REGENERATIVE BRAKING SYSTEM BY USING SPRING LOAD TYPE

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ABSTRACT

This paper presents new design of energy recovering system in braking system. In general, regenerative brake is an energy recovery mechanism which slows down a vehicle or object by converting its kinetic energy into other form, which can be either used instantly or stored until needed. This contrast with conventional braking systems, where the excess kinetic energy is renewed to heat by friction in the brake linings and therefore wasted. In our methodology, the too much kinetic energy is converted useful mechanical energy and stored by spring.

Keywords: Brake, High pulling power, Regenerative power.

1 INTRODUCTION

Introduction to Regenerative Braking Systems When a conventional vehicle applies its brakes; kinetic energy is converted to heat as friction between the brake pads and wheels. This heat is carries away. In the airstream and the energy is effectively wasted the total amount of energy lost in this way depends on how often, how solid and for how long the brakes are applied. Regenerative braking refers to a method in which a portion of the kinetic energy of the vehicle is stored by a short term store system. Energy normally dissolute in the brakes is directed by a power transmission system to the energy store during deceleration. That energy is detained until necessary again by the vehicle, whereby it is rehabilitated back into kinetic energy and used to accelerate the vehicle. The extent of the portion obtainable for energy storage liberty varies according to the type of storage, drive train efficiency, and drive cycle and inertia weight.

A lorry on the mom way could travel 100 miles among stops. This represent tiny saving even if the efficiency of the system is 100%. City centre driving involves many more braking events representing a much higher energy loss with greater potential savings. With buses, taxis, delivery and and so on there is even more potential for financial system. because regenerative braking consequences in an increase in energy output for a given energy input to a vehicle, the competence is improved The sum of work done by the engine of the vehicle is abridged, in turn plummeting the amount of prime energy required to propel the vehicle. n order for a regenerative braking system to be cost effective the prime energy saved over a specified lifetime must offset the preliminary charge, bulk and heaviness penalties of the scheme. The energy luggage compartment unit must be dense, durable and capable of handling high power levels efficiently, and any supplementary energy relocate or energy adaptation equipment must be efficient, dense and of sensible cost. To be successful a regenerative braking system should ideally have the following properties efficient energy conversion An energy store with a high capacity per unit weight and volume A high power rating so large amounts of energy can flow in a short space of time Not require over complicated control systems to link it with the vehicle transmission Smooth delivery of power from the regenerative system Absorb and store braking energy in direct proportion to braking, with the least delay and loss over a wide range of road speeds and wheel torques.

2 DESCRIPTION OF EQUIPMENTS

2.1 SPRING

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The automobile chassis is mounted on the axles not direct but through some appearance of springs. This is done to detach the vehicle corpse from the road shocks which may be in the appearance of rebound, terrain, revolve or swing. These tendencies give rise to an uncomfortable ride and also cause additional stress in the automobile structure and dead body. All the parts which act upon the occupation of isolating the automobile from the road shocks are collectively.

A Springing device must be a compromise between flexibility and firmness. If it is more firm it will not sop up road shocks efficiently and if it is more flexible it will continue to vibrate even after the bump has passed so we must have sufficient damping of the spring to thwart undue flexing. A spring is a flexible elastic object used to store mechanical energy.

2.2 AC MOTOR

An AC motor is an electric motor driven by an alternating current. The AC motor commonly consists of two essential parts, an outside motionless stator having coils supplied with alternating current to produce a rotating magnetic field, and an at home rotor psychologically involved to the yield shaft producing a second rotating magnetic field. The rotor magnetic field may be bent by permanent magnets, disinclination saliency, or DC or AC electrical windings.

Less commonly, linear AC motors operate on similar principles as rotating motors but have their stationary and moving parts arranged in a straight line pattern, producing linear motion in its place of rotation. AC motors operate with two rotating (or moving) magnetic fields on the rotor and stator in that order. Pulling or pushing the poles of the two magnetic fields beside, the speed of the stator rotating magnetic field (Ws) and the speed of the rotor rotating magnetic field (Wr), which is relative to the speed of the mechanical shaft (Wm), must maintain synchronism for average torque production by satisfying the synchronous speed relation (i.e., ±Ws ±Wr = Wm).[1]

The two main types of AC motors are classified as induction or synchronous. The induction motor (or asynchronous motor) always relies on a small difference in speed between the stator rotating magnetic field and the rotor shaft speed called slip to induce rotor current in the rotor AC winding.

