Conventional Free Energy using Flywheel

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Abstract— This Paper deals with the concept of free energy and its generation using flywheel system. A mains motor of half horsepower capacity is used to drive a series of belt and pulley drive which form a gear-train and produces over twice rpm at the shaft of an alternator. The intriguing thing about this system is that greater electrical output power can be obtained from the output of the alternator than appears to be drawn from the input motor. This is done with the help of Gravity wheel. The gravity wheel or flywheel is coupled with the gear-train in order to produce more excess energy or free energy. Detail study is done with various parameters of flywheel to obtain the maximum free energy out of the system.

Key words: Conventional Energy, Free Energy, Flywheel, Gravity, Power System, Generator

Abbreviation

- HP- Horse Power
- AC- Alternating Current
- DC- Direct Current
- UPS- Uninterruptible Power Supply
- FES- Flywheel Energy Storage
- CVT- Continuously Variable Transmission
- KERS- Kinetic Energy Recovery System
- RE- Regenerative Energy
- KW- kilowatts

Nomenclature

- P = Power, kW
- d_1 = Diameter of driver pulley, mm
- d_2 = Diameter of driven pulley, mm
- N_1 = Speed of driver pulley, rpm
- N_2 = Speed of driven pulley, rpm
- Fa = Service Factor
- P_d = Design Power, kW
- L = Length of Belt, mm
- C = Center Distance, mm
- F_c = Correction Factor
- α = arc of contact
- P_r = Power Rating, kW
- Z = No. of Belts
- ω = Angular Speed, rad/s
- $K.E._f$ = Kinetic energy of flywheel, Nm
- I = Moment of Inertia, Kg m^2
- m = Mass of Flywheel, Kg
- r = Radius, m
- k = Flat solid disk of Uniform Thickness
- Syt = Yield Stress, N/mm^2
- τ = Permissible shear stress, N/mm^2
- Mt = Torsional Moment, Nmm
- W = Weight, Kg
- g = 9.81 m/s^2
- M_b = Bending Moment, Nmm
- L_{10} = Bearing Life, mill. rev
- L_{10h} = Bearing Life, hours
- C = Standard Load Bearing Capacity, N
- P = Dynamic Load Bearing Capacity, N

I. Introduction

Nikola Tesla once said that, all people should have energy sources for free. There is electricity everywhere present in limitless quantities and can drive the world's equipment without the need for gas, coal or oil.

Free energy means zero cost energy. Mechanical energy which drives windmill, or Solar energy in solar cell which is converts into DC current other energies obtained are from wind power, water power & telluric power. Free energy generator is a process to generate these types of energy.

Free energy suppression is the notion that corporate energy interests intentionally suppress technologies that may provide energy at very low cost. Other remaining untouched forces of nature which are well familiar in the scientific literature include earth batteries, atmospheric electricity, telluric currents, and pressure system changes.

The energy from perpetual motion is considered fantastical forces. These devices utilize quantum vacuum energy, quantum vacuum perturbation, rotating magnets, purported methods to crack hydrogen.

Free Energy generally means a method of drawing power without fuel to be burnt from the local environment, There are many different ways for doing this. These ways span many years and countries. The amount of power which can be obtained can be very high and the few kW needed to power a household are most definitely within the reach.

This concludes that energy can definitely obtain from the local environment in sufficient quantities so that our basic requirements are fulfilled. This basic fact and it is denied at every opportunity in conventional science appears determined not to accept it. It seems that root cause of this refusal to accept this fact are likely that given financial interests. The true scientific method is to improvement scientific theory by observed fact and new discoveries, but the true scientific method is not being followed at the present time.

Some of the methods which can be used as the free energy devices are as follows:

- Battery-Charging Pulsed Systems
- Moving Pulsed Systems
- Energy-Tapping Pulsed Systems
- Aerial Systems and Electrostatic Generators
- Motionless Pulsed Systems
- Fuel-less Motors
- Magnet Power
- Passive Systems
- Gravity-Powered Systems

II. HISTORY OF FLYWHEEL

Flywheels are around for about thousands of years. The initial application is the potter's wheel. Perhaps the most commonly used application in recent years is in internal combustion engines. A flywheel is a simple form of mechanical energy storing device. Energy is stored by rotating disc to spin about its axis. This energy is proportional to its mass and the square of its rotational speed.

