

Design and Development of Bicycle Using Kinetic Energy Recovery System

Prof. G.S. Jagushte¹, Akshay Warang², Rahul Zore³, Gourav Patil⁴, Vaibhav Gawande⁵

¹Assistant Professor, Dept. of mechanical Engineering

^{2,3,4,5}Dept. of mechanical Engineering

^{1,2,3,4,5}Rajendra Mane College of Engineering and Technology, Maharashtra India

Abstract- Kinetic Energy Recovery System (KERS) is a system for recovering the kinetic energy of moving bicycle under the braking and it also convert this energy into gain in kinetic energy. When riding a bicycle, high amount of energy gets lost under braking so that the human efforts get reduced.

So here we used KERS with flywheel to store the energy which get lost during braking and it is use for further boosting of bicycle. The flywheel is used for increases acceleration and about 10% pedal energy can be saved when the normal speed is about 12.5 to 15 mph.

Keywords- KERS, Flywheel energy storage, Flywheel bicycle, Mechanical KERS, Clutch mechanism.

I. INTRODUCTION

Kinetic Energy Recovery System (KERS) is a system for recovering the kinetic energy of moving bicycle under the braking and it also convert this energy into gain in kinetic energy. KERS store energy when the vehicle is braking and it use for further acceleration. While applying the brake kinetic energy get lost in the form of heat energy and sometimes is in the form of sound energy. Bicycle with KERS are able to avoid reduction of this kinetic energy by a proper mechanism. This stored energy is converted back into kinetic energy giving the vehicle extra boost of power. KERS uses flywheel for storing of energy and clutch mechanism is used for engagement and disengagement of the clutch to flywheel according to energy transmission.

II. RESEARCH AND COLLECT IDEA

- [1] From this paper we conclude that the KERS system recover the moving bicycle kinetic energy while braking and also convert it into gain in kinetic energy. It also give information about how the KERS system works.
- [2] From this paper we came to know KERS system is used for the energy storage and this energy is further used for the boosting of bicycle. KERS system with flywheel is

used for energy storing purpose. It has been found out that the flywheels are 10 to 15 percent more efficient in storing the energy when compared to the batteries.

- [3] From this paper we came to know that mechanical KERS system is efficient than electric KERS system. The global energy conversion efficiency exceeding 70%, more than twice the efficiency. When riding speed ranges between 12.5 to 15 mph there is increase in maximum acceleration and about 10% of net pedal energy.
- [4] This paper gives information about how the flywheel can be used for storing of lost kinetic energy and what are the steps required to calculate the appropriate specifications of flywheel. It was found that if an ordinary cycle is fitted with flywheel to store energy, then almost 65-70% of the total energy, which was being wasted, can easily be recovered. The remaining 30-35% of energy cannot be recovered due to the presence of friction in bicycle
- [5] The above paper give us the knowledge about flywheel based kinetic energy recovery system.

III. STUDIES AND FINDINGS

Study of KERS.

KERS means Kinetic Energy Recovery System. It is system for recovering the moving vehicle kinetic energy under the braking. KERS is a collection of parts which takes the kinetic energy of moving vehicle under deaccelerating and store this energy by using some reservoir as like flywheel. This store energy can use for the further acceleration of the vehicle giving extra boost power to the vehicle. The basic principle of KERS is store the energy while deacceleration and it will use for further acceleration.

There will be two types of KERS as Electrical KERS and Mechanical KERS. In Electrical KERS there will more forms of energy conversion so at the output we don't get that much power. In Mechanical KERS there will be no such types of energy conversion it just uses the kinetic energy. So we

decided to use KERS for our project. In mechanical KERS flywheel is used for the storing of energy. So the KERS system is best for the increase the efficiency of any moving vehicle with energy recovery mechanism.

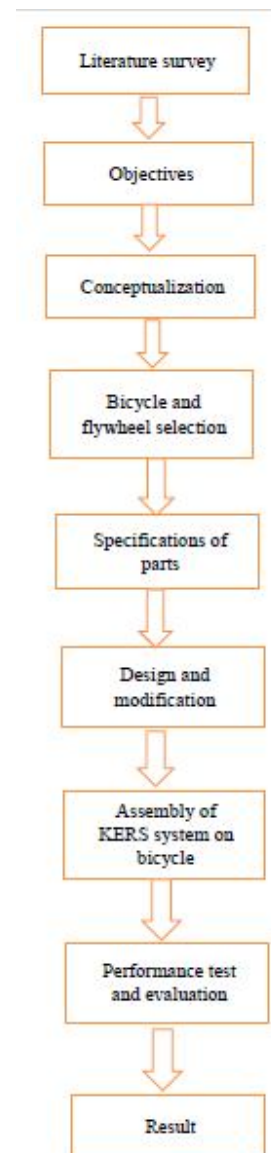
Working of KERS Bicycle

A crank wheel connected to the rear wheels of bicycle. By using the chain transmission mechanism there is engagement and disengagement of clutch to the flywheel. For increasing the overall speed of flywheel specific gear ratio is needed. Now at a time when there is need to apply the brake, by using the mechanism engage the clutch to the flywheel. Then the flywheel starts rotating and speed of bicycle is reduces. So that the energy is stored in the flywheel. Now in this case even clutch is disengage flywheel is in rotating motion. When we again ride the bicycle just engage the clutch to the flywheel from that store energy which is in flywheel transmitted to the rear wheel of bicycle through the clutch and chain mechanism. From that we can reduce some amount of human energy and extra boost power is given to bicycle. This application we can used when situation like traffic jam , down climbing a hill. By KERS system we can used the store energy for efficient working of bicycle and to reduces the human energy.

Components in KERS bicycle.

1. Flywheel: Flywheels are widely used as storage device which stores the energy of rotation with the help of its moment of inertia The flywheel stores energy in the form of mechanical energy rather than in the form of chemical energy. The flywheel is the most important component in this fabrication process.
2. Clutch plate mechanism: This mechanism used for energy transmission. Engagement and disengagement of flywheel according to energy transmission clutch mechanism is used in bicycle.
3. Sprocket: It is a profiled wheel which has a number of teeth on it. The teeth on this wheel are designed and placed properly based upon various calculations of the design. The main objective of this sprocket wheel is to mesh with the chain drive for the transmission of the power from one circuit to the other.
4. Chain drive: chain drive is used for the transmission of energy or power. Here we used two chain drive for transmission of power between wheel and pedal and also between the rear and sprocket to the flywheel.
5. Axle: axle is used for carrying flywheel and clutch unit.
6. Bearing: Transmission purpose

IV. METHODOLOGY



V. CONCLUSION

Kinetic energy recovery system is used in bicycle for the purpose of energy storage which was lost during the braking. It can be concluded that in future KERS can be considered as a fundamental of energy storage. And it can be also seen as a source of minimizing energy losses. KERS with flywheel and clutch mechanism has high efficiency. From some result around 30% of energy we can recovered by KERS.[2].

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