

The Optimisation of Windmill using a New Spring Energized Motor

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ABSTRACT: The best way to save our nature and increase energy production is by using renewable energy. Here an attempt is made to utilize deflection of the spring as an input energy for rotational motion of shaft. A shaft with the eccentric and a crank pin is mounted, a spiral spring is positioned in such a way that it deforms when a load is applied. The crankpin continuously energized by the spring at the end, by this way the shaft, connected to the eccentric rotates. A pulley type wheel is fixed on the shaft by which the energy can be transmitted. The shaft 'rotates continuously with high torque and low speed'. The main application of this process is adding this setup to the windmill, the spindle rotates endlessly and the power production is also unremittingly which can be used in some remote areas.

KEYWORDS: renewable, resilience, eco-friendly.

I. INTRODUCTION

In this modern age more and more energy is required for daily consumption in all walk of life. Hence conservation, tapping new sources of energy and harnessing of the same from the various sources, is an important aspect of energy production and utilized. The present concept is one of the answers to this problem, as they said deflection of the spiral spring into useable mechanical energy which can be utilized in various forms. Alternate energy forms is increasingly gaining the focus of the world due to the rapid depletion of the limited fossil fuel reserves, rising global energy consumption and pollution. As it also has great potential to create employment, spring resilience has emerged as a viable and cost-effective option for power generation. But the main problem with spring fatigue and the exact arrangement of it severe a great difficulties of this process.

II. IMPLEMENTATION

We can implement this mechanism in the windmill, which are the main source of electricity in many of the remote area in the world such as villages of India, Africa etc. In Tamil Nadu, Muppandal is a small village on the southern tip of India in Kanyakumari District. It is located in a hilly region where wind from the Arabian Sea gusts through mountain passes.

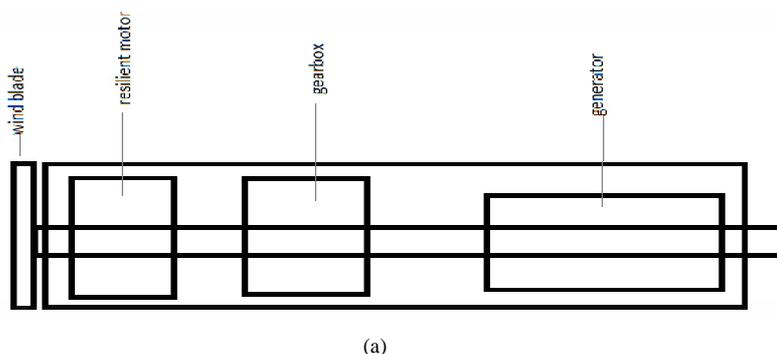


Fig.1. Basic structure (a)Outline of the new windmill setup with resilient motor

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Since, the efficiency of windmill is not average, hence there is only minimum number of windmill, and due to the frequent changing of wind. This loss in efficiency is because the spindle inside the windmill is not gyrating continuously, while this supplementary setup is positioned in such a way that it makes the spindle to move intermittently. As a result, the improved power production is achieved.

III. SELECTION OF MATERIALS

In an application that demands a high tensile strength, a material with higher tensile strength must be selected. If a proper material selection is not done, the product life tends to be highly unpredictable. Therefore the material selection process is quite important for the long term success of engineering applications.

