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Design and Construction of Fuel-less Generator as Free Energy Generating System

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Authorship Declaration

This is to certify that the work given in this Project titled "Design and Construction of Fuel-less Generator as Free Energy Generating System" is the result of research conducted under the supervision ofDr. Md. Fokhrul Islam, Professor, Islamic University of Technology. This Project has been prepared in partial fulfilment of the requirement for Degree of Bachelor of Science in Electrical and Electronics Engineering.

Signatures of the Candidates

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List of Abbreviations

AC Alternating Current

DC Direct Current

CO2 Carbon Dioxide

kW Kilowatt

kWh Kilowatt-hour

ke Kinetic Energy

Hz Hertz

kva Kilo-watt-ampere

ABSTRACT

The generation, transmission, and distribution of electricity are all interconnected. Due to the depletion of conventional fossil fuels and the associated environmental damage, power generation from renewable sources is crucial for sustainable development. The goal of this project is to design and construct a system for producing free energy with a fuel-less generator. A fuel-less generator is an engine that generates electricity without the use of (petrol, gas, diesel, oil, grease, or sunshine). A rechargeable battery fuels the DC motor that drives the drive mechanism. When the starting button is depressed, the DC motor rapidly turns the alternator's armature in the field coil, providing 220V of output alternating current.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Man'sMan's requirement for information and quest for it has prompted headway and improvement in all features of presence. It is difficult to exaggerate how significant development is to the development and headway of different features of human life. In any case, as development has spread over the long run, different features of human life have been significantly affected. The improvement of electrical power is one of development's outstanding results. Albeit the specific operations of power are obscure, examination uncovers that it contains a small unfortunate charge known as an electron. At the point when these electrons are static, contact is intended to create power, and when they are, areas of strength for moving should be delivered. Power age and scattering has been a basic compute the headway of an economy, going from collecting, banking, media, clinical consideration, and flying (Cibulka, 2009).

The fuel-less engine frequently works unimaginably unobtrusively and easily, and the most amazing aspect of the plan is that it is liberated from air contamination since there is no arrival of hazardous gases like carbon monoxide (CO), carbon dioxide (CO2), etc. The speed can be modified to run at a solitary speed with an engine that consumes no sort of gas, oil, or other burnable fuel. Yet again the free electrical energy conveyed by the fuel-less generators is displaced into the motor and reused by the motor (James, 2005).

Using the power created by a vehicle or boat battery or from biologically well disposed power sources like sun based controlled chargers or wind turbines, fuel-less generators are utilized to work electrical hardware. Batteries store DC power, but most of electrical gadgets require AC ability to work, thus a generator is important to change over the DC power into a construction that can be utilized. The generator just creates unadulterated sine waves as its wave type. The result voltage of a sine-wave generator has a sine wave structure like the sine wave kind of the mains/utility voltage in unadulterated sine-wave. A sine wave's voltage rises and falls flawlessly with an effectively movable organizing point and furthermore switches limit immediately when it arrives at 0 Volts.. Fuel-less generators are used to power fragile

electronic devices that need the best waveform possible with the least amount of consonant contortion. They have a high flood limit in expansion, which means they can momentarily exceed their assessed wattage. This enables power engines to operate efficiently and draw up to multiple times their estimated wattage when they first ignite. A pure sine generator's output will enable practically any electronic device to function. The flywheel appeals for usage as an energy storage device primarily due to four characteristics: Long cycle life; no long-term corruption; easily measurable condition of charge; high power thickness.

1.2 Problem Statement

Fuel generator causes Environmental pollution and produces smoke which leads to degradation or depletion of ozone layer and the smoke affect human health which is one of the major problems caused by the use of generator with fossil fuels other problem includes land, water pollution, Noise pollution, Increase in price of fossil fuel year in year out, among others. All these problems led to the idea of generation electricity that produces no noise and smoke.

1.3 Aims of the Project

A basic generator can provide all the electricity we need, however all generators need fuel to produce electricity.

The project's goal is to build a generator that can produce electricity without the use of fuel, recover energy from a flywheel using a standard energy recovery system, and produce enough energy to power the project's setup with only a small amount left over to power an external power source.

1.4 Objectives of the Project

- To build the fuel-free generator with materials that are readily available locally.
- To investigate the information and result attributes of the planned generator.
- To make use of the flywheel's gravitational energy.
- To power a load bank with the energy produced by the flywheel generator.

- To compare flywheel technology with other developments for energy capacity frameworks.

1.5 Benefits envisioned for the project

- Reduce business failure due to lack of electricity.
- Create job opportunity.
- Reduces environmental pollution.
- It requires very low maintenance.
- It operates noiseless which is environmental friendly.

