

Regenerative Braking System – By Using Dynamo

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ABSTRACT

As the basic law of Physics says ‘energy can neither be created nor be destroyed it can only be converted from one form to another’. During huge amount of energy is lost to atmosphere as heat. It will be good if we could store this energy somehow which is otherwise getting wasted out and reuse it next time we started to accelerate. Regenerative braking refers to a system in which the kinetic energy of the vehicle is stored temporarily, as an accumulative energy, during deceleration, and is reused as kinetic energy during acceleration or running. Regenerative braking is a small, yet very important, step toward our eventual independence from fossil fuels.

KEYWORDS:Regenerative Braking, Hybrid vehicles, Kinetic energy recovery system (KERS), Flywheel Motor Hydraulic Power Assist.

I. INTRODUCTION

Brakes use employed to stop or retard the motion of any moving body. Thus, in automobiles the brakes are having the most important function to perform. In a conventional braking system the motion is retarded or stopped by applying kinetic energy by friction, by making the contact of the moving body with frictional rubber pad (called brake liner) which causes the absorption of kinetic energy, and this is wasted in form of heat in rounding. Each time we brake, the momentum of vehicle is better that it has gained by it and to re-accelerate the vehicle we have to start from the scratch to redevelop that momentum by using the more power from an engine. Thus, it will intimately result in huge waste of energy. As the basic law of Physics says energy can neither be created nor be destroyed it can only be derived from foot will be good if we could store that energy somehow which is

there wise getting wasted out and time it net time we started to accelerate. That's the basic concept of **Regenerative ("regent") Brakes**, which provide braking for the later when needed by converting the available energy to some usable form. These widely used in electric trains and the latest electric cars.

Regenerative Brake in an energy recovery mechanism which slows a vehicle by converting its kinetic energy into another form which can be either used inordinately or stored until needed. Thus, the rated electricity during the braking is fed back into the supply system (in case of electric train when in battery electric and hybrid electric vehicles, the stored in a battery or bank of capacitors for later use. Energy may also be stored by compressing air or in a rotating flywheel.

An Energy Regeneration Brake was developed in 1967 for the AMC Amitron. This was a completely battery powered urban concept car whose batteries were recharged by regenerative braking, this increasing the range of the automobile.

Many modern hybrid and electric vehicles use this technique to extend the range of the battery pack. Examples include the Toyota Prius, Honda Insight, the Vectrix electric maxi Scooter, and the Chevrolet Volt.

Need of Regenerative Braking System

The regenerative braking system delivers a number of significant advantages over a car that only has friction brakes. In low-speed, stop-and-go traffic where little deceleration is required; the regenerative braking system can provide the majority of the total braking force. This vastly improves fuel economy with a vehicle, and further enhances the attractiveness of vehicles using regenerative braking for city driving. At higher speeds, too, regenerative braking has been shown

to contribute to improved fuel economy - by as much as 20%.

Consider a heavy loaded truck having very few stops on the road. It is operated near maximum engine efficiency. The 80% of the energy produced

is utilized to overcome the rolling and aerodynamic road forces. The energy wasted in applying brake is about 2%. Also its brake specific fuel consumption is 5%.

