Dyno-Drive: Turning Power into Motion

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Abstract: *Disc shaped neodymium magnets were placed in such a way that all the north poles or south poles are facing one direction. This magnet also produces a magnetic field, so both the magnetic fields repel each other, which causes the fins to move. By using the magnetic force of magnets continuous motion is generated which leads to generate an electric power. But at the same time there is misconception of free energy generator. By this research work, we certainly say that this free energy generator which leads a drastic change in today's modern world and this experimental design proves to be a pioneer in the field of research of free energy. Since there are cycling competitions that are conducted throughout the year, we could generate sufficient energy to charge small and large devices. But the problem is lots of other existing energy generation mechanism or generators generate energy by taking some physical contact with tire but we are developing this idea that could generates electricity without any friction with flywheel. This research report revolves around the construction, working and applications of free energy generator & its future enhancements*

Keywords: Neodymium Magnets, Freewheel, Medium-Density Fibreboard, Generator, Coils, Rechargeable Battery

I. INTRODUCTION

We are switching to a frictionless power generation system using a wheel in order to conserve energy and natural resources while still meeting our everyday needs. Because earlier methods for producing power with a wheel relied on dynamos and wind turbines, which are limited in their ability to produce more power, they required more wind energy for production and had less appealing aesthetics. This technology, which is founded on the electromagnetic induction theory, overcomes all the drawbacks of the aforementioned. methods. The battery holds this energy in reserve.

This technology is a manpower generator because it does not require an external power source to recharge the apparatus. During prolonged power outages, this technique is extremely helpful. It is a green method of energy production because it doesn't involve any fuel burning. Building clean energy without burning fuel, power, or any other non-renewable fuel was the project's primary driving force.

The inspiration for this project came from the fact that motors can produce electricity but only when there is friction. If we open a motor and look inside, we will see that there are coils called the stator and rotating magnets called the rotor, and there is an air gap in the middle. So why not put magnets on the wheels and fixed coil sets on the axle? With no friction, this mechanism can produce electricity.

II. LITERATURE REVIEW

K. Ghedamsi: Concept- The flywheel energy storage systems (FESSs) are suitable for improving the quality of the electric power delivered by electric motor. The applications of FESSs can be categorized according to their power capacity and discharge time. Recently developed FESSs have lower costs and lower losses. They can work for multiple hours instead of just several minutes or seconds. Besides, FESSs boast advantages like long life cycles, fast responses, and less sensitivity towards temperature and humidity. This gives FESSs the potential to replace electrochemical batteries in the grid and renewable energy applications.

Jamie Patterson, 2004: **Concept-** The broad goal of this project was the development and demonstration of a complete prototype Flywheel Power System (FPS) and successful proof of the feasibility of this energy storage technology.

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Michael Mathew, 2009: **Concept-** Flywheels serve as kinetic energy storage and retrieval devices with the ability to deliver high output power at high rotational speeds as being one of the emerging energy storage technologies available today in various stages of development, especially in advanced technological areas, i.e., spacecrafts. Mainly, the performance of a flywheel can be attributed to three factors, i.e., material Strength, geometry (cross-section) and rotational speed. While material Strength directly determines kinetic energy level that could be produced safely Combined (coupled) with rotor speed, this study solely focuses on exploring the effects of flywheel geometry on its energy storage/deliver capability per unit mass, further defined as Specific Energy.

B.Sneha, Dr. M. Damodar Reddy, October 2015: **Concept-** "Generation of Power from Bicycle Pedal". Dynamo attached to the cycle pedal can serves as a mechanism for converting mechanical energy from pedal to electrical energy. For running of appliances, we need to convert this dc power to ac power by using inverter. Output of the dynamo or generator depends on the pedalling speed. A hardware prototype of this model is developed and tested for various loads.

Suraj A.Sevatkar, Eknath M. Pise, Pravin S. Ghawade: **Concept-** "Design and Fabrication of Flywheel on A Bicycle Used as Kinetic Energy Recovery System". When riding a bicycle, a great amount of kinetic energy is lost while breaking.

III. PROBLEM STATEMENT

- **Loss of power:** In other system there are the various losses. Which include heat loss, friction loss etc. which causes major loss of energy for this frictionless energy must be needed.
- **More friction:** Due to the friction more amount of heat is generated in the system and also it causes wear and tear of the material, this heat causes the deflection of material, need to exert more power to the machine, it opposes the motion, produces noise, engine consumed more fuel.
- **Wastage of energy:** When energy is transfer between two bodies this total energy usually results in maximum kinetic energy loss of the system.
- **Low amount of fuel on earth:** There is a limited amount of fossil fuel. which found in rare places Each of those regions contains less than 15 percent of the world's proven reserves Worldwide. Demand for oil is accelerating rapidly worldwide while supplies remain finite.

