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Power Generated by Regenerative Braking Systems

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***Abstract*- Most brakes commonly use friction between two surfaces pressed together to convert the kinetic energy of the moving object into heat, though other methods of energy conversion may be employed as all the energy here is being distributed in the form of heat. Regenerative braking converts much of the energy to electrical energy, which maybe stored for later use. Driving an automobile involves many braking events, due to which higher energy losses takesplace, with greater potential savings. With buses, taxis, delivery vans and so on there is even more potential for economy. As we know that the regenerative braking, the efficiency is improved as it results in an increase in energyoutput for a given energy input to a vehicle. The amount of work done by the engine of the vehicle is reduced, in turnreducing the amount of energy required to drive the vehicle. The objective of our project is to study this new type of braking system that can recollect much of the car's kinetic energy and convert it into electrical energy or mechanical energy. We are also going to make a working model of regenerative braking to illustrate the process of conversion ofenergy fromoneformto another. Regenerative braking converts afraction amount of total kinetic energy intomechanical or electrical energy but with further study and research in near future it can play a vital role in saving thenon-renewable sources of energy.**

***Keywords*- Regenerative, Braking, Hybrid vehicles, Kinetic energy recovery system (K.E.R.S.), Flywheel, Motor, Hydraulic Power.**

I.INTRODUCTION

A brake could be a machine that inhibits motion by absorbing energy from a moving system. it's used for slowing or stopping a moving vehicle, wheel, axle, or to stop its motion, most frequently accomplished by means of friction. The term 'Braking' during a moving vehicle means the appliance of the brakes to cut back its speed or stop its movement, usually by depressing a pedal.

The braking distance is that the distance between the time the brakes are applied and also the time the vehicle involves a whole stop. In braking systems on conventional vehicles, friction is employed to counteract the forward momentum of a moving vehicle.

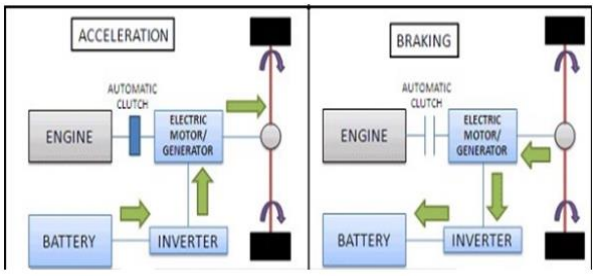

Fig 1. Momentum Of A Moving Vehicle.

As the restraint rub against the wheels or a disc that's connected to the axles, excessive energy is formed. This energy dissipates into the air, wasting the maximum amount as 30 percent of the vehicle's generated power. Over time, this cycle of friction and wasted heat reduces the vehicle's fuel efficiency.

II. LITERATURE REVIEW

Yimin Gao and Mehrdad Ehsani 2001 The desirable braking system of a land vehicle is that it can stop the vehicle or reduce the vehicle speed as quickly as possible, maintain the vehicle direction stable and recover kinetic energy of the vehicle as much as possible. In this paper, an electronically controlled braking system for EV and HEV has been proposed. The results show that significant amount of energy can be recovered and braking performance of the vehicle is perfect.

SR Cikanek, KE Bailey-Proceedings of the 2002 American This paper discusses a regenerative braking system (RBS) for a parallel hybrid electric vehicle (PHEV) that performs regenerative energy recovery based on vehicle attributes, thereby providing improved performance, efficiency and reliability at minimal additional cost. A detailed description of the regenerative braking algorithm is presented along with simulation results from a dynamic model of the PHEV exhibiting the regenerative braking performance.

X Nian, F Peng, H Zhang - IEEE Transactions on Industrial …, 2014) Regenerative braking can improve

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energy usage efficiency and can prolong the driving distance of electric vehicles (EVs). A creative regenerative braking system (RBS) is presented in this paper. The RBS is adapted to brushless dc (BLDC) motor, and it emphasizes on the distribution of the braking force.

III. SCOPE AND OBJECTIVE

- Use in electrical vehicles for generates the electricity and storage in some unit.
- World's leading automakers like Ferrari, Renault, BMW, McLaren, Tesla are developing hybrid and also complete electric cars and are trying to add this Regenerative braking systems (RBS) to them.
- The efficiency of IC engine vehicles is 20-25%.By using electric vehicles the efficiency increases by 50%. (i.e., 70-75%). Using RBS it contributes to the improvement of the overall efficiency of electric vehicles by providing braking feature and also saving most of the energy at the same time, which gets wasted. So by this system the efficiency can be increased approximately by 15% (i.e., 85-90%).
- Maximum efficiency from the automobiles which are to be introduced in near future is possible by this RBS.

IV. METHODOLOGY

Design requirements include dimension restrictions, effectiveness and safety. You have just once start the servo motor and one rode connected the motor and pulley. Regenerative braking is a way of taking the wasted energy from the process of slowing down a car and using it to recharge the car's batteries. ... In these cars, the system is virtually imperceptible to the driver but in hybrid and pure electric cars regenerative braking takes a more active and obvious role.

So when start the motor and rotate the connecting rode and pulley, when pulley is rotated then we give the friction on it by breaks or small pulley. When the friction applied on pulley the k.e energy produce the one type of friction power & this power is go in power transmission machine.

And the power is supply in the power bank or any other instruments, then the power is saved in power bank. This power we are used for charging the mobile and use this mechanical energy to produce the electrical energy. And also to re-charge the battery of electrical vehicles.

V. ACKNOWLEDGEMENT

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VI. CONCLUSION

The beginning of the 21st century could very well mark the final period in which internal combustion engines are commonly used in cars. Already automakers are moving toward alternative energy carriers, like electric batteries, hydrogen fuel and even compressed gas. Regenerative braking may be a small, yet very important, step toward our eventual independence from fossil fuels. These sorts of brakes allow batteries to be used for extended periods of your time without the need to be plugged into an external charger.

These forms of brakes also extend the practice range of fully electric vehicles. In fact, this technology has already helped bring us cars like the Tesla Roadster, which runs entirely on battery power. Sure, these cars may use fossil fuels at the recharging stage that's, if the source of the electricity comes from a fuel like coal -- but when they're there on the road, they will operate with no use of fossil fuels at all, and that's a big step forward.

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