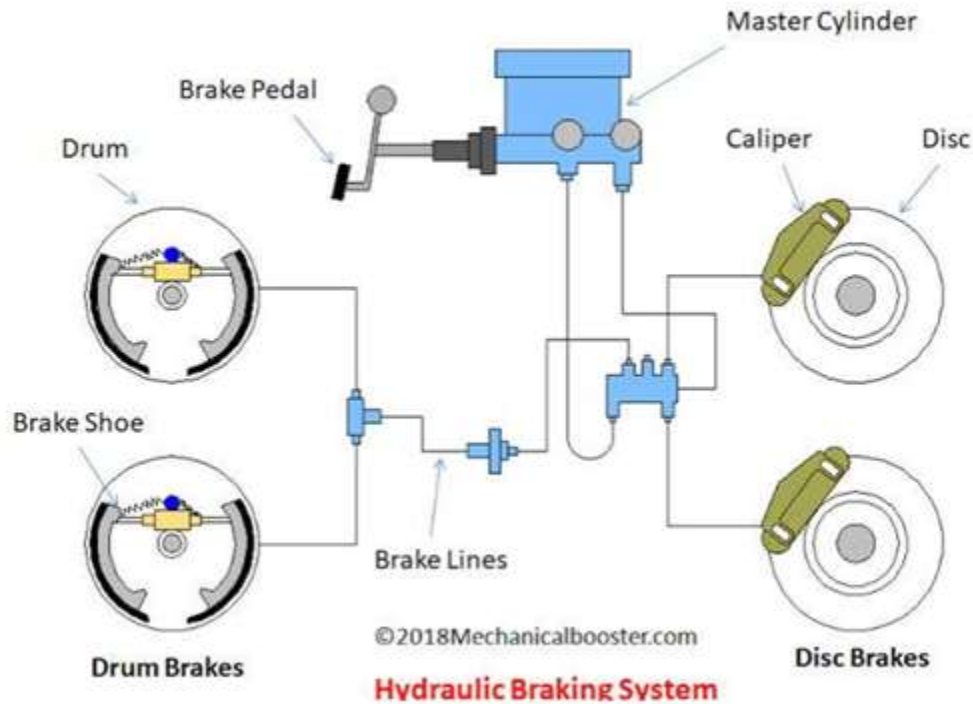


Fig: Brake

Now consider a vehicle, which is operated in the main city where traffic is a major problem here one has to apply brake frequently. For such vehicles the wastage of energy by application of brake is about 60% to 66%.

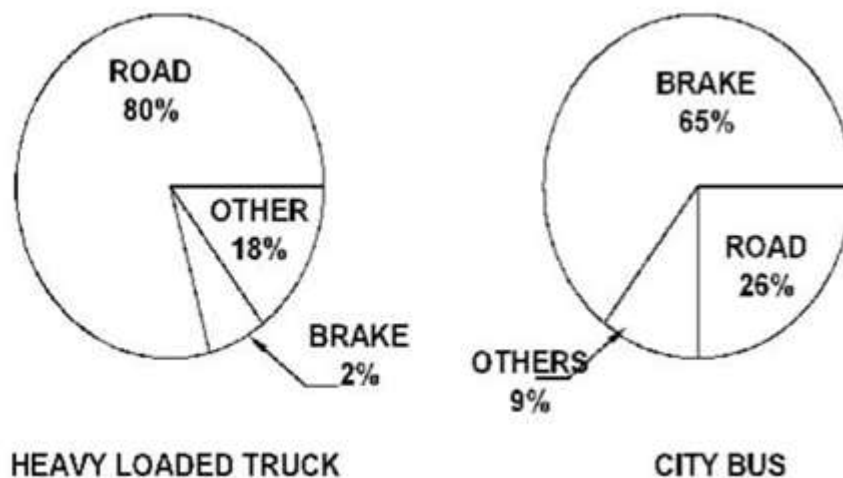


Fig: Graphic representation of energy usage of two vehicles

Modification In R.B.S:

In this modification we introduce a controller that response to the clutch and clutch pedal. Hydraulic mechanism is placed in the controller. In the end of that hydraulic mechanism

two dynamos are placed these two dynamos work independently that mean accordingly to the application we apply one or two dynamos at a time. In all this conditions the electrical energy which will be stored in separate battery.