IV. OBJECTIVE

- **Save Energy**: Flywheel is used in this project due to which kinetic energy is saved while normal & breaking the vehicle.
- **Reduce Friction:** Dynamo mechanism or regenerative braking system not used in this project coils & magnet concept to generate electricity frictionlessly.
- **No Air or Environment Pollution:** No fuel is required to run this project due to which no exhaust of pollutants take place.
- **Easy Power Generation:** As the vehicle is running the power generation takes place by itself and no need of extra efforts to generate power.
- **Low Cost:** Main constrain a Low-cost device middle class or small-scale industries or society can use it with the vehicles.

V. METHODOLOGY

To avoid Dynamo mechanism, we have designed this system. In this system, we are converting the kinetic energy to the mechanical energy. As we are converting electrical energy directly to the kinetic energy and then mechanical energy. Hence, there is no chance of energy loss and we get 100% energy output as given input without any friction. And there is no unwanted effect will be observed to the other parts. By using this energy, we can charge battery also. We can

make bicycle which can run on battery, so this friction-less energy generator will help to charge that battery or mobile or any other devices too.

To make this mechanism we are using some coils, strong magnets which are different from normal magnets which is called as "Neodymium Magnet". There is no physical contact like dynamo with tyre, just small coined size magnets are placed on the tyres, so when tyre rotates it will generate emf (electro-magnetic field) which will induced in coil. It generates electricity which is up to 230V. We are using the wheel which is connected to the pulley mounted on the same shaft and its diameter is less than the wheel diameter. Due to this, speed of rotation will increase. The Neodymium Magnets-Coil arrangements are mounted on the wheel.

Bike and Bicycle tyre are known to be richest source of kinetic energy. So, we are directly converting Kinetic energy to the Electrical energy. This works on the principle of Law of conservation that is, energy cannot be created nor be destroyed but it can only transform from one form to another form.

Components:

Neodymium Magnets-
- Dimensions: 40mm OD x 20mm ID x 10mm thick
- Magnetic Face; 40mm diameter
- Magnets Type; Neodymium
- Material: NdFeB,
- Grade: N52
- Plating /Coating: Ni-Cu-Ni (Nickel)
- Magnetization Direction: Axial/radial (Poles on Flat Ends)
- Hole type: single hole
- Max Operating Temp: 176ºF (80ºC)
- Quantity: 1 pc

Chain Drive-
Used to convey power to the wheels of a vehicle, particularly bicycles and motorcycles.

Freewheel-
A freewheel mechanism acts as an automatic clutch, making it possible to change gears in a manual gearbox, either up- or downshifting, without depressing the clutch pedal, limiting the use of the manual clutch to starting from standstill or stopping.

Medium-Density Fibreboard (MDF)-
It is generally cheaper than plywood, but it is not as hard and can sag under heavy weight.

Generator-
The axial flux generator design, these generators have air gap surface perpendicular to the rotating axis and the air gap generates magnetic fluxes parallel to the axis.

Rechargeable Battery-
Using the two 4v battery which are serially connected to each other.

Design Calculations:

Belt Drive Transmission-

Motor RPM = 1440rpm (standard motor)
Motor Pulley Diameter (Input) = 75mm
Large pulley Diameter (output) = 85mm
Centre Distance = 250mm
Output RPM = ? To find
Using formula we got the values,

1440/RPM of shaft 1 = 85/75
RPM of shaft 1   = 1270.58
RPM of shaft 1= N_2 = 1270.58

Chain Drive Transmission-
Rpm output of belt drive is input rpm of chain drive therefore,
Large sprocket RPM   = 1270
Large Sprocket diameter   = 120mm
Small Sprocket diameter   = 80mm
 Large sprocket teeth (input)   = 22
Small sprocket teeth (output) = 14
Centre Distance   = 400mm
Chain length   = 1000mm

Formula-

$$\frac{\text{RPM of Shaft 1}}{\text{RPM of shaft 2}} = \frac{\text{No of teeth on larger pulley}}{\text{No of teeth on smaller pulley}}$$