1.6 Formation of the Project

Our entire report is divided into 5 chapters. The chapters are summarized as follows:

The general introduction to the project is covered in Chapter 1. The literature evaluations on the fuel-less generator are included in Chapter 2. The methods utilized to fabricate the project design are displayed in Chapter 3 along with the various materials that were employed. Chapter 4 displays several project outcomes. Chapter 5's Conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This section targets surveying important writing on the point. Under this section, terms such as knowledge of generators will initially be visualize trailed by right on time and later advancements of the fuel-less generator. Additionally, this part will likewise zero in on the different works done by analysts on a similar point and conclude the holes that might be viewed as in their explores.

A generator that can produce electricity without using fossil fuel is referred to as fuel-less. However, it draws on more resources to provide more environmentally friendly, sustainable energy. The best feature of the design is that it is devoid of air pollution and noiseless, and it typically works extremely smoothly and quietly.

2.2 Historical Background

The usage of flywheel to store energy is positively not another development. Basic flywheels like stone wheels were used to make stoneware quite a while ago. The stone wheel smoothens the beat power from the foot and enabled a smooth turn of the pottery turntable. Under the cutting edge insurrection the use of the flywheel extended on a very basic level when the steam engine was introduced. During this period mechanical headway of flywheels started. The primary accomplishment was when Dr. A Stodola showed that particular shapes yield uniform tension course for isotropic materials. The accompanying accomplishment in flywheel progression happened during 1970's when applications for support power and electric vehicles were proposed. During this period flywheels made

of composite material was proposed and collected. The headway happened during the 1980's when appealing bearing were introduced. Later progressions in materials, alluring course, microcomputers and power equipment have made it possible to consider flywheels serious decision for electric energy storing (Bitterly, 1997).

In spite of the fact that flywheels have been in need for millennia to store brief beats of energy, it was not until the most recent hundred years that the innovation turned out to be adequately evolved to license flywheels to store energy for generally significant stretches of time. For instance, advancement of the American Howell torpedo started in 1883. Its only drive energy source was a steel flywheel that was turned up through a steam turbine, giving adequate energy to permit the torpedo's propellers to drive the weapon for a few minutes at fast. Utilization of the flywheel as the energy source in this framework brought about a maritime torpedo that had a more prominent speed and reach than some other than in presence. Additionally, it left no wake, didn't change trim, and, being flywheel settled, was very exact.

2.3 Impact

With the expansion in total population and the ascent of expectations for everyday comforts, the interest for energy on the planet is consistently expanding. Worldwide natural issues and depletion of fossil assets additionally present difficult issues for energy utilization (Houghton, 1989). Natural cordial energy innovation and a shift to non fossils energy assets, for example, regular energy and biomass are normal.

For the most part, from the past endeavors of so many analysts it very well may be derived that quest for environmentally friendly power is significant concerning supportable energy all through the world. Subsequently working rule of electromagnetic generator, for example, fuel-less power creating set plan, development and assessment is of generally significant.

Power created from non-renewable energy sources stays one of the greatest polluters of our current circumstance. Studies have shown that the assessed CO2 outflows from the worldwide electrical power industry are north of 33 billion tons yearly.

This devastatingly affects the World's environment. The expansion in degrees of air carbon dioxide builds the nursery impact that causes a dangerous atmospheric devation.

The story doesn't end here. Different discharges may likewise be delivered relying upon the sort of non-renewable energy source and the strategy for copying. Sulfur and nitrogen oxides cause exhaust cloud and corrosive downpour, for instance.

Not just service organizations and modern plants depend on power age by consuming petroleum products. The sporadic power supply circumstance in many agricultural nations likewise powers individuals to utilize generators to drive their homes and working environments.

Social activists and associations are driving the charge against petroleum products yet numerous specialists dread that our endeavors are nearly nothing and past the point of no return. Unsalvageable harm has previously been caused to the planet.

In any case, we should perceive our aggregate liability to safeguard this planet for a long time into the future. This implies putting resources into cleaner techniques for power age and lessening our utilization of non-renewable energy sources.

2.4 Development of Fuel-less Generator

Fuel-less Generator; A machine and a device based on the principles of Advanced Physics, which was put in place by a Siberian born physicist, an electrical Engineer and as well a mechanical Engineer Nikola Tesla.

All things considered, the idea of an efficiently manufactured fuel-less motor has stayed a fascinating recommendation to designs today. Many papers have been composed on the practicality of building such a motor in view of crafted by Tesla. At gatherings and career expos, it is actually normal to find engineers who talk on the side of the possibility of Tesla's fuel-less motor occasionally, little scale models were developed. Nonetheless, it doesn't seem, by all accounts, to be at this functioning model that can be delivered for use in industry or by the overall people (Abatan, 2013).

