

Design & Fabrication of Frictionless Electromagnetic Braking System – A Review

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Abstract— Brakes could be the crucial parts in most of the moving system that are generally used to slow down or stop the motion of the any moving system. Braking system uses the friction force to transform the kinetic energy of a moving parts into heat by the use of the brake pads. Frequently using of these type of friction braking leads to rise in temperature of brake pads, these leads to effecting the effectiveness of the braking system. By overcoming these effects we use electromagnetic braking. In this project, we have to use eddy current braking in vehicle to stop the vehicle by non-contracting type. This braking system is friction-less, it has an advantages over the ordinary braking system in the performance and maintenance.

Key words: Eddy Current Braking System, Eddy Current, Magnetic Field, Brakes, Frictionless

I. INTRODUCTION

In the operation of any machine the primary safety system is the braking system. As brake is an essential parts of car innovation, there are developments in brakes as well. The mainly utilized brakes in cars are drum and disk brakes. In green technology, which focused on the importance of environment conservation, a move to a new braking system is needed. The primary basic designs of the braking system involve the conversion of kinetic energy to heat energy by the use of friction. This is accomplished by friction between two rubbing surfaces may be in disk brake and drum brake. These brakes pose several problems i.e. more wear, complex and slow actuation, lack of fail-safe features, increased fuel consumption. To solve these problems, a contactless magnetic brake has been used to reduce or overcome the friction effect. This concept includes a metals disc which will conduct eddy currents generated by magnets. Electromagnetic braking is an imaginative innovation and further more frames the premise of developing innovation. Electromagnetic brake is as new idea.

This brake is wear-free, low-sensitive to temperature compare to friction brakes, it has fast and simple actuation, and has a reduced sensitivity to wheel lock. This is carry out by the generation of braking torque by a magnetic field across a moving conductor which creates a perpendicular magnetic field by induced eddy currents. Contactless brakes can be applied to any machinery like automobiles, locomotives, roller coasters, machine tools, elevators, etc. Eddy current braking has a lot of advantages compared to conventional braking system such as friction free, there should be no wear and tear in brakes.

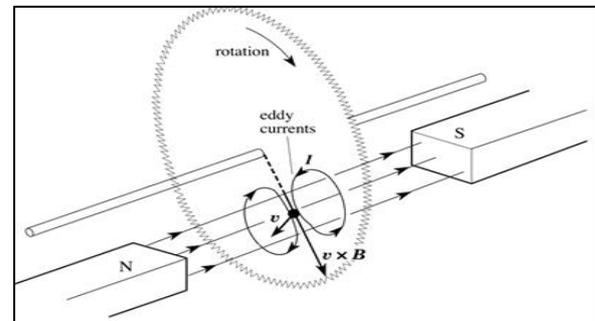


Fig. 1: Eddy Current

A. Eddy Current

Eddy current brake could be work on the basis of Faraday's law of electromagnetic induction. According to this law, whenever a current carrying conductor cuts the magnetic lines of force, an EMF is induced in the conductor, the magnitude of eddy current is proportional to the strength of the field of the magnet and the speed of the conductor. If the conductor is the disk, there could be circulatory current (eddy current in the disc). According to the Lenz's law, the direction of the current is in oppose the cause that is act on the movement of the disk.

B. Electromagnets

Electromagnets are DC type which is to be powered by battery. Electromagnets are selected instead of permanent magnet as electrical actuation which is faster than mechanical actuation with lower losses.

Magnetic field can be generated at the time when it is needed only.

C. Circular Disc

We have to take the circular disk for our project would be an aluminium disc.



Fig.2. Circular disc

II. METHODOLOGY

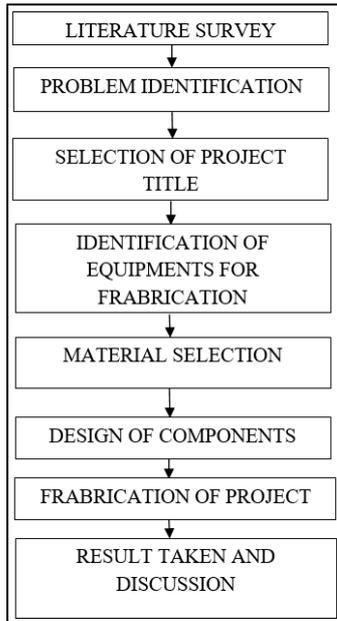


Fig. 1: Methodology

III. CONCLUSION

Electromagnetic braking system is assign to be more reliable as compared to ordinary braking systems. In oil braking system or air braking system even a small leakage in the oil or air tank may lead to complete failure of brakes. In the eddy current braking due to no friction there should not be led to failure of brake. It is found that electromagnetic brakes may be used approximately 60% of all of the power applied brake applications. This braking system not only helps in effective braking but also helps in avoiding the accidents and reducing the frequency acquire of accidents to be minimum. Furthermore the electromagnetic brakes prevent the danger that can arise from the regular use of brake over their capability to dissipate heat.

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