1270/RPM output = 22/14
RPM output   = 808

Hence the input speed of 1440 RPM is converted to 808 RPM to flywheel through a belt drive and chain drive. According to design Magnets will also rotate with same speed as flywheel.
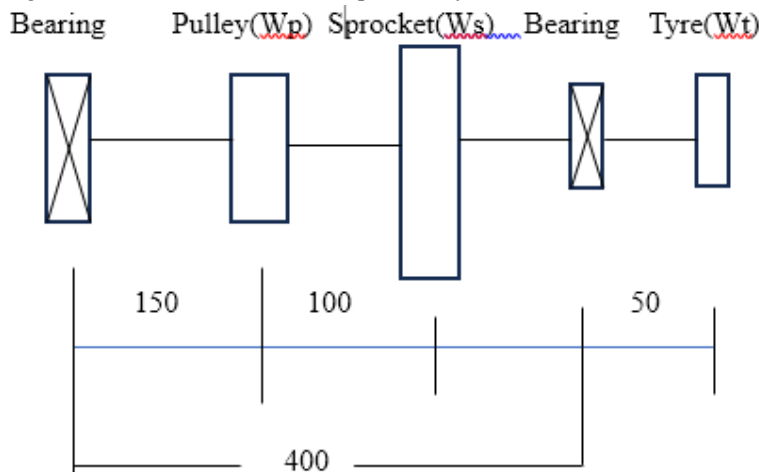
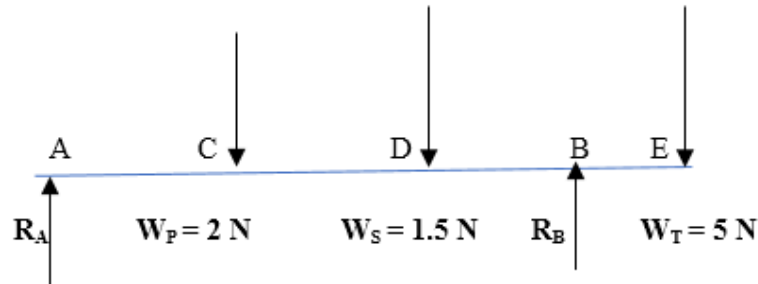Fig. 1. System Structure Diagram

Power transmitted by shaft,
 P = 2 π N T/ 60
 0.5 = (2π x 1270 x T) / (60*1000)
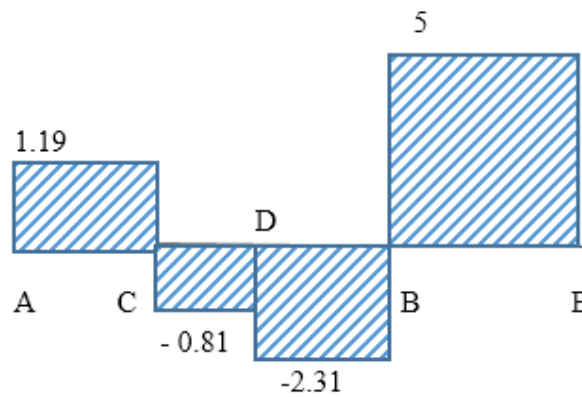 **T = 3.76 Nm**

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Load Diagram:

S. F. Diagram:

Fig.2 SF Diagram

After taking reactions, we get values,

R_A = 1.19N & R_B= 7.31 N

Similarly, max. bending moment at point C = 178.5Nmm

From above data we get equivalent torque,

T_{eq} = $\sqrt{[T^2 + M^2]}$ = 3.76 Nm

and shear stress value,

$Ʈ = (16 \times T_{eq})/ (\prod \times 0.02^3) = 2.3949$ N/mm^2

Allowable shear stress 60 N/mm2 ≥ Ʈ.

Hence, which results Design is Safe.

Mechanism:

In our design we have chosen to sandwich the coils between two attracting magnets. This design will increase the field density greatly improving the voltage output. The increased thickness of a coil would therefore increase the distance between the two magnets reducing the flux. A balance must be found between the amount of voltage required and the amount of current required. We have chosen to use a very high gage wire to increase the amount of voltage the generator can provide. If the generator is required to produce more current the coils can be replaced with those of a smaller gage wire.

