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Fabrication of Electromagnetic Braking System

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ABSTRACT:

Electromagnetic Braking system uses Magnetic force to engage the brake, but the power required for braking is transmitted manually When electricity is applied to the coil a magnetic field is developed across the plunger because of the current flowing across the coil and causes plunger to get attracted towards the coil.As a result, it moves the brake shoe against the rotating drum and eventually the vehicle comes to rest. In this project the advantage of using the electromagnetic braking system is automobile is studied. These brakes can be incorporated heavy as an auxiliary brake.

INTRODUCTION:

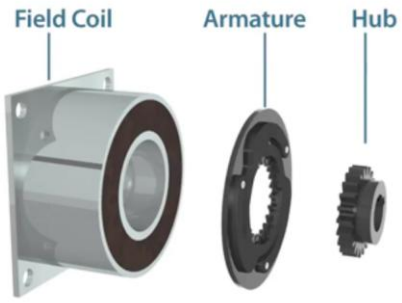
This project intends to the design, analysis and implementation of new braking system. We are trying to analyze a braking system which is economical and environment friendly. The design of brakes based upon the phenomenon of electromagnetic induction and eddy currents. The eddy current development obeys Maxwell's law of electromagnetic induction and Lenz's law.

WORKING:

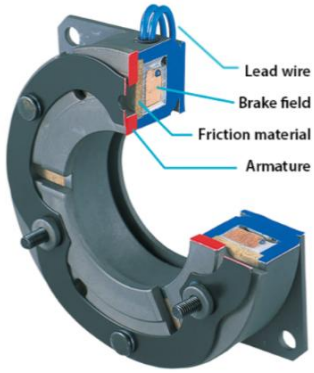
Electromagnetic brakes (also called electro-mechanical brakes or EM brakes) slow or stop motion using electromagnetic force to apply mechanical resistance (friction). They were originally called "electro-mechanical brakes," but over the years the name changed to "electromagnetic brakes", referring to their actuation method. Since becoming popular in the mid-20th century, especially in trains and trams.the variety of applications and brake designs has increased dramatically, but the basic operation remains the same.

Both electromagnetic brakes and Eddy current brakes use electromagnetic force, but electromagnetic brakes ultimately depend on friction whereas eddy current brakes use magnetic force directly.

The working principle of the electric retarder is based on the creation of eddy currents within a metal disc rotating between two electromagnets, which sets up a force opposing the rotation of the disc (see figure 2.3). If the electromagnet is not energized, the rotation of the disc is free and accelerates uniformly under the action of the weight to which its shaft is connected. When the electromagnet is energized, the rotation of the disc is retarded and the energy absorbed appears as heating of the disc. If the current exciting the electromagnet is varied by a rheostat, the braking torque varies in direct proportion to the value of the current. It was the Frenchman Raoul Sarazin who made the first vehicle application of eddy current brakes. The development of this invention began when the French company Telma, associated with Raoul Sarazin, developed and marketed several generations of electric brakes based on the functioning principles described above (Reverdin, 1974).

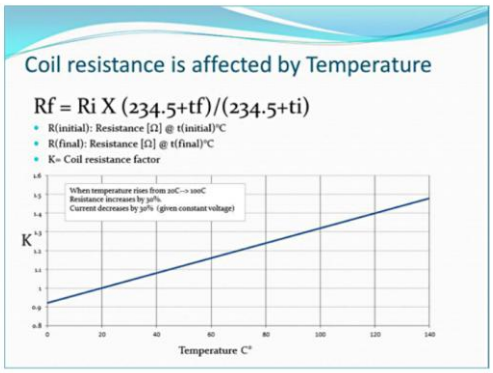


A typical retarder consists of stator and rotor. The stator holds 16 induction coils, energized separately in groups of four. The coils are made up of varnished aluminum wire mounded in epoxy resin.



Brake Construction

The stator assembly is 9 supported resiliently through anti-vibration mountings on the chassis frame of the vehicle. The rotor is made up of two discs, which provide the braking force when subject to the electromagnetic influence when the coils are excited. Careful design of the fins, which are integral to the disc, permit independent cooling of the arrangement.



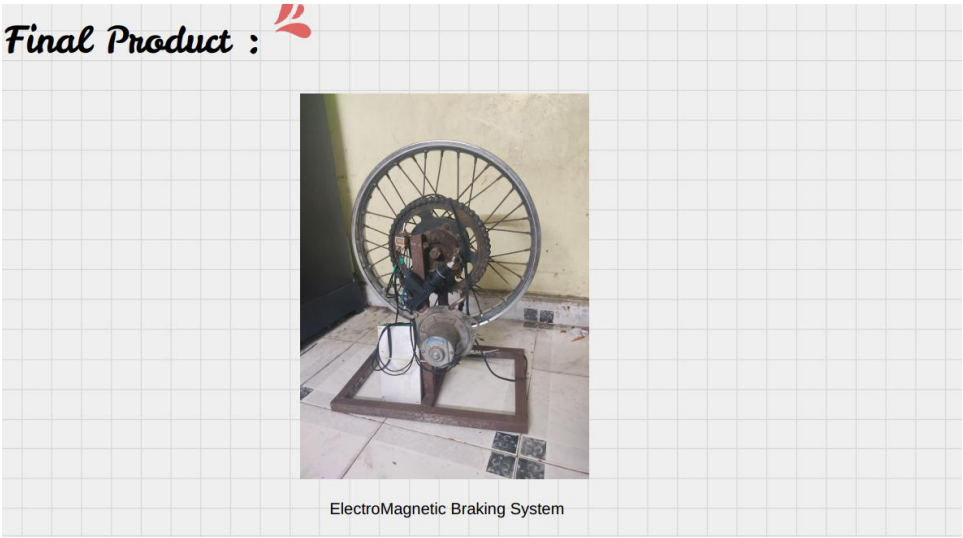
APPLICATIONS:

In locomotives, a mechanical linkage transmits torque to an electromagnetic braking component.
Trams and trains use electromagnetic track brakes where the braking element is pressed by magnetic force to the rail. They are distinguished from *mechanical* track brakes, where the braking element is mechanically pressed on the rail.
Electric motors in industrial and robotic applications also employ electromagnetic brakes.
Recent design innovations have led to the application of electromagnetic brakes to aircraft applications. In this application, a combination motor/generator is used first as a motor to spin the tires up to speed prior to touchdown, thus reducing wear on the tires, and then as a generator to provide regenerative braking.

.CONCLUSION

In conclusion,

This type of braking system [Electromagnetic Braking System] is more economical and efficient than conventional braking system and also is environmentally friendly. No physical contact between rotating and stationary components means minimal friction and wear from load-bearing elements. It does not need lubrication, making them virtually maintenance-free. The Electromagnetic brakes also have excellent heat dissipation and have better thermal dynamic performance than regular friction brakes. They are also proven to work faster than conventional brakes



SUMMARY:

With all the advantages of electromagnetic brakes over friction brakes, they have been widely used on heavy vehicles where the ‘brake fading’ problem is serious. The same concept is being developed for application on lighter vehicles.

References:

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ANNEXURES:

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