



Emergency Braking System

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ABSTRACT: Car safety is the avoidance of automobile accidents or the minimization of harmful effects of accidents in particular as pertaining to human life and health. Special safety features have been built into cars for years. Some for the safety of car's occupants and some for the safety of others. In most situations, the vehicle is braking by using ordinary braking system. In the case of emergency, driver doesn't have to apply brake by his/her leg. With the help of this project, all the driver needs to do is turn on the emergency button. The button is provided near the driver. This braking system is designed in such a way that it brings the vehicle to a stop smoothly. Since the operation requires the basic step of pushing a button, it is very simple to use in practice.

KEYWORDS: Electromagnet, Spur Gear, Actuation of Mechanical Link

I. INTRODUCTION

Emergency Braking System is nothing but one of the braking systems used in automobile at the time of emergency. This braking system is an electrically operated one. Here the additional electromagnetic and emergency button is provided in the automobile. This braking system is used to avoid accidents. This braking system is described in working of a prototype model. An electromagnetic braking system uses magnetic force when applied, which applies a force on the brake, but the power is transmitted manually to operate the brake. The rake disc is connected to the shaft and electromagnetic kit are attached to a frame. The power source used is electricity. The electric power applied comes from the magnetic coil i.e., from the developed magnetic field in armature coil and attracts the electromagnet aluminum disc which applies the brake and stops the wheel and in turn, the vehicle.

In this project the push button is used to activate or deactivate the electromagnet. The switch is turned on at the time of emergency which activates the electromagnet so that braking is applied. In this way, we control the speed of the vehicle at the time of emergency. In our project we have to apply this braking system on one wheel to constitute a model.

II. RELATED WORK

As concluded by Prof. N.B.Totala in his journal Electromagnetic Braking System, "By using the electromagnetic brake as supplementary retardation equipment, the friction brakes can be used less frequently, and therefore practically never reach high temperatures. The brake linings would last considerably longer before requiring maintenance, and the potentially "brake fade" problem could be avoided.

III. METHODOLOGY

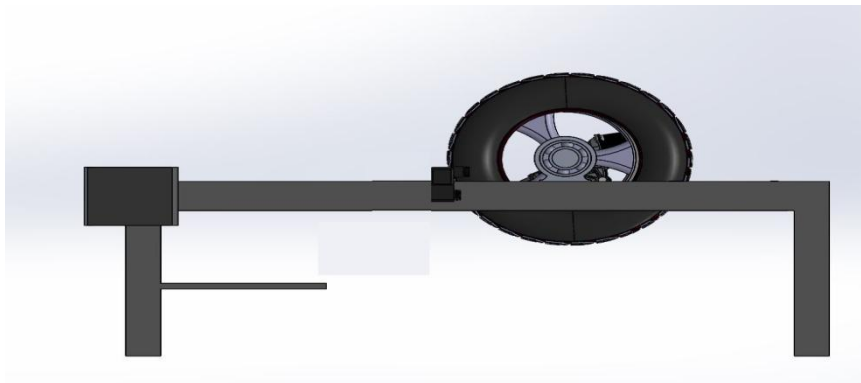
A brake is a device by means of which artificial frictional resistance is applied to a moving machine member, in order to retard or stop the motion of a machine. In the process of performing this function, the brake absorbs either kinetic energy of the moving member or potential energy given up by objects being lowered by hoists, elevators etc. the energy absorbed by brakes is dissipated in the form of heat. This heat is dissipated in the surrounding air (or water) which is circulated through the passages in the brake drum so that excessive heating of the brake lining does not take place. It goes without saying that brakes are one of the most important control components of vehicle. They are required to stop the vehicle with in the smallest possible distance and this is done by converting the kinetic energy of the vehicle into the heat energy which is dissipated into the atmosphere.

A machine that converts direct current power into mechanical power is known as D.C Motor. Its generation is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force. The direction if this force is given by Fleming's left-hand rule. In any electric motor, operation is

based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field.

As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

An electromagnetic coil is formed when a conductor solid copper wire is wound around a core or form to create an inductor or electromagnet. One loop of wire is usually referred to as a turn, and a coil consists of one or more turns. For use in an electronic circuit, electrical connection terminals called taps are often connected to a coil. Coils are often coated with varnish and/or wrapped with insulating tape to provide additional insulation and secure them in place. A completed coil assembly with taps etc. is often called a winding. A transformer is an electromagnetic device that has a primary winding and a secondary winding that transfer's energy from one electrical circuit to another by magnetic coupling without moving parts. The term tickler coil usually refers to a third coil placed in relation to a primary coil and secondary coil. A coil tap is a wiring feature found on some electrical transformers, inductors and coil pickups, all of which are sets of wire coils. The coil tap are points in a wire coil where a conductive patch has been exposed. As self-induction is larger for larger coil diameter the current in a thick wire tries to flow on the inside. The ideal use of copper is achieved by foils. Sometimes this means that a spiral is a better alternative. Multilayer coils have the problem of interlayer capacitance, so when multiple layers are needed the shape needs to be radically changed to a short coil with many layers so that the voltage between consecutive layers is smaller.