Again, the force that is desired is the permanent magnet repelling force in the air gap of the magnet. This force will be obtained from equation but the flux ϕ is unknown at this point. Φ is going to be difficult to find in this situation because of the absence of finite analysis tools but approximations can be made to get a close estimate. Under normal operating conditions with no outside influence, it can be assumed that the flux distribution is proportional around a magnet as seen in given Figure,
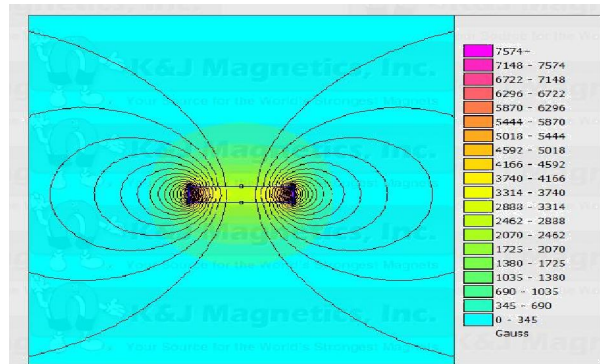
Fig. 3 Change in Flux Density

Consider, a disc magnet dimension from the supplier CatLog's. Diameter for disc magnet 25mm and thickness 3mm, From the website results of https://magnet.com.au/magnet-strength-flux-calculator.html We get the, magnetic field of neo-magnet = 0.1726 T (tesla).

So, each coil produces average voltage of 20.19V

After calculations, we get the values to describe our system,

R= 0.05544 mΩ

Current= 0.360750361 m Amp
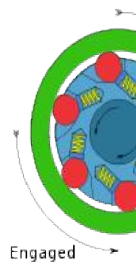
Power, P = 0.00721500722 Watt.

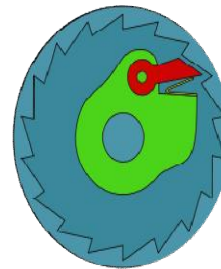Fig. 4. Freewheel Position- Engaged & free   Fig. 5. Freewheel Structure

VI. CONCLUSION

We can conclude that, the system arrangement generates electricity without any friction with wheel and it can be utilized in the maximum amount. The voltage output taken from the assembly is totally dependent on the rpm of the wheels so voltage is fluctuating so a battery is used to provide a constant power supply. A battery connected to the generator assembly is continuously charged when shaft moves at 80- 90 rpm which is normal speed of vehicle. By this assembly battery is continuously charging.

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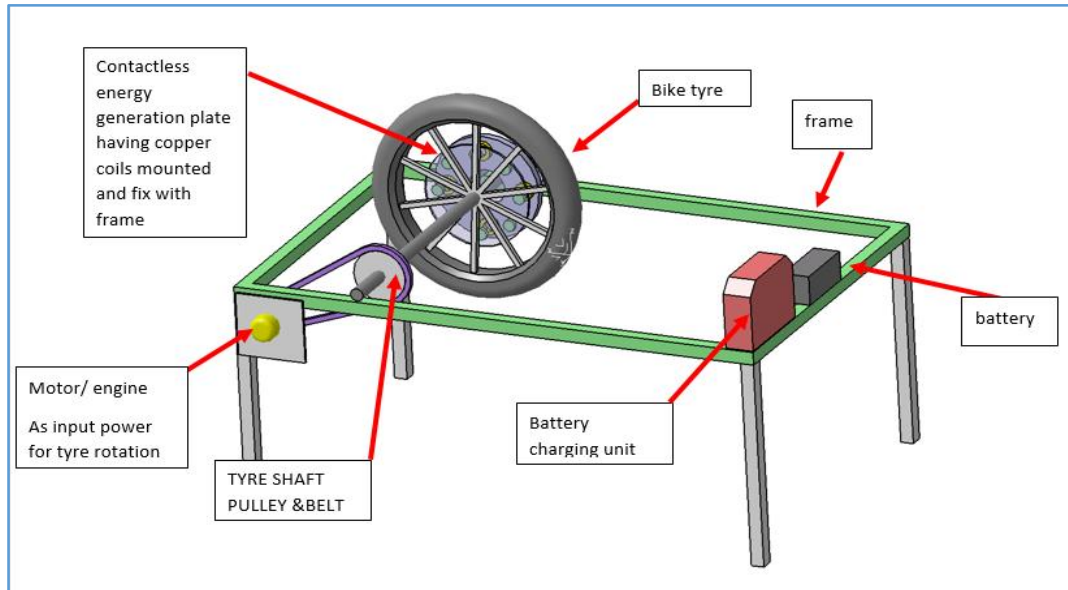
Final Project Structure Using CATIA

Fig 6. Dynamo-less electricity generation mechanism