

Regenerative Clutch Power Generation

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Abstract - We have introduced the regenerating braking system it's a new innovative concept. It has been mainly developed for utilizing the braking operation in four wheelers. We have generated the electrical power through clutch system. In some vehicles electrical accessories are fitted to provide a good look to vehicle, but it needs the more electric power to work it, so we are using dynamo for producing the electric power with the arrangement of clutch system. This project made up of the following parts; dynamo, battery, wheel, chain drive, belt drive, AC motor, limit switch, battery and Electromagnetic clutch.

Keywords–Power Generation Using Clutch Plate;

I. INTRODUCTION:

Electromagnetic clutches are made to operate electrically and transmit torque mechanically. This is why they used to be referred to as electro-mechanical clutches. Over the years, EM became known as electromagnetic versus electro mechanical, referring more about their actuation method versus physical operation. Since the clutches started becoming popular over 60 years ago, the variety of applications and clutch designs has increased dramatically, but the basic operation remains the same.

Single face clutches make up approximately 90% of all electromagnetic clutch sales. The electromagnetic clutch is most suitable for remote operation, since it does not require linkages to control its engagement. It has very fast and smooth operation. However, because energy dissipates as heat in the electromagnetic actuator every time the clutch is engaged, there is a chance of clutch being overheated. Consequently the maximum operating temperature of the clutch is limited by the temperature rating of the insulation of the electromagnet.

CLUTCH MECHANISM :

A clutch is a mechanical device that engages and disengages the power, transmission, especially from driving shaft to driven shaft is shown in fig.1.

Clutches are used whenever 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 application, clutches connect and disconnect two rotating shafts (drive shafts or line shafts). In these devices, one shaft is typically attached to an engine or other power unit (the driving member) while the other shaft (the driven member) provides output power for work. While typically the motions involved are rotary, linear clutches are also possible.

In a torque-controlled drill, for instance, one shaft is driven by a motor and the other drives a drill chuck. The clutch connects the two shafts so they may be locked together and spin at the same speed (engaged), locked together but spinning at different speeds (slipping), or unlocked and spinning at different speeds (disengaged).



Fig.1

Clutch mechanism

COMPONENTS OF REGENERATIVE BRAKING SYSTEM

This regenerative braking system consists of the following components to fulfill the requirements of complete operation of the machine. .

AC Motor .
Dynamo .
Spur gear.
Belt and pulley .
Electromagnetic clutch .
Bearing .

Tyre

LITERATURE REVIEW:

The history of the automobile begins as early as 1769, with the creation of steam-powered automobiles capable of human transport. In 1806, the first cars powered by internal combustion engines running on fuel gas

appeared, which led to the introduction in 1885 of the ubiquitous modern gasoline or petrol fueled internal combustion engine. Cars powered by electricity briefly appeared at the turn of the 20th century but largely disappeared from commonality until the turn of the 21st century, when interest in low and zero emissions transportation was reignited. In electronics, a battery or voltaic cell is a combination of many electrochemical Galvanic cells of identical type to store chemical energy and to deliver higher voltage or higher current than with single cells .

Most commonly brakes use friction to convert kinetic energy into heat, though other methods of energy conversion may be used. This work is based on regenerative braking which converts much of the energy to electrical energy, which may be stored for later use [1]. The driving range limitation is the key restriction for the large scale development of EV (electric vehicle), and regenerative braking is one of the effective approach to extend the driving range of EV. To protect the battery from broken due to large charging current during regenerative braking, the control strategy that makes the charging current as control object [2].

REGENERATIVE BRAKING:

It is a small, but still a very important step towards our gradual independence from fossil fuels. These technique allow batteries to be used for longer periods of time without plugging into an external charger [3]. Kinetic energy recovery system used in the vehicles saves a part of the energy lost during braking. It can also be operated at high temperature range and are very efficient as compared to conventional braking system. The results from some of the test conducted show that around 30% of the energy delivered can be recovered by the system [4].