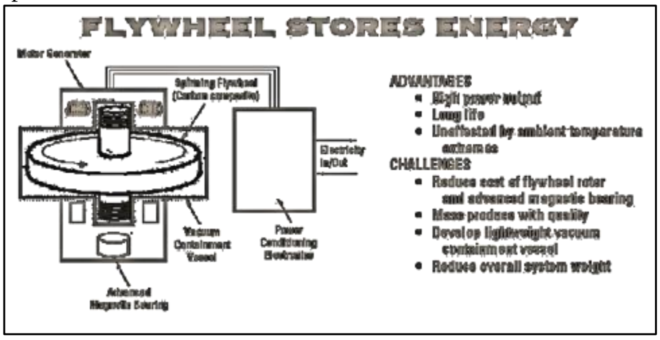

Fig. 1: Flywheel Stores Energy [2]

Advances in magnetic bearings, power electronics, and flywheel materials coupled with integration of mechanisms have resulted in DC supply flywheel energy storage systems that can be used as a supplement or auxiliary to batteries in UPS systems. Generally, more expensive than batteries in terms of the longer life, first cost, simpler maintenance, and smaller footprint of the flywheel systems makes them alternative to battery.

Introduction to Flywheel Energy Storage Kinetic storages, also known as FES, are used in many technical fields. Inertial mass is increase speed to a very high revolving speed and maintaining the energy in the system as rotational energy. The energy is transformed back by slowing down the flywheel. The available performance comes from Inertia effect and rotational speed.

Flywheel mass is either mechanically driven by CVT gear unit or electrically driven via electric motor / generator unit, mechanically driven composite flywheel, electrically driven flywheels Devices that use mechanical energy directly are being developed, but most FES systems use electricity to accelerate and decelerate the flywheel.

III. RELATED WORK

A. Design Consideration

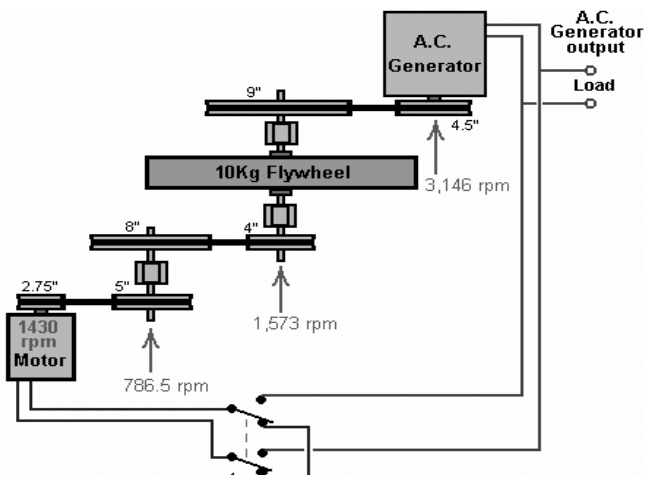

Fig. 2: Chas Campbell's Power Generation System [9]

Mr. Campbell recently demonstrated in Australia that flywheel electric system can generate power gain. But he fails to explain to the science community how energy gain from gravity using flywheel, when he applied examination request for patent grant.

But the fact is that, the generating system of the He produces a significant amount of free energy haggard from the gravitational. By confirming the extra energy by receiving the flywheel up to rapidity and then transferring the i/p drive motor to generator. The result is a self-powered system capable of running extra loads. In Oct '09, Lawrence Tseung demonstrate the energy addition gravity-based pulse theory. theory explains that excess energy = 2mgr (m = mass, g = gravitational, r = radius); fed into flywheel

There will be no gain in energy if flywheel is driven at constant speed. Conversely, there is energy taken from gravity if it is uneven. energy increases with increasing diameters, weight, coupling force & impulses of the flywheel.