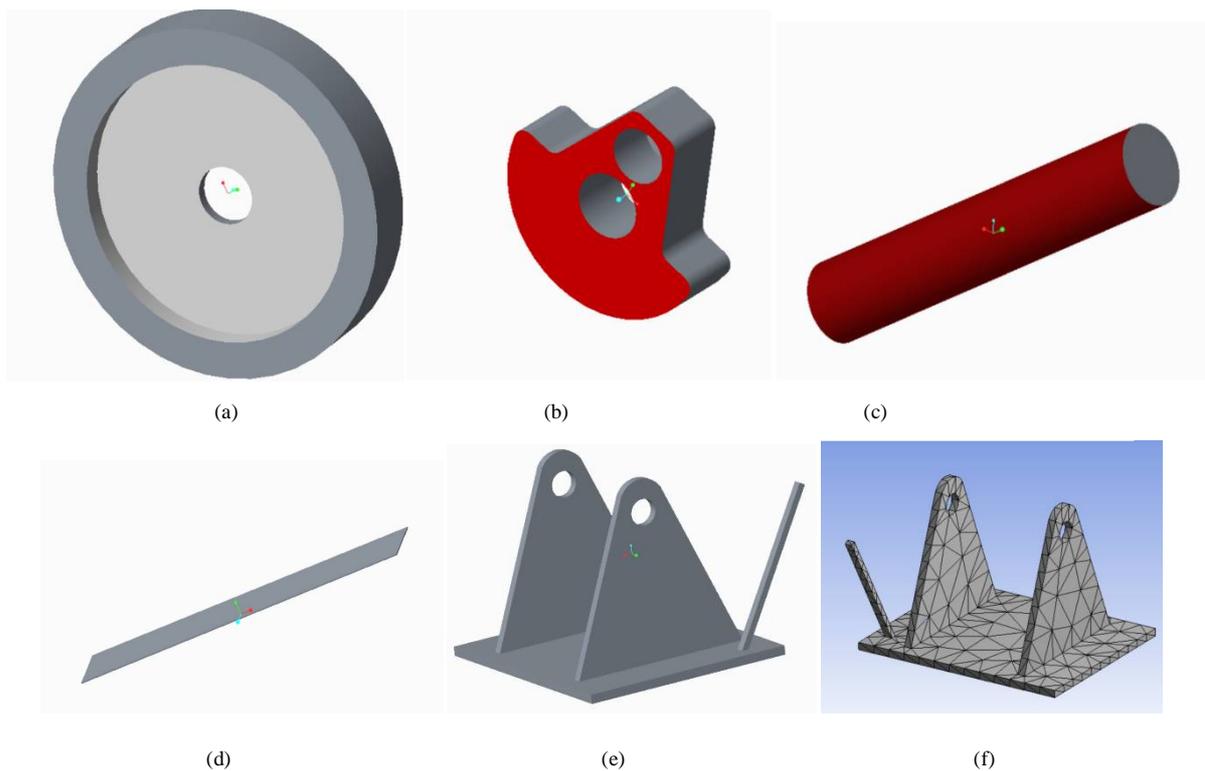


Fig.2. Selection of components (a) CAD model of flywheel (b) CAD model of balancing weight (c) CAD model of shaft (d) CAD model of spiral spring (e) CAD model of base (f) Mesh model of base

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The components involved in the corresponding selection of materials can be established based on two trials, Trial 1 and Trial 2 respectively. The conception driving the selection process with reference to the component list can be tabulated taking into consideration of base, balancing weight, flywheel, spring effect, crank pin and shaft.

COMPONENTS	TRIAL 1	TRIAL 2
Base	Sheet metal (CRS-1018)	Sheet metal (CRS-1018)
Balancing weight	Grey Cast iron	Grey Cast iron
Flywheel	Cast iron	Teflon (PTFE)
Spring effect	Steel ruler	Tempered spiral
Crank pin	Aluminium	Cast iron
Shaft	Grey Cast iron	Grey Cast iron

IV. EXPERIMENTAL RESULTS

The basic design consists of mounting the shaft along with the bearing with the base. At one end of the shaft is attached with the balancing weight with crank pin. The base is built by cutting the sheetmetal using arc cutting process and welded together to get the required structure.

BASE& BEARINGS

Sheet metal of thickness (3mm) is cut using arc cutting process and welded together to achieve the required structure. Bearing with inner diameter (12mm) is fitted with the base using shielding.

SHAFT

The cast iron is machined by lathe machine in such a way that the rod is formed with the required dimensions ($\phi=12\text{mm}$, length=25mm)

BALANCING MASS

Cast iron is passed through the various machining process such as lathe machining, milling and drilling. The material is first machined in lathe and operated in milling process to achieve required dimensions.

SPRING EFFECT

The spring effect is the most essential in this process. They are some factors which should satisfy by the material to be used as a spring or spring effect. The factors like stiffness, thickness and length of the spring.

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FLYWHEEL

The flywheel we know is reservoir of energy but here, is used for providing inertial force to the shaft. The factor behind this the weight of the flywheel should be greater than all the components weight.