Environment protection and energy conservation was the main reason for the development of electric vehicles. However, the commercialization of theses was not successful. The main reason was that it could not satisfy the consumers' need due to high cost and short range [5].

he possibility to recover vehicle energy otherwise lost as heat during braking is an inherent advantage of a hybrid electric or a fully electric vehicle. Regeneration has the potential to answer this problem by aiding in range extension with recuperation of vehicle energy during braking. The control and dynamics of braking undergoes a major change as compared to a conventional vehicle with friction braking, due to the addition of motor-generator.

WORKING PRINCIPLE:

The main components involved in this project consist of motor, spur drives, dynamo, electromagnetic clutch, and bearing, and limit switch, clutch pedal and battery. The basic concept behind this project is to generate electricity while the clutch is in disengaged position. Here we are using a belt drive to couple the wheel with the

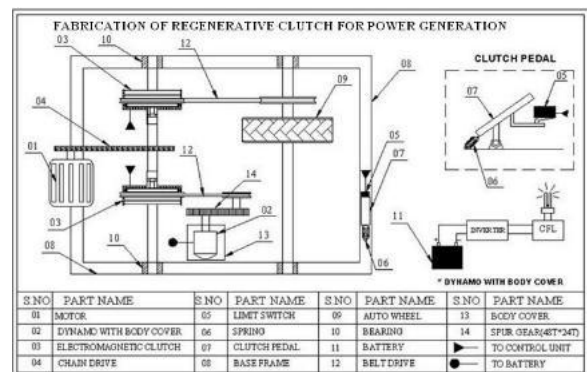
electromagnetic clutch and similarly couple the dynamo setup with the electromagnetic clutch from motor.

When the motor rotates coupled with the dynamo setup and wheel also rotates with the help of two electromagnet clutches using belt drives. Limit switch is placed below the clutch pedal. If we press the clutch pedal, limit switch activates it gives signal for disengage the electromagnetic clutch near wheel and engage the electromagnetic clutch near dynamo setup.

The dynamo will produce power according its rotation. With the help of inverter circuit, the generated power is converted and stored in Battery. So whenever the clutch is applied, some amount of power can be produced which can be stored in the battery.

If the clutch pedal in rest position, wheel near the electro-magnetic clutch is engaged. Dynamo setup near the electromagnetic clutch is disengaged.

LINE DIAGRAM:



5.1.MERITS & DEMERITS :

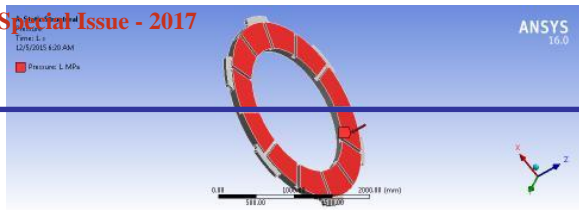
Merits:

- Automatically operate
- Implementation is easy
- Maintenance is easy

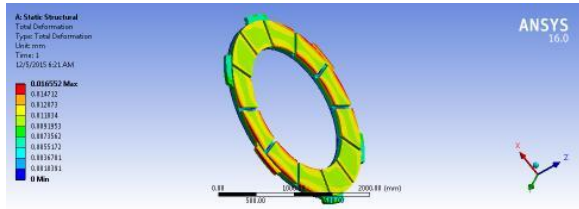
Demerits:

- Power produced is less
- Un-economical if produced in small numbers.

DESIGN OF CLUTCH



ANALYSIS



RESULTS

S.no	Total deformation	Stress	Strain
Structural steel	1.62e-2 mm	3.11MPa	4e-4
ARMID FIBER -KEVLAR29	1.81e-3	1.6MPa	4.76e-5

CONCLUSIONS:

The project carried out by us will make an impressing mark in the field of automobile.

Regenerative clutch is an effective method of improving vehicle efficiency and longevity. The regenerative clutch

system used in the vehicles satisfies the purpose of saving a part of the energy lost during clutch applied. Regenerative clutch system has a wide scope for further development and the energy savings. The use of more efficient systems could lead to huge savings in the economy of any country. It is very usefully for recover the energy waste from clutch system.

The miraculous thing about regenerative clutch is that it may be able to capture as much as half of that wasted energy and put it back to work. This project has also reduced the cost involved in the concern. The project has been designed to perform the required task taking minimum time. The lower operating and environment costs a vehicle with regenerative clutch system should make it more attractive than conventional one. The traditional cost of the system could be recovered in few years only.

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