The first created of a fuel-less generator by utilizing nearby material was finished by J.O Otulana etal (2015). They utilized 1hp direct current engine, fueled by a 12volts battery, which spines the 0.95KW alternator to create power with output force of 1Kva, and simultaneously re-energizing the battery through a diode.

Power system from a fuel-less motor in a solitude power making frame work was created by S.Bala Iyappa(2014). Non-conventional energy sources has become apparent because of in light of quick consumption of ordinary energy sources a non traditional methodology is been carried out at this point. For instance; wind, solar, bioenergy and hydro power energy is becoming well known sustainable power sources. These cycles tend to decrease reliance on the utilization of petroleum/diesel generators.

2.4.1 Advantages

- They can run for hours without a need to recharging

- Has the capability of carrying machine loads
- Low cost of maintenance
- They do not make noise
- No breeding of smoke
- Ability to charge itself while in use
- It is good as being used indoors

2.4.2 Dis-advantages

- Damages easily if it comes in contact with water
- 2. Not useful if its batteries die
- 3. Its efficiency depreciates as time goes on
- 4. Cannot long for a long time without breakdowns
- 5. Recharging is quite expensive

2.5 Summary

A thorough writing survey has uncovered that the venture deals with the fuel-less generators as been effectual, enough electrical power yield has been acquired for each situation, which can translate an answer for electric power shakiness in the world. Notwithstanding, the previous work have not laid a lot of accentuation on the expense decrease consider creating the fuel-less generator, also, the presentation boundaries to upgrade the productivity of the fuel-less generator, subsequently the focal point of this undertaking work is to investigate the crucial exhibition boundaries influencing the execution of the fuel-less generators and another methodology for getting peak proficiency from the generator, which obviously is the consolidation of the flywheel.

CHAPTER THREE

MATERIALS AND METHODS

The design limitations were extensively examined by carefully reviewing the literature survey and selecting the best possible design for the most efficient outcomes to improve the project's workability.

3.1 Design Concept

The fuel-less energy generator with a flywheel is made up of four key components, as indicated in Figure: the power supply unit, the generating unit, the power supply unit, and the frame/transmission unit.