From the book in reference no. 12 shows a diagram of a motor/generator. He kept it running for 3 years along with fully charged battery. There is also black and white portrait of a large structure version of the motor by Jim Watson. Which had generated extra output of many KW, due to very big size, weight of his flywheel. As mention, the free energy is acquired from the gravity. There are two factors elaborate. The 1^{st} is its weight, size & rotational speed of the flywheel & the 2^{nd} is connection between flywheel and drive motor effectiveness. [12]

B. Objectives of the Project

- The main objective of system is the utilization of gravity using the flywheel.
- The primary step for this is to increase ratio of input speed to output speed.
- The secondary step is to use the energy generated by the generator to the load bank.
- Obtaining the maximum output and calculating the maximum efficiency of the working model.

C. Principle

The aim of this project is to recover energy of flywheel by using principle of energy recovery system from flywheel and produce enough energy to run the project set up and also some additional energy to run external power supply.

The project is inspired from CHAS CAMPBELL's Generator. An AC motor is initially run with help of AC supply. The speed varies with help of pulleys with different diameters. After some time, the initial AC input supply is replaced by the output supply of generator.

IV. LITERATURE REVIEW

A. Referring the Book by Perry I-Pei TSAO

It introduces the key system design issues for flywheel energy storage systems. First, the energy storage requirements in hybrid electric vehicles are presented. Then integrated flywheel energy storage systems and their advantages are described. The motor requirements for flywheel systems and homopolar motors are discussed. This work describes the design of an combined gravity wheel energy storage system along with motor or generator of homopolar & a drive at high frequency for high power applications. A system level design method for integration, design detail & its analysis of the flywheel system motor/generator are shown. This thesis presents a brief information on application, competing energy storage of flywheel and its different technologies. [3]

B. Referring the book by Cibulka, J

This paper deals with the design of KERS by means of FES. This is currently under development both for road hybrid automobiles & motor sport. The aim of the work is the optimization and implementation to the electric & hybrid automobiles. Design of Simplified FES was made for Testing equipment for the experimental study. [2]

C. SJSU-RBS by Tai-Ran Hsu

This paper represents a flywheel-based RE recovery, storage & release system developed at laboratory. It can recover and store RE produced by braking motion generator with alternating rotary velocity such as the rotor of a wind turbo generator subject to irregular intake wind and the axels of electric & gas-electric automobiles during frequent braking & coasting. [13]

Releasing of the stored RE in the flywheel by the alternator is transformed to electricity. A proof-of-concept prototype called the SJSU-RBS, design, built and tested by students with able assistance of a technical staff in author's school.

A new regenerative braking system, the SJSU-RBS was developed with the design, construction and testing of a proof-of-concept prototype. It involves a fast spinning flywheel/alternator unit with a uniquely designed progressive braking system and an epicyclic gear train. This new SJSU-RBS can be readily adapted to power plants driven by renewable energies from alternating source such as solar, wind & hybrid gas-electric automobiles during braking & coasting.

The SJSU-RBS was proof-tested for its feasibility and practicality for the intended applications. Despite the success in the preliminary bench-top testing of the prototype of the SJSU-RBS as presented in the paper, a few key technical issues remain unsolved. Issues such as the optimal design of flywheel for maximum net recovery and storage of regenerative energies; quantification of aerodynamic and electromechanical resistance to the free spinning of the flywheel, and the effective and optimal control of the motion of the flywheel and the driving shafts, etc. will have significant effects on the performance of the SJSU-RBS or similar regenerative braking system for maximal recovery of regenerative energies in reality.

Further research on the detailed design and integration of the SJSU-RBS to wind power generating plants and EVs and HEVs for performance enhancements is desirable. The success of such integration will result in great economical returns to the renewable power generation industry. Efficient power generations by renewable energy sources by RBS will make significant contributions to the sustainable development of global economy and well-being of all humankind.

