

Research Paper :

# Application of pedal operated flywheel motor as an energy source for fodder chopper

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## ABSTRACT

The Pedal Operated Energized Flywheel Motor has been adopted for many design of rural applications in the last two decades, establishing functional feasibility and economic viability of Pedal powered process machines of 3 to 7h.p capacity .In recent past a pedal powered process machines has been developed for wood turning (Modak and Bapat, 1993), washing (Dhakate, 1995), brick making (Modak and Moghe, 1998). The functional feasibility and viability of this application is established in this paper. The paper presents experimental work executed for establishing generalized empirical model for fodder-cutting operation. This also includes design and development of a machine .Estimation of mathematical model and its optimization.

**Key words :** Pedal operated energized flywheel motor, Spiral jaw clutch, Fodder clutch

**T**he main objective to design and develop a machine, which uses the Pedal, operated energized flywheel motor as an energy source, consisting of a bicycle mechanism, use of non-conventional energy as source. Developing countries like India are facing problems of Power storage due to rapid industrialization. Non availability of power in Interior areas and large scale unemployment of semi-skilled worker. In the context of the present condition in India of Power shortage and exhaustion of coal reserves and unemployment, it is felt that "Pedal Operated Energized Fodder Chopping machine" for cutting fodder is very necessary. This machine is environment friendly *i.e.* non-pollutant. It will bring innovation and mechanization in agricultural engineering. Unskilled women may also get employment. Development of such energy source which has tremendous utility in energizing many rural based process machines in places where reliability of availability of electric energy is much low.

## METHODOLOGY

The average work rate of a man working continuously is equivalent to 75W (Alexandrove, 1981). Therefore, only continuous manufacturing process requiring less than 75W can be man powered. Any manufacturing process requiring more than 75W and which can be operated intermittently without affecting end product can also be man powered. Such man powered manufacturing process can be based on the following concept.

In this processes a flywheel is used as a source of

power. Manpower is used to energize the flywheel at an energy input rate, which is convenient for a man. After maximum possible energy is stored in flywheel it is supplied through suitable clutch (Gupta, 1997) and gearing system to a shaft, which operates the process unit. The flywheel will decelerate at a rate dependent on load torque. Larger the resisting torque larger will be the deceleration. Thus theoretical a load torque of even infinite magnitude could be overturn by this man-flywheel system. Pedal driven fodder chopper operates on the basis of above principle. If such machine is developed it will be great help to farmers of rural area because it does not need conventional energy. It is environment friendly machine.

## Working of machine:

Working of manually energized chaff cutter machine as shown in Fig.1 and 2, the rider inputs mechanical energy during one minute pedaling time. Each rider accelerates the flywheel for about one minute. The flywheel is accelerated to the speed of 600 rpm in minute time. The flywheel size of 1 m rim diameter, 10cm rim width and 2 cm rim thickness such a flywheel when energized to the speed of 600 rpm stores energy. In this machine, first energy is stored in the flywheel by accelerating it to a desired speed by pedal through chain and gear drive. When flywheel attains desired speed, it is connected to the torque amplification gear by engaging a spiral two jaw clutch. The energy then stored in flywheel is supplied at the required rate to shaft of the chaff cutter and cutting of fodder, to obtain small pieces of fodder. A free wheel is used between pedals and the flywheel to