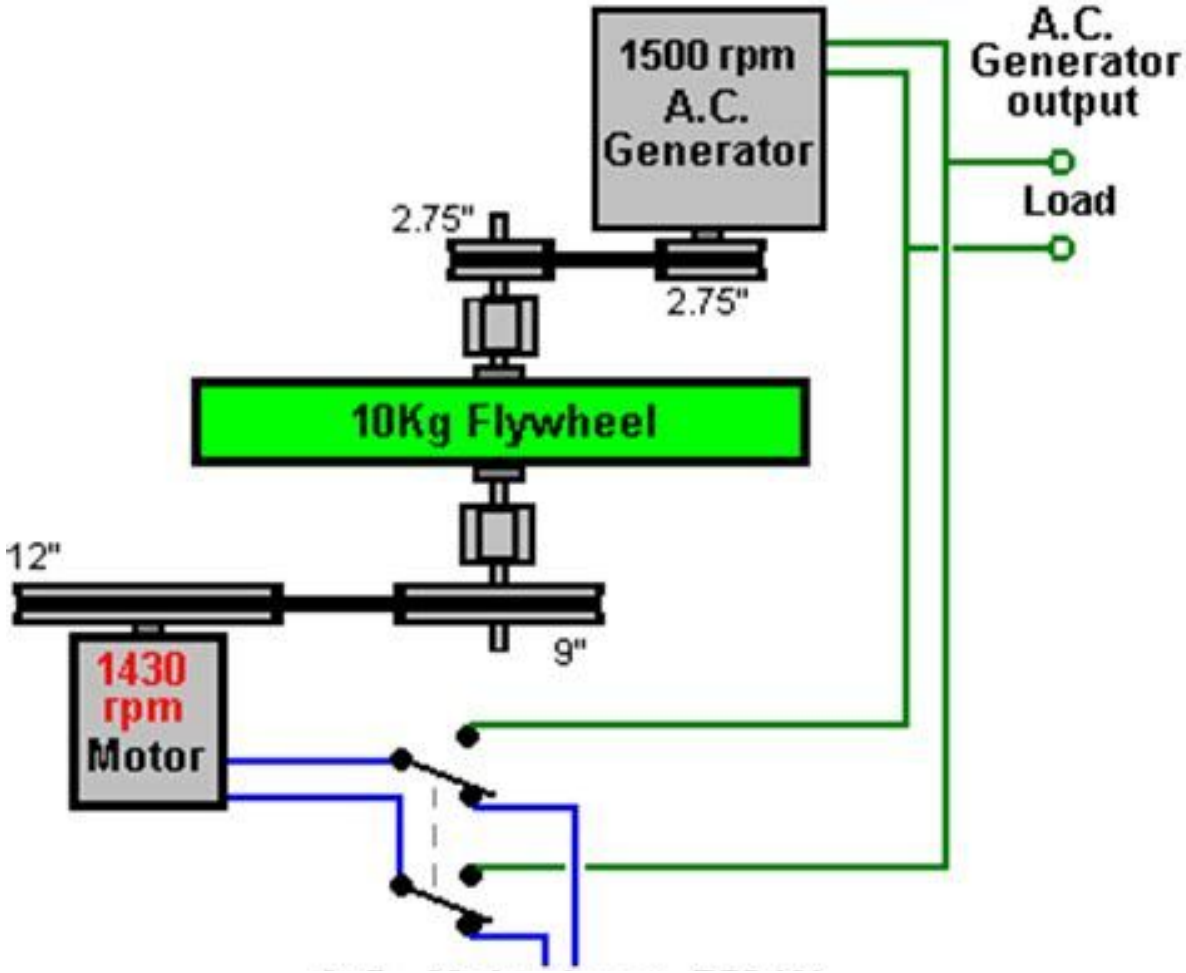

Figure 3.1: Design Concept

The power supply unit consists of DC Battery/Manual Hand gear.

A flywheel and a 220-volt alternator make up the generating unit. The unit is in charge of converting mechanical energy into electrical energy and vice versa.

The power supply unit is incorporated to provide a fixed amount of electrical power to the external loads. It consists of electrical cables and sockets.

The frame and transmission unit are made up of the casing and supports that house the other components, as well as bearings, shafts, the flywheel, and pulleys.

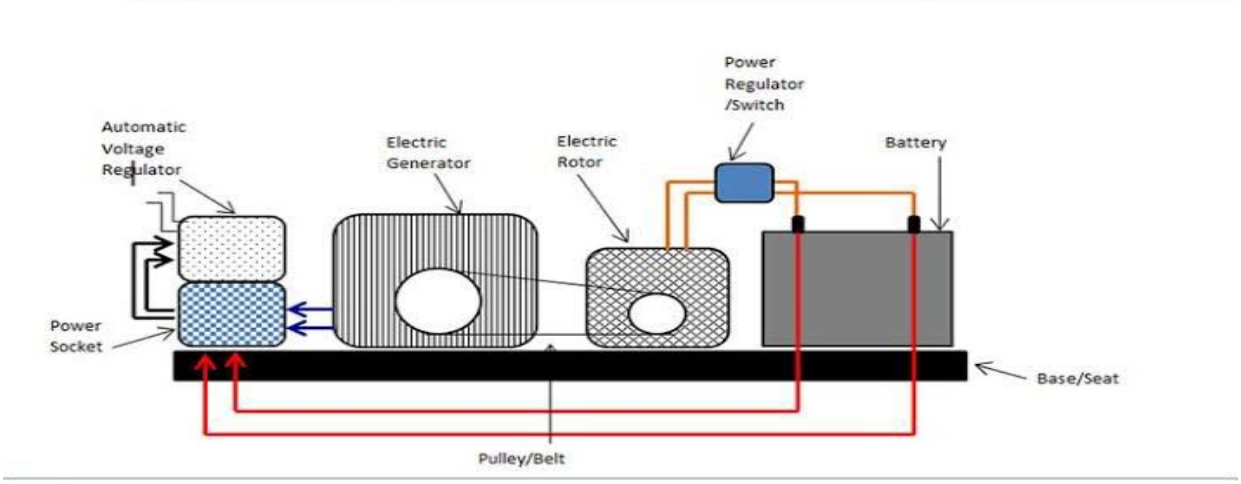

Figure 3.2: Block diagram for the fuel-less generator

3.1.1 The DC Generator

The capacity required by the intended user influences the alternator selection. Kingsley Nwaogbo (2010) recommends that an alternator used in a fuel-less generator be 20% larger than the target load capacity. The generator was also chosen based on its accessibility. As a result, the project's generator was purchased from a 220volt generating set that was abandoned due to a faulty combustion unit, as illustrated in the figure.

Fig 3.3: DC Generator

3.1.2 The AC Motor

The effectiveness of energy move from the power supply unit to the alternator is the essential standard for choosing an air conditioner engine. AC engines are known to be worked to give ideal proficiency at or close to the evaluated load (Theraja, 2005). One more component to consider was the speed of the air conditioner engine. The recurrence of the created voltage in an alternator is notable to be given by:

$$f=\frac{p}{2}\text{x}\,\frac{n}{60}$$

Where P is the quantity of generator shafts and n is the rotor speed in cycles each moment. For a similar explanation, a steady speed engine was looked for so the recurrence of created voltage would be something very similar from no load to full load. Thus, with a 50Hz created voltage using a two-shaft generator, the engine chose for this study is a 3HP electric engine with a most extreme functional speed of 2060 rpm, as displayed in fig 3.4.