V. METHODOLOGY

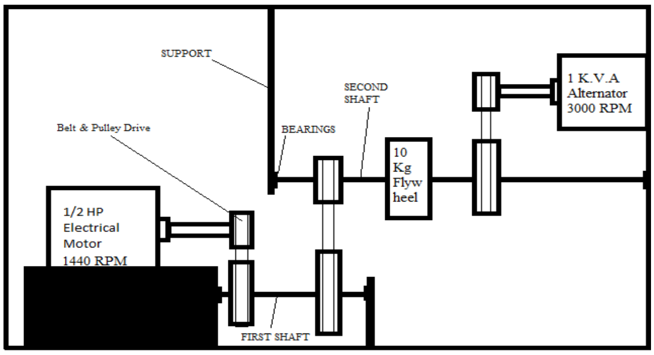

Fig. 3: Schematic Layout of our System

A. General Consideration:

In this System Design We Mainly Concentrate on the Following Parameters which can be seen in the fig. 3.The system consists of design of various parts like Pulley, Flywheel, Belt drive, Shaft, Bearings etc.

1) Design of Shaft and Bearings:

There are 2 shaft in the Layout of the system. Thus Design of Shaft is to be calculated in order to find the proper Shaft diameter which would withstand the load easily and to ensure the maximum energy is transfer with minimum loss. Bearing selection is also some important criteria in order to ensure smooth and long lasting functioning of the system.

2) Design of Belt Drive:

At the first stage we selected pulley as per standard specification. We know that a belt drive is useful for the power transmission using pulley. Each pulley has different diameters and speed. The belt, wire (rope) drives are used for the power transmission. In the project, we are going to use total six pulleys, so we need three different belt drives.

3) Design of Flywheel:

This Project is all about generation of free energy with using the gravitational energy. Thus we are using flywheel of mass 10kg that can utilize the gravitational energy and give us more output.

B. Input:

- P = Power of the motor = 0.5 kW
- N_1 = Speed of driver pulley = 1440 rpm
- d_1 = Diameter of driver pulley = 63.5 mm
- d_2 = Diameter of driven pulley = 127 mm
- Flywheel Diameter = 290 mm
- Angular speed of Flywheel = 1152 rpm
- Mass of Flywheel = 10kg

C. Shaft:

Shaft Material	Yield Stress N/mm^2	Shaft Length (mm)	Power transmitted (kW)	Speed of Shaft (rpm)	P1/ P2
M.S	250	610	0.5	720	2.5
M.S	250	610	0.5	4608	2.125

Table 1: Shaft Material Property [10]

1) For 1st Shaft

a) Calculate permissible stress

$$\tau \max = \frac{0.5 * Syt}{fs} \quad (1.1)$$

$$= \frac{.5 * 250}{3} \quad (1.2)$$

= 41.66 (1.3)

b) For torsional moment

$Mt=\frac{60*10^6*(kw)}{2\pi n}$ (1.4)

$=\frac{60*10^6*(0.5)}{2\pi 720}$ (1.5)

=6631.45 N-mm (1.6)

c) Bending moment

For pulley 1,

(P1-P2) *63.5=6631.45 (1.7)

(P1-P2) =104.43 (1.8)

Also, P1/P2=2.5 (1.9)

From eqn (1.8) & (1.9),

P1=174N P2=69.62 N (1.10)

The weight of the pulley is given by,

(P1+P2+W1) = (174+69.62+0.9*9.81) (1.11)

=252.44 N (1.12)

The bending moment at the bearing A is given by,

(Mb)at A =252.44*185 (1.13)

=46701.4 N-mm (1.14)

For pulley 2,

(P1-P2)*101.6=6631.45 (1.15)

(P1-P2)=65.27 (1.16)

Also, P1/P2=2.125 (1.17)

From eqn (1.16) & (1.17),

P1=123.27N P2=58.01 N (1.18)

The weight of the pulley is given by,

(P1+P2+W1) = (123.27+58.01+1.6*9.81) (1.19)