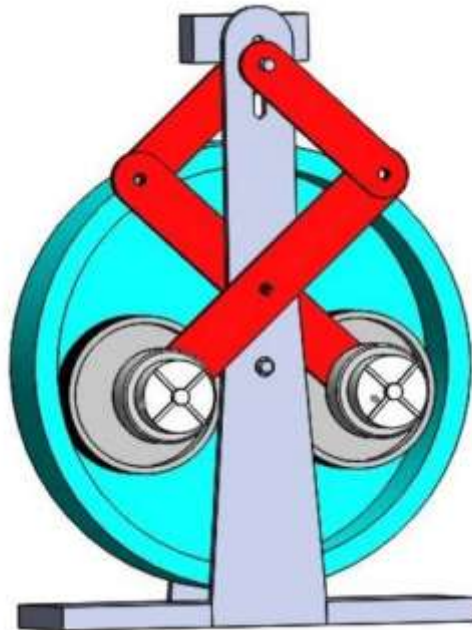
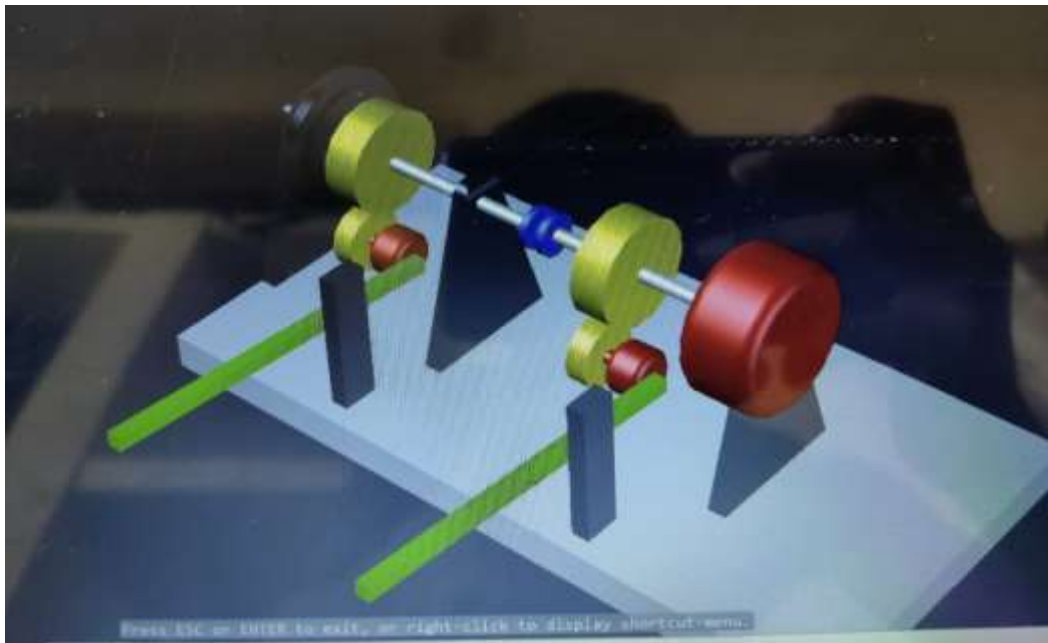
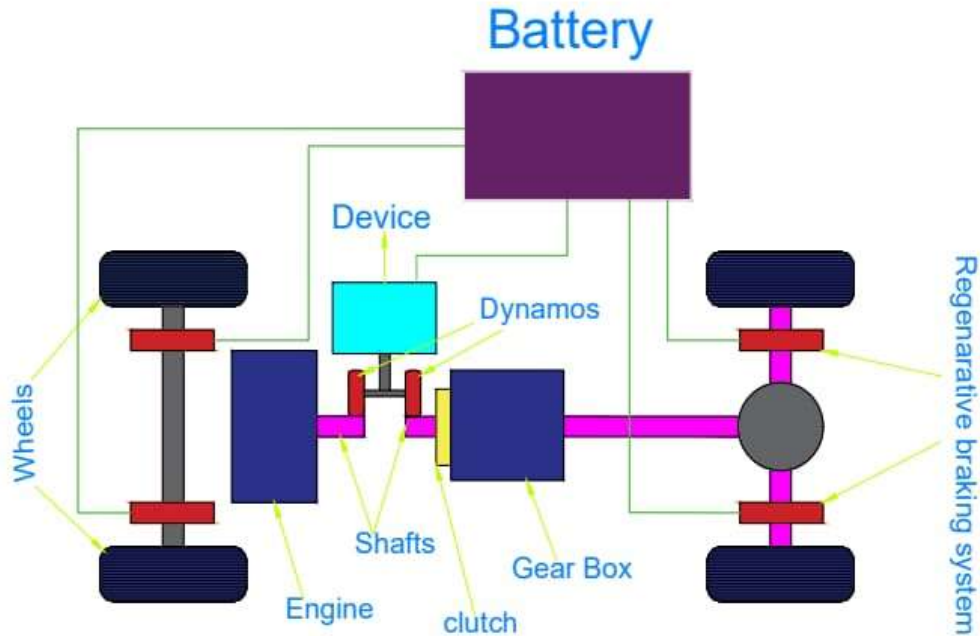