Fig 3.4: AC Motor

3.1.3 The Flywheel

The kinetic energy of a moving particle is known to be impacted by its mass, as illustrated in the equation below.

$E = \frac{1}{2}mv^2$

However, the kinetic energy developed by a flywheel is given by:

$$K.E = {}^{1}/_{2} \text{ x I x w}$$

Where:

I= denotes the moment of inertia.

W = the flywheel's angular velocity

As a result, using a flywheel with a bigger mass than the frame can withstand increases the kinetic energy produced, which in turn rotates the generator to provide a large electrical output. A flywheel with mass concentrated at the rim also improves system efficiency. As a result, a flywheel with a mass of 50kg focused at the rim was employed for the project. The flywheel, on the other hand, is depicted in Figure.

Fig 3.5: Flywheel

3.1.4 Cable & Bearing

The plan utilized different lengths of protected wires for sending power to drive homegrown electrical hardware, as well as metal rollers to forestall scouring or sliding rubbing. A turning

symmetric part is intervened between the two moving surfaces that turn over one another for straightforward development. The bearing is made out of gentle steel and is decided to oppose scraped spot wear.

3.1.5 Belt Selection

There are numerous aspects to consider when picking what kind of belt should be worn;

- The drive or driven pulley's speed
- The transmission's power
- The distance between pulleys' centers
- Speed to volume
- Service circumstance

Taking into account the above factors, V-belt was considered for the plan in fig 3.6.

As per Khurmi and Gupta (2012), the accompanying plan conditions are used in examination to decide the boundaries expected for the belt plan:

Length of the belts:

$$L = \frac{\pi}{2}(D + d) + 2C + \frac{(D-d)^2}{4C}$$

Belt Center Distance:

The belt center distance is however given by;

$$C = 2 \text{ x } \sqrt{(D + d) \text{ x } d}$$

Where L = length of the belt

D = diameter of enormous pulley

d = diameter of a little pulley

C = center-to-center distance

Point of lap (curve of contact);

$$\Theta = (180 - 2\alpha)\frac{\pi}{180}$$

Belt speed:

The belt speed is however given by;

$$V = \frac{\pi DN}{60}$$

Belt tension

A belt is given an initial tension when it is wrapped around a set of pulleys that is only present when the system is at rest. Centrifugal force is produced as a result of the belt's continual motion over the pulleys, which raises tension on both the tight and slack sides. Calculating the belt tension using the following equation:

$$P = (T_1 - T_2)v$$

$$2.3\log\frac{T_1}{T_2} = \mu\alpha$$

Where: P = power of engine

T_1 = Tension on the tight side (opposind side)

T_2 = Tension on the slack side (pulling side)

v = Velocity of the belt

μ= coefficient of static rubbing

Fig 3.6: Bearing & Wheel

3.1.5 Bearing Selection

However attractive direction are expected for more prominent productivity in the fuel-less generator, mechanical course were picked for the venture because of their significant expense and restricted accessibility. Then again, the components of direction have been around the world normalized. The bearing exhaust and series — additional light (100), light (200), medium (300), and weighty (400) — decide the size. To choose the ideal bearing for the plan, the essential powerful outspread burden was determined and duplicated by the help factor. An outline of fundamental static and dynamic limit is then used to choose the bearing (Khurmu and Gupta, 2010). The numerical association administering bearing choice is displayed underneath..

LH = years x one day x three hours per day

Bearing life in revolutions; L = 60 x speed x LH

Bearing design must take into account the following factors: bearing shaft finish perfection, fillet radii of corners or shaft, and shoulder height. As a result, a roller bearing (ISO 15 ABB-4030-14, DE, AC, 14_68) was selected,

3.2 Material Selection

As indicated in the table, suitable material selection is assured for the project design to enhance the efficient functioning of the project design; the following aspects are the major areas evaluated to enhance the functionality.

- Reliability.
- Complexity.
- Ductility.
- Tensile strength.
- Resistance to corrosion.
- Available materials.
- Machinability.
- Weight Reduction.

Table 3.1: Components and Materials Used Breakdown

Component	**material**	**Justification**
Main frame(support)	Structural steel	Cheaper and has high strength to weight ratio
Flywheel	Maraging steel	High density and high strength to weight ratio
Shaft	Mild steel	High resistance to breakage
Pulley	Cast iron	Cheaper
Belt drive	Rubber	Highly flexible
Bearing (ISO 15 ABB-4030-14.DE,AC,14_68)	Alloy steel	Hardness and high strength

Bolts and nuts (ISO 7411-M16 x 50---36-WS)	Alloy steel	Hardness and high strength

3.3 Methods

A fuel-less generator is a device composed of various components linked, fixed, or coupled together to function as a single unit to generate electric current/electricity.