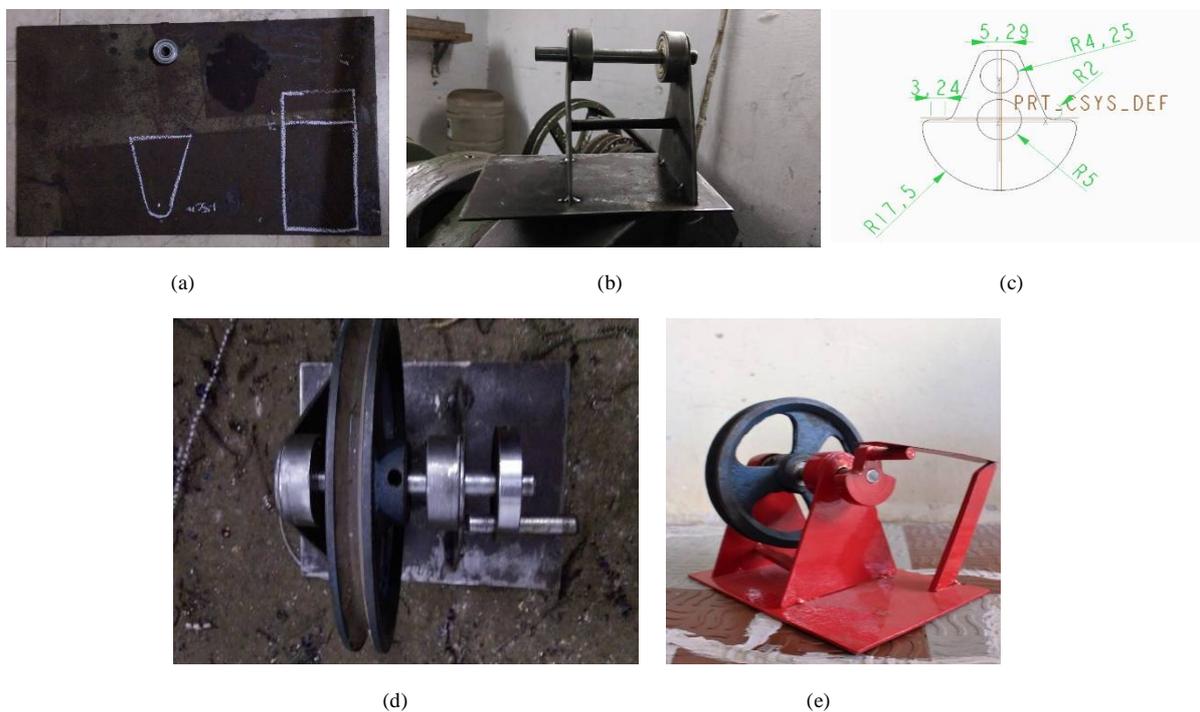


Fig.3.Construction (a) Sheet metal (b) Setup after welding (c) Balancing weight (d) Entire setup (e) Photographic view

The primary physical principle used here is the deflection of the spring. When a load is applied on the one end of the spring while the other end is fixed, the spring deforms to some extent by storing some energy which is released when the load is released. The other small mechanism used here is the force required to rotate the big disc is higher than the force required to rotate the small disc. The special design of balancing weight done this action in the system. When all the construction are made as shown in the design, the initial force is given to rotate the flywheel which turns on the system. The flywheel is firmly fixed with shaft, which moves the shaft along with the flywheel. The end of the shaft is connected with the balancing weight which also rotates. The crank pin is placed eccentric which applies and releases load on the spring periodically. The spring deforms to some extent by storing some energy which is released when the load is released. This spring effect gives energy to the rotating crank pin ultimately, the shaft gains some energy and continue to rotate. When this shaft is connected with the wind blade of the windmill, the initial torque is given by the wind, after that the shaft unremitting to rotate which is coupled with the generator which produce electricity uninterruptedly is stored in the battery and can be used in future.

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V. FUTURE SCOPE

The advantages of using the resilient motor in the spheres pertaining to windmill relate to the free energy production from free source, efficient storage of coal, constant wind speed in this type of energy production which is totally reliable, inexhaustible source of energy, a limitless resource virtually and generation of energy without polluting environment, thus establishing eco-friendly patterns. Today, increasing demand in the engineering sector is power production in the systems without any damage to the environment. By implementing this technique in windmill, power production can be increased. The main reason for this paper is to increase the power production by using this additional system in the windmill, which will be the future scope.

VI. CONCLUSION

In the field of engineering, this kind of experimentation is new. By implementing this system, an alternative source of energy can be created without hampering environment. Moreover, the cost of the project is low and could be recovered within few years. In the first trial, the usage of steel scale as a spring was carried out but the expected results were not satisfactory. However, in second trial, the output can be subjected to a higher efficiency with the tempered spring at one end. The output was 5-6 rotations with the initial slight input. As a result, the experimental based observations can be used to ascertain the fact that the spring with higher stiffness can be used for getting improved results.

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