Fig : Regenerative Braking System





The Dynamo as a generator

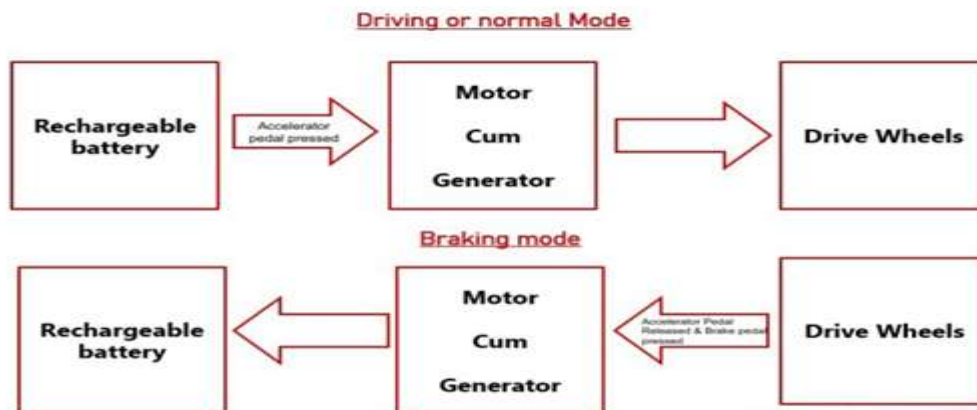


Fig: Direction of flow energy

Vehicles driven by electric motors use the Dynamo as a generator when using regenerative braking, it is operated as a generator during braking and its output is supplied to an electrical load, the transfer of energy to the load provides the braking effect. Regenerative braking is used on hybrid gas/electric automobiles to recoup some of the energy lost during stopping. This energy is saved in

a storage battery and used later to power the motor whenever the car is in electric mode.

When the vehicle is on Driving mode, the power from the battery is consumed by the Electric motor which converts the Electrical energy into Mechanical energy, which is the driving force for the Vehicle

When the driver applies the brakes, the Electrical supply to motor is stopped and the Mechanical energy is supplied from the Drive wheels, which produces an Back E.M.F in the motor and motor now becomes the Generator and produces the power which can be stored for other purposes.

Advantages:

- Avoiding friction brakes completely
- Additional electrical energy generated
- It extends the battery charge
- Improves energy conservation
- It allows for traditional friction based brakes
- It doesn't require traditional braking to be removed.

II. CONCLUSION:

- The regenerative braking system used in the vehicles satisfies the purpose of saving a part of the energy lost during braking. The regenerative braking system is designed to partially recover the battery charge wasted in braking of the vehicle.
- The energy is converted into heat by friction brakes which are dissipated to the environment. This Energy is utilized to rotate the rotor of generator converting mechanical energy of wheels into useful charge of battery. The regenerative braking system cannot be

used as main braking system of vehicle as it cannot bring the vehicle to rest.

- Experimentally it is found that, on increasing the speed of the wheel (rpm) the voltage generated will also be increasing and vice-versa. As others researchers had used stepper or servo motors as regenerative motor, so in this project, it is replaced with D.C motor with gear.
- Hence, if this system is installed in the actual vehicles minimum 11% battery energy can be recovered using the regenerative braking system which would otherwise be wasted to heat in friction brakes. So the distance travelled between two successive charging requirements can be increase to 10 to 15 % using this regenerative braking.

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