The equipment/measuring instruments utilized will be considered in this part, as will the numerous manufacturing processes employed and the sequences of operations that were followed to effectively manufacture the project. The fabrication manufacturing procedures used in this project were drilling welding, and temporary joining.

3.3.1 Equipment and Tools that were Required

The following equipment/tools were required for the fabrication:

- **Measuring tape:**
  The measuring tape illustrated in Figure 3.10 is used for measuring long lengths; it is utilized to determine and measure the real length of the flat bars and other design components.

Fig 3.7: Measuring Tape

Other tools used as shown in the Figure below

- 12/13 flat spanner
- 10/11 flat spanner
- 10/12 3 heads spanner
- Screwdriver (flat & star)
- Drilling bits (10, 12)
- Two nose pliers
- Ammeter (for testing of the output current).

Fig 3.8: Other tools used

3.3.2 The Fabrication Flow Chart

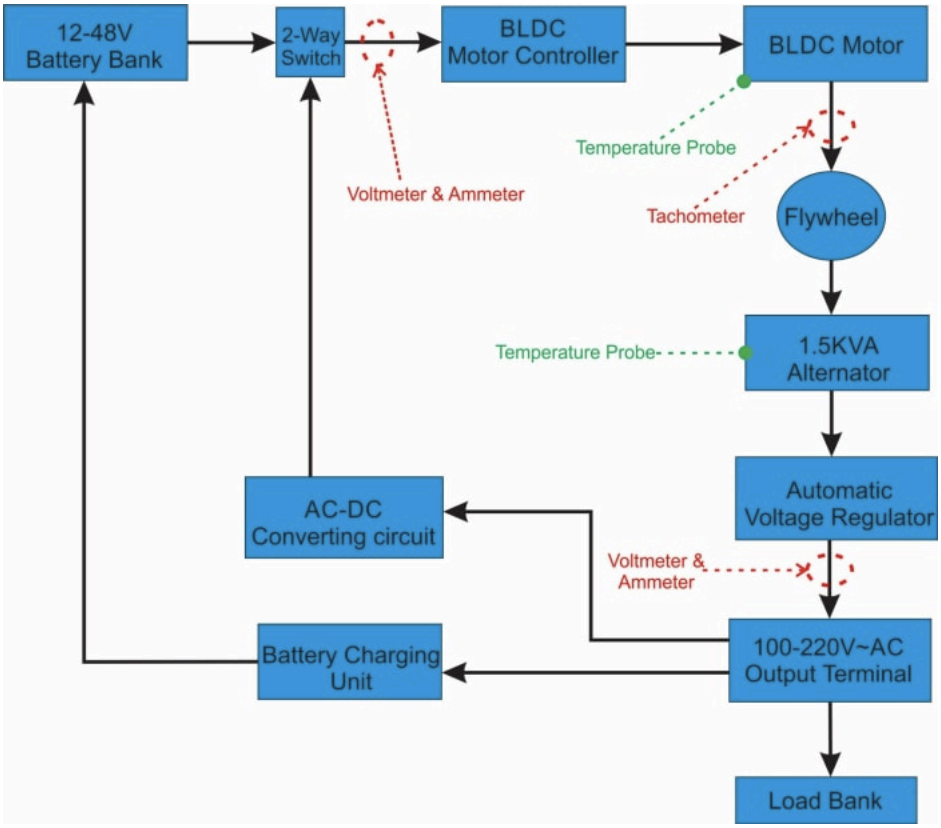

Fig 3.9: Flow Chart

3.3.3 The Fabrication Process

As illustrated in Fig 3.8, the key manufacturing methods used in this project fabrication were Cutting and drilling. In general, the frame was acquired in the desired size and built with bolts and nuts. Angle bars were also cut to the needed size and welded together to provide a metal foundation basis for installing the DC motor and alternator, as well as where the battery would be located to form the frame structure. To construct the machine, the following techniques were used: Step 1 entails fabricating a crankshaft and creating a decent hole that will readily fit into the DC motor, alternator, and flywheel with a threaded hole for fastening the trio to the crankshaft.

The second step is to install the constructed crankshaft into the DC motor. Step 3 is inserting the newly constructed crankshaft into the alternator. Fitting the manufactured crankshaft into the flywheel is the fourth step. Step 5 entails connecting the flywheel shaft's two ends to the

ball bearing installed on the frame. Step 6 is inserting a long bolt through the stator's bearing end and tightening it tightly to connect the motor and alternator.

Step 7 entails replacing the alternator cover and securing both the cover and the crankcase together.

Step 8 entails building a framework for the generator to give support and rigidity. Step 9 entails aligning the numerous pulleys according to the design. Step 10 entails putting the belt drive on the appropriate pulleys to offer a mode of transmission. Step 1 requires connecting the DC motor terminals to the battery's equivalent terminals, and Step 12 involves connecting the electrical wires to the AC mains as output.