=196.97N (1.20)

The bending moment at the bearing A is given by,

(Mb)at A =196.97*225 (1.21)

=44318.25 N-mm (1.22)

d) Shaft diameter on strength basis

$\tau\ max = \frac{16}{\pi d^3}\sqrt{(Mb)^2 + (Mt)^2}$ (1.23)

$41.66 = \frac{16}{\pi d^3}\sqrt{(46701.4)^2 + (6631.45)^2}$ (1.24)

d=17.93mm (1.25)

So we choose,

d= 25 mm (1.26)

2) Bearing Selection for 1st shaft

a) Bearing Selection 1

Given:

n =720 rpm

L_{10h}=20000

P=252.44N

1) Bearing life

$L_{10}=\frac{60*n*L10h}{10^6}$ (2.1)

$=\frac{60*720*20000}{10^6}$ (2.2)

=864 (2.3)

2) Dynamic Load capacity

$C=P(L_{10})^{1/3}$ (2.4)

$=252.44(864)^{1/3}$ (2.5)

=2404.34 (2.6)

As per Standard bearing capacity C=14000 N

Bearing No: 6205 for d=25mm [11]

b) Bearing selection 2

Given:

n =720 rpm

L_{10h}=20000

P=196.9 N

1) Bearing life

$L_{10}=\frac{60*n*L10h}{10^6}$ (2.7)

$=\frac{60*720*20000}{10^6}$ (2.8)

=864 (2.9)

2) Dynamic Load capacity

$C=P(L_{10})^{1/3}$ (2.10)

$=196.9\ (864)^{1/3}$ (2.11)

=1875N (2.12)

As per Standard bearing capacity C=14000 N

Bearing No: 6205 for d=25mm [11]

3) For 2nd Shaft

a) Calculate permissible stress

$\tau max=\frac{0.5*Syt}{fs}$ (3.1)

$=\frac{.5*250}{3}$ (3.2)

=41.66 (3.3)

b) Torsional moment

$Mt=\frac{60*10^6*(kw)}{2\pi n}$ (3.4)

$=\frac{60*10^6*(0.5)}{2\pi*1152}$ (3.5)

=4144.65 N-mm (3.6)

c) Bending moment

For pulley 1,

(P1-P2)*63.5=4144.65 (3.7)

(P1-P2)= 65.27 (3.8)

Also, P1/P2=2.125 (3.9)

From eqn (3.8) & (3.9),

P1=123N P2=58N (3.10)

The weight of the pulley is given by,

(P1+P2+W1+W2) = (123+58+0.9*9.81+5*9.81) (3.11)

=239.16N (3.12)

The bending moment at the bearing A is given by,

(Mb)at A =239.16*285 (3.13)

=68160.86-mm (3.14)

For pulley 2,

(P1-P2)*101.6=4144.65 (3.15)

(P1-P2)=40.79 (3.16)

Also, P1/P2=2.125 (3.17)

From eqn (3.16) & (3.17),

P1=77N P2=36.26N (3.18)

The weight of the pulley is given by,

(P1+P2+W1) = (77+36.26+0.9*9.81+5*9.81) (3.19)

=171.139N (3.20)

The bending moment at the bearing A is given by,

(Mb)at A =171.139*295 (3.21)

=50486N-mm (3.22)

d) Shaft diameter on strength basis

$\tau\ max = \frac{16}{\pi d^3}\sqrt{(Mb)^2 + (Mt)^2}$ (3.23)

$41.66 = \frac{16}{\pi d^3}\sqrt{(68160.86)^2 + (4144.65)^2}$ (3.24)

d=20.28mm (3.25)

so we choose , [10]

d= 25 mm (3.26)

4) Bearing selection for 2nd Shaft

a) Bearing Selection 1

1) Bearing life

$L_{10}=\frac{60*n*L10h}{10^6}$ (4.1)

$=\frac{60*1152*60000}{10^6}$ (4.2)

=1382.4 (4.3)

