

A REVIEW ON MECHANISM AND VARIOUS APPLICATIONS OF HUMAN POWERED FLYWHEEL MOTOR MONITORING SYSTEM

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ABSTRACT

Recent innovations in Flywheel motor has opened the gate for a variety of applications that are energized by the human energy and these variety of applications are growing so far that the researchers are curious to focus on this theory of optimum utilization of human energy for any process unit. Some of the applications of the mentioned theory were evaluated and validated. A brief literature analysis on the flywheel motor is carried out to support the efforts that are invested and also to validate the theory used. Several processes were designed and fabricated adopting an energy source such as fodder chopper, wood turning, algae formation machine, keyed bricks, oilseed presser, etc. Therefore this energy source can be vital if it is utilized to operate a potato peeling machine. The source model would be of a great help if it can be implied in the remote rural areas so that the small businesses should not have to rely on the conventional energy sources and work can be generated by everyone amongst a family.

Keywords –: *Flywheel motor, HPFM, pedaling, chaff cutter, brick making, double lever inversion mechanism*

I. INTRODUCTION

India is a rural dominant country where electricity is yet to reach to its deep extents. A machine based on the human power is the basic need of such a developing country. In recent researches and operations a variety of applications are urbanized and improvised such chaff cutter, brick making, turmeric polishing, mini paddy harvester, etc. based on this theory . A man working continuously on an operation can produce a power of about 75W. Therefore human power is justified on the operations which require a power of about 75W or less than that. The machine model that stores energy can also be developed without affecting the end product if the process that is to be carried out has an intermittent nature despite of having a power requirement of more than 75W. One can easily generate a power as large as four times by pedaling than by hand-cranking therefore pedaling is any time more efficient than hand-cranking. A person pedaling at full power is liable to get tired in a quick period of time of about 10mins, but if he continues to pedal at a reduced rate of power then he can sustain for about 60mins. A person can drive a device at the same rate as achieved by hand-cranking but with less effort, fatigue and stress that's why pedaling is any time more efficient than hand-cranking.

The human powered flywheel motor is developed using the following main parts:

1. Energy Unit
2. Transmission Unit
3. Process Unit

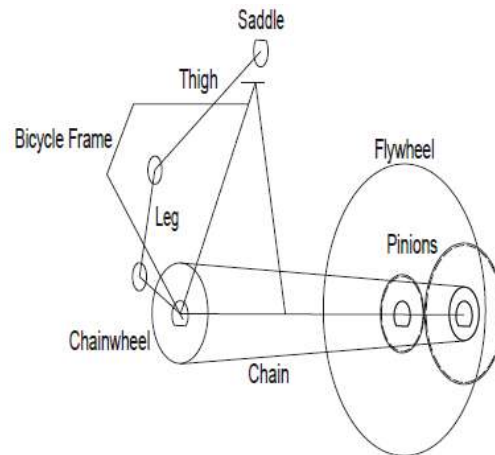


Fig1. Motormonitoring system

II. LITERATURE SURVEY

[1] In 2010, K. S. Zakiuddin developed a model of Human Powered Fodder Chopper based on an experimentation carried out on Artificial Neural Network. A Fodder Chopper fully energized by human power was the main source of experimentation. Mathematical models used in this paper were firstly formulated, then validated and at last were optimized at various parameters. To generate correct values of output parameters that correspond to various values of input parameters an ANN model was formulated. The ANN model helped to compute the regression coefficient between the values of response variables and observed values so that the model should be justified as the best fit model. ANN developed can be used to select values of various independent features for designed chaff cutter to match features of machine operator performing chaff cutting task so as to optimize productivity and minimize torque, cutting time. Selecting best possible combinations of input parameters by using ANN can improve productivity of an experimental setup.

[2] In 2012, Performance analysis on pedal powered multipurpose machine was carried out by S. G. Bahaley. As a matter of fact energy plays a vital role in the development and improvisation of modern technological civilization. The conventional energy sources being scarce are replaced by alternative energy sources that are affordable, easily available and should meet and satisfy the basic technical requirements. During the last experimentation, a human powered multipurpose machine proved to be working quite satisfactorily for a longer time span. To fill a water tank of 1000 liters of capacity, 33.33mins of time was sufficient at an average head of 6m. A battery of 40Ah when fully discharged was able to be charged within 10 hours due to the optimum working of the generator. The power required to carry out the above mentioned operations by pedaling was well below the capacity with which an average healthy man can pedal. The system stands good to as far as human health is concerned because pedaling directly acts as a health exercise and helps to improve human workout

efficiency. Undoubtedly, the system proved to be working satisfactorily in all aspects making the proper use of domestic and other terms and satisfying all the basic requirements.

[3] In 2013, Human powered flywheel motor system was used by V.M. Sonde to develop a wood chipper cutter model base on generalized experimental data. The mathematical model to be used in the experimentation was formulated in compact mode so as to generate an optimum data by reducing the time in experimentation. Some of the key measurement factors for which the experimental setup was designed using specially designed electronic kit were processing time, processing torque and angular velocity at the outlet. Factors such as Regression analysis and sensitivity analysis were used to develop the indices for the mathematical model.

[4] In 2013, yet experimentation was carried out by Umesh Bokade by which he designed and developed a manually energized water distillation device. The main function of this model was depicted as to convert the dirty/saline water into pure water using the renewable source of energy (i.e. Human power). Generator is used to generate electricity with the help of energy stored in the flywheel. The generated electricity is used for water distillation in the evaporator. Convection process was the basic heat transfer mode for evaporation of dirty saline water and converting it into pure drinkable water. 14 lit. of dirty water can be converted into 1.5 lit of pure water in 6 hours by the designed model. The plant efficiency was found out to be 64.37%. For operating the system some of the most efficient and productive ways are established i.e. the input pedaling rate is set in three stages, viz., 30-50 rpm, 50-70 rpm, 70-90 rpm. The distillation rate of water for 30-50 rpm range was found to be slow at the rate of 25 minutes. Per 100 ml of pure from 500 ml of dirty water. 15mins. is the average time by which the subject can maintain the pedaling. The distillation rate of water for 70-80 rpm range was observed to be maximum.

[5] In 2014, human powered ice-cream making equipment was developed and evaluated by R. B. Ramawat. This machine was developed to enhance the technique and provide a new era in the process of ice cream making, the machine more efficient and easy to build, low maintenance, cheap and affordable as for the earning requirement of small sector businessman. The total cost of machine was estimated to be Rs.17691. After further evaluation on the ice cream making machine such as field testing, etc. it was concluded that it took 15 minutes to produce 2 Kg of ice cream in a steel drum of 30 cm dia. and 40 cm length rotating at 20-400 rpm. The equipment capacity was found out to be 8 Kg per hour. The conclusion of this experimentation gave us the approach that ice cream making in rural areas and especially for small sector businessman could be empowered if the proposed solution is energized by human powered flywheel motor. Also the model developed will be cheap and affordable for the small sector businessman.

V. CONCLUSION

This paper discusses the importance of human powered machine models by referring some of the applications of human powered flywheel motor driven process units such as fodder chopper, water distillation device, ice cream making machine, multipurpose machine etc. and also confers about the evaluation and validation of the above mentioned models. The conclusion further states that for various other process units that requires energy from 2-7hp, human powered flywheel motor can be a promising source to energize them. The above mentioned process

units. as well as the other process units that justify the principle of human powered flywheel motor can be used in urban and preferably in rural area.

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