Manufacturing techniques utilized

Fabrication of frame and base

The different processes that were involved in the fabrication of the frame and base include:

3.4 Marking Out

Checking out was achieved by moving structures and lines onto the material (sheet) to act as an aide for cutting, twisting, molding, and different systems. Exact checking out and estimating are basic for guaranteeing that the materials fit together appropriately. The accompanying apparatuses were utilized for checking out:

- T square
- Measuring table
- Scriber

The marking out was done to obtain the sizes.

CHAPTER FOUR

RESULT & DISCUSSION

The immediate coupling strategy was executed during the advancement of the fuel-less power-creating set and light bulbs were used as the heap, associated with the augmentation wire. A stopwatch was used to record the time a break of 20 seconds for five unmistakable runs, while the multi-meter was used to examine the voltage yield, current and the mean voltage with the ongoing result.

Yield proficiency was determined utilizing the information got later testing, during which the heap limit utilized went from 0 watts to 400 watts. The speed of the engine used was 18000 rpm while the alternator's speed was 500 rpm. The power factor was kept steady ($\Phi = 0.85$), as the standard reach from IEEE is between 1 - 0. Each test was imitated multiple times.

The assessment of the productivity is given by;

$$Efficiency = \frac{output\ \ power}{input\ \ power} \times 100$$

4.1 Control Unit

This unit performs the following work; converts direct current (DC) to alternating current (AC), removal of ripples, and rectification. The size of the alternator been used, will determine the capacity of the generating set. Mathematically;

$P = IV \cos\phi$

where,

P = Power output (watts) = ?

V = Voltage (Volts) = 220

I = Current (ampere) = 1.82A

Cos ϕ = 0.85

$P = 1.82 \times 220 \times \cos 0.85 = 400W$

Therefore, the capacity of the generating set is

$P = 1.82 \times 220 \times \cos 0.85 = 400W$.

Table 4.1: Input Parameters

No:	PARAMETERS	VALUE	UNIT
1	Generator Rating	220	V
2	Motor Power Rating	12 DC	V
3	Rotation Speed of Generator	15600	rpm
4	Rotation Speed of Motor	18000	rpm
5	Diameter of Belt	6	mm
6	Diameter of Pulley	5	mm

Table 4.2: Generator Loads Result

No	Components	Quantity	Connected load (Watt)	Current (Amp)	Voltage Output (Volts)
1	Incandescent Lamp (5W)	3	400	0.022	220
2	Mobile Charger	1	5	0.05mA	220