2) Dynamic Load capacity

$C=P(L_{10})^{1/3}$ (4.4)

$=239.16\ (1382.4)^{1/3}$ (4.5)
$=2664.19N$ (4.6)

As per Standard bearing capacity C=14000

Bearing No: 6205 for d=25mm [11]

b) Bearing selection 2

1) Bearing life

$L_{10}=\frac{60*n*L10h}{10\wedge 6}$ (4.7)

$=\frac{60*1152*20000}{10\wedge 6}$ (4.8)

$=1382.4$ (4.9)

2) Dynamic Load capacity

$C=P(L_{10})^{1/3}$ (4.10)

$=171.139\ (1382.4)^{1/3}$ (4.11)

$=1906.45$ (4.12)

As per Standard bearing capacity C=14000 N

Bearing No: 6205 for d=25mm [11]

Shaft no.	Bearing No.	d mm	Standard Bearing Capacity (N) C
i (1)	6205	25	14000
i (2)	6205	25	14000
ii (1)	6205	25	14000
ii (2)	6205	25	14000

Table 2: Bearing Selection [10]

D. Belt Drive

1) For the first two pulleys,

We know that,

$\frac{d2}{d1}=\frac{N1}{N2}$ (5.1)

So putting values in above equation,

$\frac{127}{63.5}=\frac{1440}{N2}$ (5.2)

$N_2=\frac{1440}{2}$ (5.3)

$N_2=720$ rpm (5.4)

Now select correction factors according to service (service factor) for system from Design Data Book, [10]

Fa=1.2

Design power = P_d = service factor * Power to be transmitted

$= 1.2 * 0.5$ (5.5)

$P_d = 0.6$ kW (5.6)

We selected V-belt type according to power transmission, We selected as "A" type V-belt from the design data book which has,[10]

Pitch width = 11mm

Nominal Pitch Width = 13mm

Nominal Height = 8 mm

Assume center distance between two pulleys

By empirical formula,

C = (d1+d2) +100 (5.7)

= 127+63.5+100 (5.8)

=290.5 ~ 300 mm (5.9)

Now we find the length of belt used for drive,

$$L = 2C + \frac{\pi(d1+d2)}{2} + \frac{(d2-d1)^2}{4C} \quad (5.10)$$

$$L = 2*300 + \frac{\pi(127+63.5)}{2} + \frac{(127-63.5)^2}{4*300} \quad (5.11)$$

L = 902.59 mm (5.12)

From Data Book,

we selected standard belt length as 990 mm. [11]

Now calculate actual center distance between pulleys,

$$990 = 2C + \frac{\pi(127+63.5)}{2} + \frac{(127-63.5)^2}{4C} \quad (5.13)$$

On solving,

C =516.41 mm (5.14)

Now select correction factors for belt pitch length for system from table of Design Data Book, [10]

Fc = 0.88

Now calculate the arc of contact for the smaller pulley,

$$\alpha = 180 - 2 * \sin^{-1}\frac{d2-d1}{2C} \quad (5.15)$$

$$\alpha = 180 - 2 * \sin^{-1}\frac{127-63.5}{2*516.41} \quad (5.16)$$

$$\alpha = 172.95 \quad (5.17)$$

Now select correction factor for arc of contact, [10]

Fd = 0.99

Depending upon the type of cross-section, now we determined power rating (Pr) of single V-belt

It depends upon three factors- Speed of faster shaft, pitch diameter of smaller and speed ratio.

