_{mean} \times \theta_1} \quad \textbf{(1)}$$

Mean torque can calculated as,

$$\tau_{mean} = \frac{1}{n}(\tau_1 + \tau_2 + \cdots + \tau_n) \quad (2)$$

Where **n** is no of torque value taken while $\boldsymbol{\theta_1}$ degree displacement.

Now as per work energy theorem change in rotational energy is equal to work done. If initial angular velocity is **0** then work done,

$$W_2 = \frac{1}{2} I\omega^2 \quad (3)$$

Where **I** is moment of inertia and **ω** is angular velocity of disk.

For solid disk moment of inertia is,

$$I = \frac{1}{2} mr^2 \quad (4)$$

Where **m** is mass of disk and **r** is radius of disk.

Angular velocity for disk can calculate using following formula,

$$\omega = \frac{\theta_2}{t} \quad (5)$$

Where $\boldsymbol{\theta_2}$ is angular displacement in **t** second.

So final formula for calculating rotational energy from equation (3), (4) and (5) is,

$$\mathbf{W_2 = \frac{1}{4} mr^2 \frac{(\theta_2)^2}{t^2}} \quad \textbf{(6)}$$

Table 1

| Disk Mass (Kg) | Disk Radius (metre) | Energy Input | | | Energy Output | | | η % |
|---|---|---|---|---|---|---|---|---|
| | | $\Theta_1$ (rad) | $\tau_{mean}$ (Nm) | $W_1$ (joules) | $\Theta_2$ (rad) | t (sec) | $W_2$ (joules) | |
| 0.25 | 0.115 | 0.140 | 0.025 | 0.0035 | 6.140 | 2.5 | 0.0050 | 143 |
| 0.5 | 0.115 | 0.157 | 0.026 | 0.0041 | 6.123 | 3.4 | 0.0054 | 131 |
| 0.75 | 0.115 | 0.174 | 0.026 | 0.0045 | 6.106 | 4 | 0.0058 | 127 |
| 1 | 0.115 | 0.209 | 0.027 | 0.0057 | 6.071 | 4.5 | 0.0060 | 106 |
| 1.25 | 0.115 | 0.314 | 0.027 | 0.0085 | 5.966 | 5 | 0.0059 | 69 |

## 3. Result and Discussion

All data which obtained while experiment shown on Table 1. In Figure 3 it shown energy conversion efficiency is more than 100% for 0.25 kg load and it continues reducing and at last we it come bellow 100%.

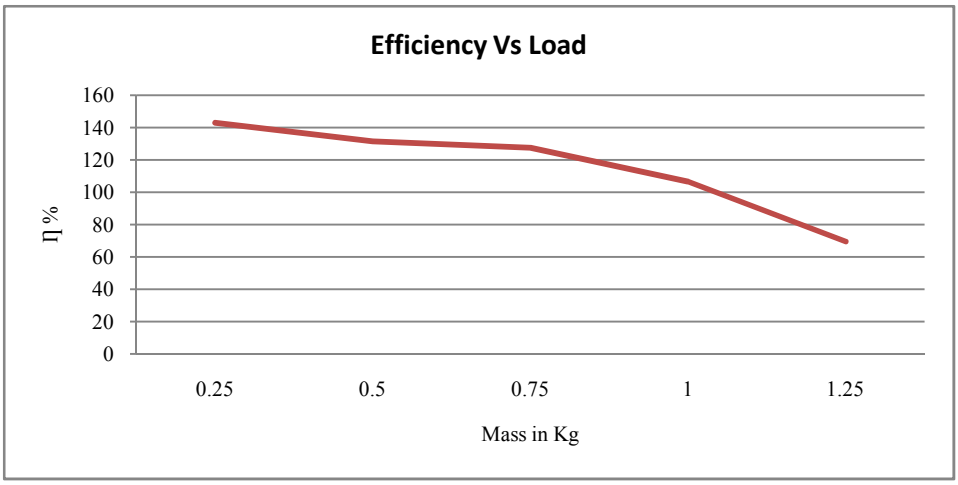



**Figure 3 Effect on efficiency with increasing mass**

But question is why efficiency of system is more than 100% from 0.25 kg to 1 kg load when we uses magnet? Even we know that as per second law of thermodynamics 100% energy or work can't be convert into other form work or energy due to loses. It will happen if any other energy source is available, in our case it is magnet. But how energy is coming from magnet even today it believes that magnet can't do work but how hear magnet is doing work?

This can understand in this way when the disk magnets **N** and **S** pole is near **N** and **S** pole of fixed magnet as shown in Figure 2 (d) then magnet disk feels torque towards clockwise. Because of torque disk rotates and comes at 320 degree after that **N** and **S** pole of disk magnet comes in attraction field of **S** and **N** pole of fixed magnet that cause again additional torque in clockwise direction start to work which increases the disk acceleration. When **N** pole of disk magnet crosses the **S** pole of fixed magnet or line of 50 degree then due to high rotational inertia attraction field of fixed magnet does not able to stop the disk. Now when disk magnet crosses line of 140 degree then repulsive force of fixed magnet tries to stop disk and it stops before line of 230 degree as shown in Figure 2 (c). That means disk rotates $\boldsymbol{\theta_2}$ degree due to magnetic field interaction, remaining $\boldsymbol{\theta_1}$ degree we have to do work. This work is very less compare to rotational energy of disk but as per work energy theorem work done to displace disk $\boldsymbol{\theta_1}$ degree should be equal to rotational energy of disk if disk starts from **0** angular velocity but it happens because of extra energy which comes from magnet.

In this way extra energy comes from magnet or magnet does works. Due to this extra energy efficiency of energy conversion is coming more than 100%.

## 4. Conclusion

It is found that output work is greater than input that means extra energy or work comes from magnet. Magnets can increase energy conversion efficiency that cause this method can use to amplify energy or work.



## References

[1] Halliday, Resnick and Jearl Walker, Principle of Physics, Wiley India Pvt. Ltd., 2012.

[2] Paul G. Hewitt, Conceptual Physics, Dorling Kindersley (India) Pvt. Ltd., 2012.

[3] H C Verma, Concepts of Physics 2, Bharati Bhawan, 2012.

[4] R. Ravi, P. Kamaraj and P. Ranganathan, Interactive Physics (Work, Power and Energy), MTG Books MTG Learning Media (P) ltd, 2012.

[5] Andre Cliché, Grand Unification in Science, Cybair Publishing Ltee. 2012.

[6] S.S. Bhavikatti, Engineering Mechanics, New Age International (P) Limited Publishers, 2012.

[7] R.S. Khurmi, A Textbook of Engineering Mechanics, S. Chand & Company Ltd, 2012.