

PEDAL OPERATED POWER GENERATION SYSTEM

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Abstract- Pedal operated power generation system is a device that uses human energy to produce electricity for charging a battery. Here an alternator is used as the electricity generator.

The alternator is coupled to a pulley which is rotated by a belt and chain- sprocket system of a bicycle structure. The input power is given to the paddle and final rotational speed is achieved in the alternator rotor.

Key Words: sprocket system, rotational speed, Alternator

1. INTRODUCTION

Pedal operated power generation system have been of interest at many places where no other alternative electricity generator has been viable. While using pedal power is not a new concept in itself, it has not been successfully used on a wider scale. Pedal powered generator is a device that uses human energy to produce electricity for charging a battery.

This innovation brings together the resourcefulness of pedal power generation with the transportation feasibility of a bicycle frame. Pedal powered generator is very useful to those areas, which areas do not have electricity connection.

The pedal power generator stores energy to a battery which provides electricity in DC form, if AC type of electricity is required, an inverter is connected.

1.1. Future Generation Scenario Demand Projection

BPDB has carried out a Power System Master Plan Study in 1995 to identify least cost power development plan up to 2015. In the PSMP, the benchmark load forecast was based on 8% growth rate.

However, due to shortage in generation capacity, the actual demand could not be supplied. The minimum demand served so far is 2823 MW (27.07.2000). The Government's Vision is to provide affordable and reliable supply of electricity to all of the year 2020.

Therefore, the electricity development is required to be accelerated to increased access and attain economic development. The desirable economic growth rate would be about 6-7% p.u. considering these aspects, it would be logical to use the high forecast of demand as given in the PSMP-95.

Based' upon the High Forecast from FY2003 onwards, the anticipated peak demand would be about 6071 MW in FY2007 and 11439 MW in FY2015. According to this Forecast, the average growth rate between 2000-2007 is 9.83% and 8.98% between 2000-2015.

2. Selection of Components

2.1 Selection of Battery

Battery selection depends on load. Capacity of the battery must be increased for the higher power consumption. A sample calculation for selection of battery is provided below:

Battery rating: (12V , 2.5 Ahr)
(2 Batteries)

Max Power Stored in Battery = $12 \times 2.5 \times 2 = 60.0$ Watts

Storage energy capacity of Battery = Power* Time (Time=1 hr)

= 60 watts hr

2.2 Selection of Alternator

D C GENERATOR Rating:
(12-24 V , 1 Ahr)

O/P Power in 1 hr = 24 VA= 24 watts

O/P Energy in 1 hr = $24 \times 1 = 24$ watts hr

O/P Energy in full rating in 2.5 hrs (150 min) = $24 + 24 + 12 = 60$ watts hr

O/P Energy in half rating in 5 hrs (300 min) = $12 + 12 + 12 + 12 + 12 = 60$ watt hr

2.3 Selection of Bicycle

Pedaling is the operating force of the bicycle. So bicycle frame is the best option for the pedal power generator setup. General bicycle is enough for this purpose . If suitable base is joined with the cycle frame then it will be fully prepared for the setup.

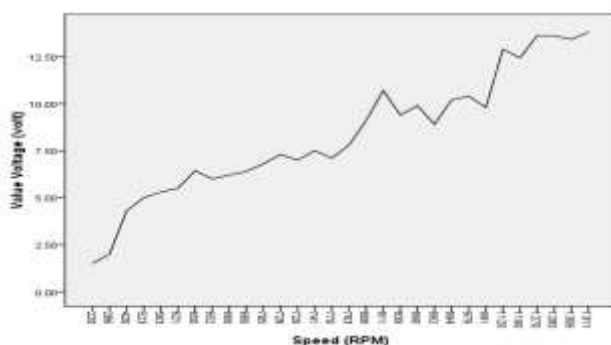
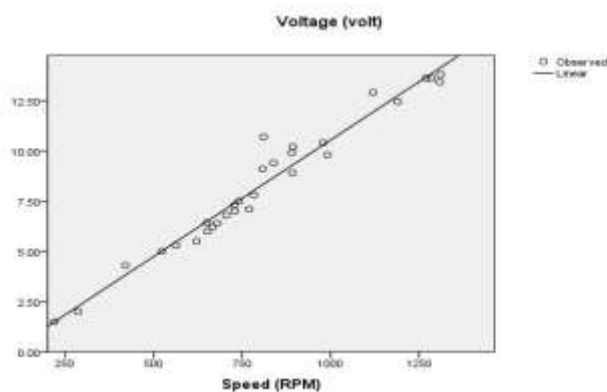
3. Result Analysis:

Relationship between speed and voltage.

SPEED (rpm)	VOLTAGE (V)
421	4.3
563	5.3
621	5.5
652	6
666	6.2
680	6.4
705	6.8

Relationship between speed and current

Speed (RPM)	Current (Amp.)
626	2.9
827	5.2
733	3.7
510	1.9
988	6.9
1013	7.2
1110	9.5



Graph obtained from result values

3. CONCLUSIONS

1. Large scale production can be possible by using larger battery and more than one alternator.
Electricity production depends on the number of users. If two setups operate at a time the production will be two times.
2. Some performance test was done. The idea about efficiency can be assumed by those data.
3. Production of electricity mainly depends on the rotor speed.
4. Charging time depends on the battery size and user's ability.

4. ACKNOWLEDGEMENTS-

The authors would like to thank Dr. V.K.Saini, Head of Department, Mechanical Engineering, IMS Engineering College Ghaziabad. The authors are also thankful to Mr. Shivansh Srivastava without whose motivation and guidance the accomplishment would have been hard to achieve. At the last but not the least, the authors are thankful to workshop authorities of IMS Engineering College for their help and support

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