Pr = 0.91+0.17 (5.18)

= 1.08 kw (5.19)

Now number of belts,

$$Z = \frac{P*Fa}{Pr * Fc*Fd} \quad (5.20)$$

$$Z = \frac{0.6*1.2}{1.08*0.88*0.99} \quad (5.21)$$

Z = 0.765~ 1 (5.22)

We increasing pitch width of V- belt instead of using more number of belts, so we are using only one belt.

a) For Third and Fourth Pulleys

Diameter of driver pulley = d_3= 8"= 203.2 mm

Diameter of driven pulley = d_4= 5"=127 mm

Speed of driver pulley = N_3= 720rpm

We know that,

$\frac{d3}{d4}=\frac{N4}{N3}$ (6.1)

So putting values in above equation,

$\frac{203.2}{127}=\frac{N4}{720}$ (6.2)

$N_2 = 1152$ rpm (6.3)

Now select correction factors according to service (service factor) for system, [11]

Fa=1.2

Design power = P_d = service factor * Power to be transmitted

= 1.2 * .5 (6.4)

= 0.6 kW (6.5)

We selected V-belt type according to power transmission, we selected as "A" type V-belt which has, [10]

Pitch width = 11mm

Nominal Pitch Width = 13mm

Nominal Height = 8 mm

Assume center distance between two pulleys

By empirical formula,

C = (d2+d4)+100 (6.6)

= 203.2+127+100 (6.7)

=430 mm (6.8)

Now we find the length of belt used for drive,

$$L = 2C + \frac{\pi(d3+d4)}{2} + \frac{(d3-d4)^2}{4C} \quad (6.9)$$

$$L = 2*430 + \frac{\pi(203.2+127)}{2} + \frac{(203.2-127)^2}{4*430} \quad (6.10)$$

L = 982.08mm (6.11)

we selected standard belt length as 990 mm. [10]

Now calculate actual center distance between pulleys,

$$990 = 2C + \frac{\pi(203.2+127)}{2} + \frac{(203.2-127)^2}{4C} \quad (6.12)$$

On solving,

C = 471.15 mm (6.13)

Now select correction factors for belt pitch length for system, [10]

Fc = 0.88

Now calculate the arc of contact for the smaller pulley,

$$\alpha = 180 - 2 * \sin^{-1}\frac{d3-d4}{2C} \quad (6.14)$$

$$\alpha = 180 - 2 * \sin^{-1}\frac{203.2-127}{2*471.15} \quad (6.15)$$

$$\alpha = 170.72 \quad (6.16)$$

Now select correction factor for arc of contact, [10]

Fd = 0.98

Depending upon the type of cross-section, now we determined power rating (Pr) of single V-belt. It depends upon three factors- Speed of faster shaft, pitch diameter of smaller and speed ratio.

Pr = 1.38+ 0.10 (6.17)

= 1.48 kw (6.18)

Now number of belts,

$$Z = \frac{P*Fa}{\Pr * Fc*Fd} \quad (6.19)$$

$$Z = \frac{0.6*1.2}{1.48*0.88*0.98} \quad (6.20)$$

Z = 0.56 ~ 1 (6.21)

b) For Fifth and Sixth Pulleys

Diameter of driver pulley = d_5= 8”= 203.2 mm

Diameter of driven pulley = d_6= 3”=76.2 mm

Speed of driver pulley = N_5= 1152 rpm

We know that,

$$\frac{d5}{d6} = \frac{N6}{N5} \quad (7.1)$$

So putting values in above equation,

$$\frac{203.2}{76.2} = \frac{N6}{1152} \quad (7.2)$$

N 5=3072rpm (7.3)

Now select correction factors according to service (service factor) for system, [11]

Fa=1.2

Design power = P_d = service factor * Power to be transmitted

= 1.2 * .5 (7.4)

P_d = 0.6 kw (7.5)

We selected V-belt type according to power transmission,

we selected as “A” type V-belt which has, [11]

Pitch width = 11mm

Nominal Pitch Width = 13mm

Nominal Height = 8 mm

Assume center distance between two pulleys

By empirical formula,

C = (d5+d6)+100 (7.6)

= 203.2+76.2+100 (7.7)

=379.4 ~ 400 mm (7.8)

Now we find the length of belt used for drive,

$$L = 2C + \frac{\pi(d5+d6)}{2} + \frac{(d5-d6)^2}{4C} \quad (7.9)$$

$$L = 2 * 400 + \frac{\pi(203.2+76.2)}{2} + \frac{(203.2-76.2)^2}{4*400} \quad (7.10)$$