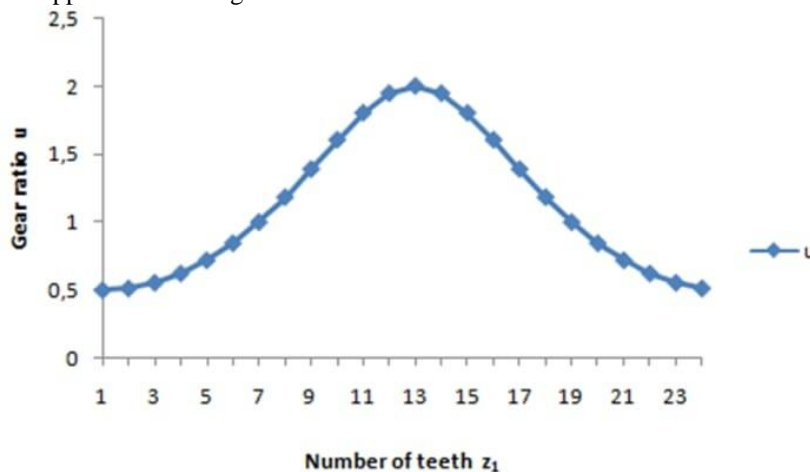
1. 3-D Drawing
2. Battery and emergency switch setup
3. Wheel connected to shaft of DC motor through spur gear



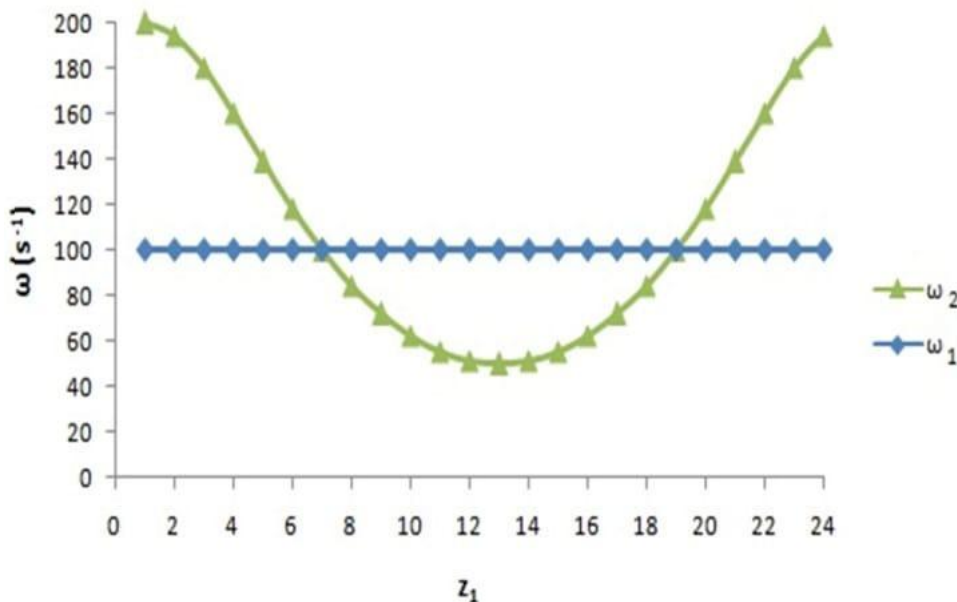
IV. EXPERIMENTAL RESULT

When the battery is connected, current starts to flow to the d.c motor. The d.c motor is coupled to a shaft which is in turn coupled to a spur gear. The wheel is coupled to the spur gear and hence the rotation of the motor results in rotation of the wheel (this indicates the motion of an automobile).

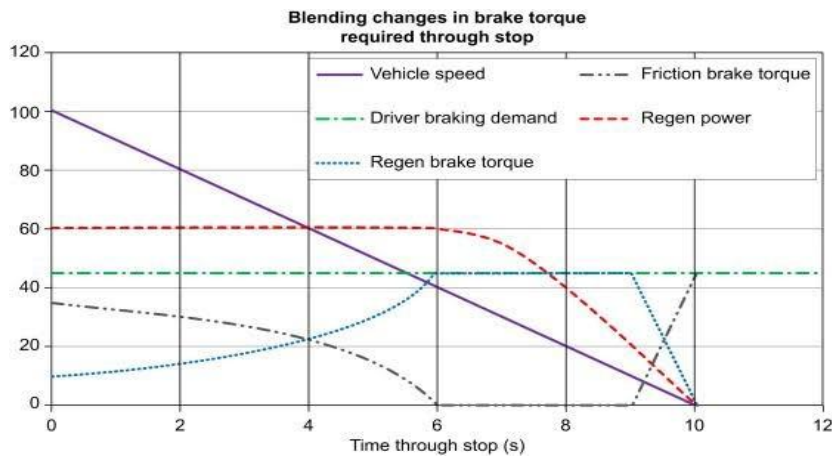
When the switch is turned on, the current is redirected from the d.c motor to an electromagnet. As a result, the electromagnet gets energized and actuates a mechanical link (D.C Gun). This link is connected to a drum brake attached to the wheel and applies the braking.



The above graph shows the correlation between the number of teeth present on the spur gear and the gear ratio. This is a course of continuously changing gear ratio. A gear ration value less than 1.0 indicates overdrive and gear ratio greater then 1.0 indicates speed reduction.



The rotational speed on drive wheel gear and driven wheel gear is constant to standard spur gears (Blue line). The graph varies for designed elliptical gearing with variable transmission, the angular velocity of the driven wheel is not constant but varies according to continuous changing of the gear ratio (Green Line).



This graph shows the blending changes in brake torque required through stop with regards to how every single parameter affect the brake torque.

V. CONCLUSION

Electromagnetic brake is a better and reliable solution. Electromagnetic brake control system is an electric switching system which gives it superior controllability. The installation of an electromagnetic brake is not very difficult. From the foregoing, it is apparent that the electromagnetic brake is an attractive complement to the safe braking of heavy vehicles. Good results with current design, a larger budget would improve performance.

The project carried out by us will make an impressing mark in the field of automobile. It is very usefully for drivers to drive the vehicle without tension.

This project has also reduced the cost involved in the concern. The project has been designed to perform the required task taking minimum time.

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