3	Extension	1	400	1.82	220

Input reaction with expanding load

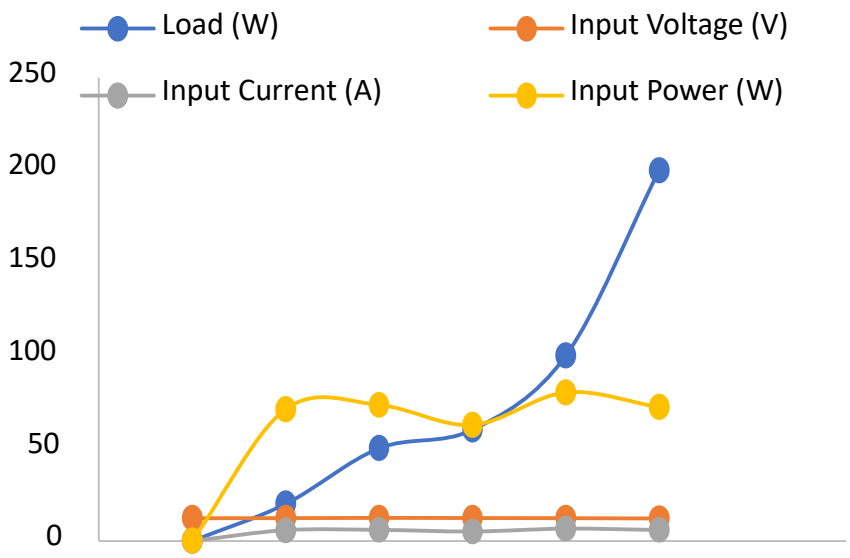

Fig 4.1: Input Parameters with Changing Load

Output Reaction with Expanding Load

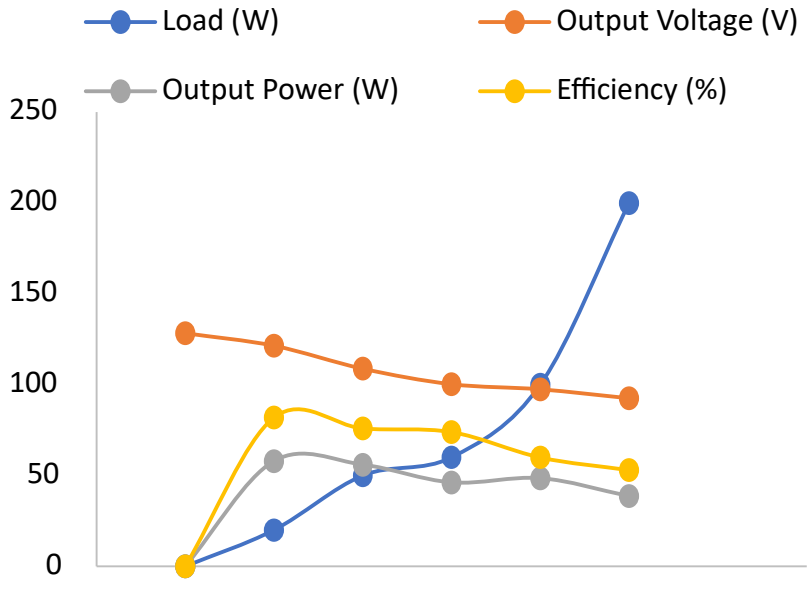

Fig 4.2: Output Parameters with Changing Load

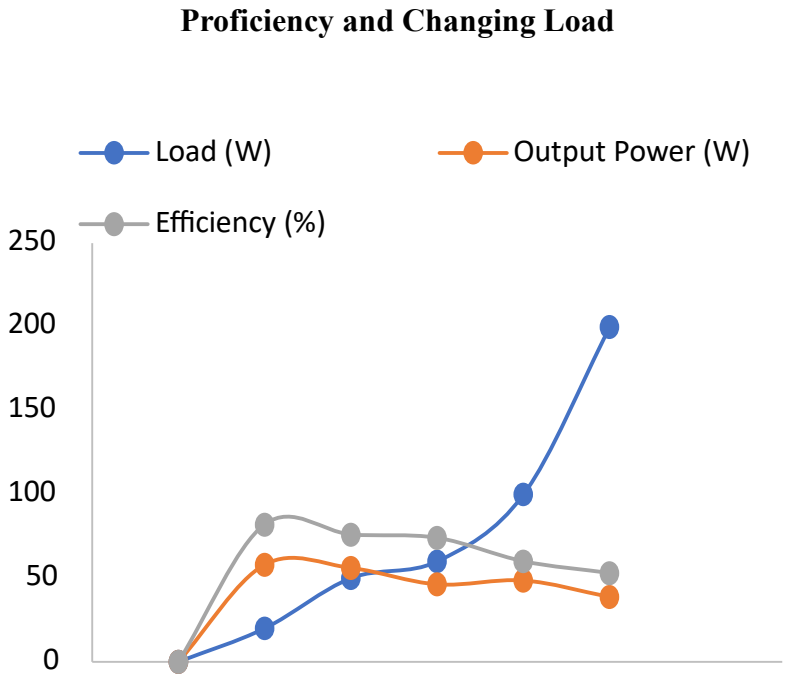

Fig 4.3: Generator Efficiency and Result

As found in figure 4.1, proficiency holds unwavering quality from nothing (0) to a hundred (100%) against a sum of six (6) preliminaries (trials) which shows a vertical pattern with top productivity before leisurely dropping with the expansion in load. Figure 4.2 and 4.3, likewise shows the association among voltage and current at both info and result focuses. The productivity of the generator lessens with increase in the info heap of the creating set. Along these lines, the greatest stacking of the machine should be under 200 watts for an expanded productivity running the creating set. This result has certified that the most raised capability recorded is at 82%, at a heap of 20W. Moreover, it was likewise seen that a lessening in the result of the machine happens when the information load increments.

CHAPTER FIVE

CONCLUSION

The requirement for new energy sources had prompted various choices with their chaperon getting teeth significant expense of fuel. In any case, from here on out, in the event that the innovation is additionally evolved and embraced, the expenses for electrical stockpile will decrease, and power will be proficiently appropriated. Flywheels are one of the most encouraging advancements for supplanting traditional lead corrosive batteries as energy stockpiling frameworks for different applications, including vehicles, efficient provincial charge frameworks, and independent, remote power units regularly utilized in the media communications industry. A new development in the mechanical properties of composites has revived interest in utilizing the idleness of a turning wheel to store energy. The condition of charge can undoubtedly be estimated, since it is given by the rotational speed. The main pivot of flywheel rotors is reasonable for direct age of high voltage. It has gotten (100 percent) extra electrical result which is free energy from the venture. The AC generator has delivered 440W of power by utilizing flywheel turned by an electric engine. The other fundamental benefits of ordinary free energy utilizing flywheel is that it can create without additional gear. Subsequently, it tends to be utilized in different applications like electric fuel vehicles and increment the proficiency of conventional electrical gear.

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