L = 1248.96 mm (7.11)

We selected standard belt length as 1250 mm. [11]

Now calculate actual center distance between pulleys,

$$1250 = 2C + \frac{\pi(203.2+76.2)}{2} + \frac{(203.2-76.2)^2}{4C} \quad (7.12)$$

On solving,

C = 801.03mm (7.13)

Now select correction factors for belt pitch length for system, [11]

Fc = 0.98

Now calculate the arc of contact for the smaller pulley,

$$\alpha = 180 - 2 * \sin^{-1}\frac{d5-d6}{2C} \quad (7.14)$$

$$\alpha = 180 - 2 * \sin^{-1}\frac{203.2-76.2}{2*801.03} \quad (7.15)$$

$$\alpha = 170.9 \quad (7.16)$$

Now select correction factor for arc of contact, [10]

Fd = 0.98

Depending upon the type of cross-section, now we determined power rating (Pr) of single V-belt

It depends upon three factors- Speed of faster shaft, pitch diameter of smaller and speed ratio.

Pr = 2.54+ 0.16 (7.17)

= 2.7 kw (7.18)

Now number of belts,

$$Z = \frac{P*Fa}{\Pr * Fc*Fd} \quad (7.19)$$

$$Z = \frac{0.6*1.2}{2.7*0.98*0.98} \quad (7.20)$$

Z = 0.27~ 1 (7.21)

E. Flywheel

1) Angular velocity (ω)

$$\omega = \frac{2\pi n}{60} \quad (8.1)$$

$$= \frac{2\pi*1152}{60} \quad (8.2)$$

=120 rad/sec (8.3)

ω^2 = 14552 rad/sec (8.4)

2) Moment of inertia (I):

Moment of inertia quantifies the rotational inertia of a rigid body and can be expressed as,

$I = k\ m\ r^2$ (8.5)

where

k =inertia constant –depends on the shape of the flywheel

m = mass of flywheel (kg)

r = radius (m)

k=Flat solid disk of uniform thickness

= 0.606 (8.6)

Therefore,

$I=0.606*10*0.290^2$ (8.7)

I= 0.606*10*0.0841 (8.8)

I =0.50964 kg-m^2 (8.9)

3) Kinetic Energy

The Kinetic energy of a flywheel can be expressed as,

$K.E._f = 1/2\ I\ \omega^2$ (8.10)

Where,

$K.E._f$ = flywheel kinetic energy (Nm (Joule)

I = moment of inertia (kg m2)

ω = angular velocity (rad/s)

Kinetic energy of flywheel:

$K.E._f = 1/2\ I\ \omega^2$ (8.11)

=1/2 0.50964*14552*9.81 (8.12)

=36339.77 N-m (8.13)

VI. FINAL OUTPUT

The total output of the Designed System is the obtained Output of the Alternator.
Motor input = 0.370 KW
Alternator Output = 0.450 KW
We know,

$$\text{Total Efficiency } (\eta) = \frac{\text{Total ALternator Output obtained(kW)}}{\text{Total Motor Input given (kW)}}$$

$$\text{Total Efficiency } (\eta) = \frac{0.45}{0.37}$$

= 1.21

Therefore, extra 21% output is obtained from the system.

VII. FUTURE ASPECT

1) Changing the Flywheel's weight, size, structure and speed, changes the output of the alternator.
2) If higher specifications system is used such as 8HP motor, 150kg flywheel could produce 50% more free energy at the output alternator.
3) Such high end system could extend the life of exhaustible nonrenewable resources for more than 50% of its current life.

VIII. CONCLUSION

We have obtained 21% extra electrical output which is our free energy. The AC generator have produce 450 W of electricity by using of flywheel from 0.5 HP motor.

The other main advantage of Conventional Free energy using flywheel is that it can generate energy without extra equipment and this free energy generation is non-hazardous and environmental friendly.

Can be use in various applications like electric fuel cars, and increase the efficiency of traditional electrical Equipment's.

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