2.3 CLUTCH

A clutch is a mechanical device that engages and disengages the power transmission, particularly from driving shaft to drive shaft. clutches are used at any time the transmission of power or motion must be controlled either in amount or over time (e.g., electric screwdrivers limit how much torque is transmitted through use of a clutch; clutches control whether automobiles transmit engine power to the wheels). In the simplest gathering clutches connect and disconnect two rotating shafts (drive shafts or line shafts). In these devices, one shaft is characteristically close to an engine or other power unit (the driving member) though the other shaft (the driven member) provide output power for work. While characteristically the motions involved are rotary, linear clutches are also promising. In a torque-controlled drill, for case in point, one shaft is driven by a motor and the other drives a drill chuck. The clutch connect the two shafts so they may be locked mutually and spin at the same speed (engaged), locked mutually but spinning at dissimilar speeds (slipping), or ajar and revolving at different speeds (disengaged)

2.4 RATCHET PAWL

A ratchet mechanism is based on a wheel that has teeth cut out of it and a pawl that follows as the wheel turns. Studying the figure you will see that as the ratchet wheel turns and the pawl falls into the 'dip' flanked by the teeth. The ratchet wheel can only turn in one direction - in this case anticlockwise. The water well seen below has a ratchet mechanism that allows the person to rotate the handle in an anticlockwise direction. The bucket of water is profound and so the person can rest by captivating his/her hands gone from the handle.

2.5 BEARING

A bearing is a machine to sanction embarrassed relative motion flanked by two parts, typically rotation or linear movement. Bearings may be classified generally according to the motions they allow and according to their principle of operation. Low friction bearings are often significant for efficiency, to diminish wear and to smooth the progress of high speeds. Essentially, a bearing can diminish friction by virtue of its shape, by its material, or by introduce and contain a fluid flank by surfaces. By shape, gains advantage habitually by using spheres or rollers. By material, exploits the nature of the bearing material second-hand. Jewel bearings, in which the load is time-honored by rolling the axle somewhat skewed. Bearings vary critically over the forces and speeds that they can support. Forces can be radial, axial (thrust bearings) or moments perpendicular to the main axis. Bearings very characteristically absorb some degree of relative pressure group between surfaces, and dissimilar types have limits as to the greatest relative surface speeds they can knob, and this can be specified as a speed in ft/s or m/s.

The moving parts there is substantial overlap between capabilities, but plain bearings can generally knob the lowest speeds while rolling constituent bearings are faster, hydrostatic bearings faster still, followed by gas bearings and finally magnetic bearings which have no known upper speed limit.

3.DESIGN OF EQUIPMENT AND DRAWING

3.1 MACHINE COMPONENTS

The regenerative braking system by using spring load type is consists of the following components to full fill the requirements of complete operation of the machine.

AC Motor
Spring
Ratchet pawl
Belt and pulley
Clutch
Bearing
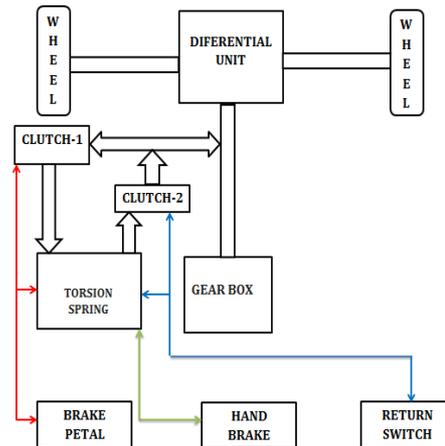
4.METHODOLOGY

4.1 Recognition of need:-

Making high quality and increasing braking efficency.

4.2 Description of the problem

While applying the brake vehicle energy is loss by means of friction due to the arrangement the energy loss is regenerated.

4.3 Synthesis:-

This paper presents new design of energy recovering system in braking system. In general, regenerative brake is an energy recovery mechanism which slows down a vehicle or object by converting its kinetic energy into other form, which can be either used instantly or stored until needed. This contrast with conventional braking systems, where the excess kinetic energy is renewed to heat by friction in the brake linings and therefore wasted. In our methodology, the too much kinetic energy is converted useful mechanical energy and stored by spring.

4.4 Design:-

For the designing purpose we select the appropriate power, Torque, wrap angle, deflection, shear stress factor yield stress, ultimate tensile strength.

4.5 Modeling:-

By using Autocad and Creo 2.0 software

4.6 Evaluation:-

To convert the frictional loss into electrical energy at the same increase the braking efficency

4.7 Result:-

In this scheme **Regenerative Braking system,** the regenerative brake capture about half of the energy exhausted and is utilized by the engine whereas in conventional brakes, 80% energy is exhausted.

5.WORKING PRINCIPLE

Feasible design of braking system is to recover the waste of energy during braking action. In conventional method extra kinetic energy changed to heat energy due to friction. The modernized design completely utilizes the waste energy.

In general, the main shaft runs of AC motor with belt and pulley connection for speed reduction. Both end of shaft is supported by bearing. In main shaft, a clutch device assembled for purpose of reducing the speed of vehicle during applying brake in case of real time application.

Here a lever engage and disengage clutch on main shaft. During disengaged position, the shaft tents to be rotated by momentum. In older method there is no recovering device. But our system having a spring to store the excessive energy wastages by connecting as shown in figure. Here spring wire is rolled over the roller element. The rotational energy in the auxiliary shaft is locked by a ratchet pawl mechanism. The same energy can be utilized whenever required by actuating the lever.

6.CONCLUSION

The project carried out by us will make an impressing mark in the field of automobile. It is very usefully for recover the energy waste from clutch system.

This project has also reduced the cost involved in the anxiety. The mission has been designed to perform the necessary chore taking minimum time.

7. REFERENCE

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