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ZERO FRICTION ELECTROMAGNETIC BRAKING SYSTEM

[1]Dr. Vishal Sulakhe, [2]Anuj Alkesh Nikam, [3]Anan Singha Gautam, [4]Himansbu Shirish Patil

[1]Assistant Prof., Dept. of Mechanical Engineering, Sandip university , Nashik
[2]UG Scholar Dept. of Mechanical Engineering, Sandip university , Nashik
[3]UG Scholar Dept. of Mechanical Engineering, Sandip university , Nashik
[4]UG Scholar Dept. of Mechanical Engineering, Sandip university , Nashik

ABSTRACT- An electromagnetic brake may be a new and revolutionary concept. Electromagnetic braking system may be a modern technology braking system utilized in light motor heavy automobiles. Electroprinciples of mechanics.Nowadays, accidents happen more frequently because of ineffective brakin g systems.It is clear that the electromagnetic brake is a vital component of heavy vehicle safety braking.It seeks to lessen breakdown to prevent traffic accidents.Additionally, it minimises brake system maintenanc This technique has the benefit of being often employed on any car with minimal gearbox and electrical sys tem adjustments.Although an electromagnetic braking system transmits the force needed for braking manu ally, it employs magnetism to interact with the brake.The disc is connected to a shaft and the electromagnet is mounted on the frame. When electricity is applied to the coil a magnetic field is developed across the armature due to the present flowing across the coil and causes armature to urge attracted towards the coil. As a result, it develops a torque and eventually the vehicle involves rest. These brakes are often incorporated in heavy vehicles as an auxiliary brake. The electromagnetic brakes are often utilized in commercial vehicles by controlling the present supplied to supply the magnetic flux. The working rule of this technique is that when the magnetic flux passes through and perpendicular to the rotating wheel the eddy Current flows opposite to the rotating wheel/rotor direction.

Key Words: Automobiles, Brakes, Electromagnetic System, Magnetic Flux, Economic

I. INTRODUCTION

Eddy current brakes and magnetic brakes both use magnetic force to apply mechanical resistance (friction) in order to slow or halt motion.The term "eddycurrent brakes" was initially used, but as time went on, it w as modified to "magnetic brakes," alluding to how they were activated.The range of uses and brake design s has substantially increased since they first gained popularity in the middle of the 20th century, particularl y in trains and trams, but the fundamental principle of operation has not changed.The brakes that use magn etic power are known as magnetic brakes.They operate according to the magnetism theory.Due to its many advantages over standard brakes, these brakes make an excellent substitute.This brake is used in vehicles to lessen brake damage because it principle of this system is that when the magnetic field passes through and at right angles to the rotating disc an eddy current is produced opposite to the rotating disc direction. This eddy current tries to stop the rotating disc. This results in the rotating disc comes to a halt.

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Types of Braking Systems

1. Electromagnetic Brake System A growing style of brakes, electro magnetic brakes use a motor that is comprised in the automobile which assist the automobile come to rest. These types of the brakes are used in maximum hybrid vehicles and use a motor to charge the battery and regenerative brake. instance, some buses will use it as a subordinate retarder brake.
2. Frictional Brake System A frictional brake is found in numerous vehicles. They are provisional brakes, and naturally found in two types; pads and shoes. As the name suggests, these brakes use friction to brake the vehicle from moving. They typically comprise a rotating disc with a stationary pad and a rotating surface. On most band brakes the shoe will compress and rub against the external of the rotating drum, otherwise on a drum brake, a rotating drum with shoes will enlarge and rub against the interior of the drum.
3. Hydraulic Brake System A hydraulic brake system is containing a master cylinder that is supplied by a reservoir tank of hydraulic braking fluid. This is linked by a collection of rubber fittings and metal pipes which are connected to cylinders of the wheel. The wheel contains two opposite piston which are located on the band, drum brake which are pressured to push the pistons distinctly forcing the brake pads in the cylinders, thus triggering the wheel to retard motion.

II. METHODOLOGY

If a piece of copper wire was wound, around the nail and then connected to a battery, it would create an electro magnet. The magnetic field that is generated in the wire, from the current, is known as the “right hand thumb rule”.

A. Design Structure

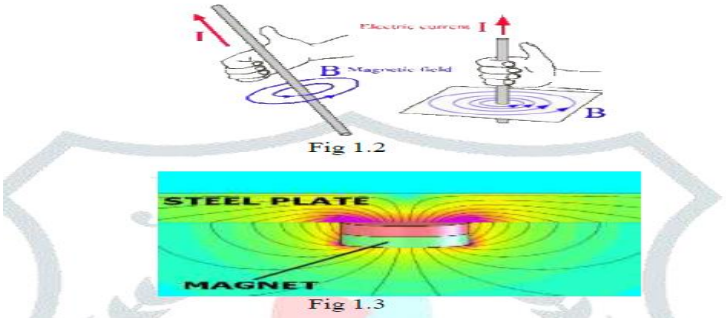

Fig.1 Design

The model operates on the basis of an electromagnetic field. The wheel is set to rotate at a certain speed ei ther manually or with the aid of a motor. Once the wheel reaches that speed or rpm, the power is released, allowing it to move freely. At that point, brakes are applied using two electromagnets mounted closely tog ether with a 0.5mm air gap between the disc and the electromagnet.

The electromagnets are only activated when a supply is present. of DC power to it, but before that the model is been automated with a regulator, relay and a RF channel controller. Where the regulator

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generates a fixed output voltage from the supply and to regulate one or more voltages, whereas the relays are the switches that opens and closes the circuit by electrically or electromechanically and they control the circuit by opening and closing contacts in another circuit. The RF channel is the device used to switching on and off of the application by means of a remote controller where by transmitting the signal to the relay and the operation is performed accordingly.

B. Implementation

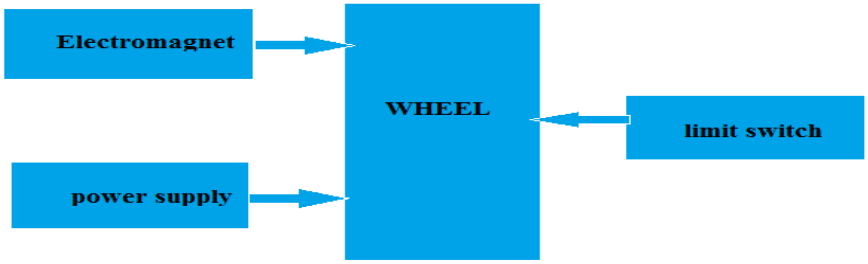

Fig.2 Implementation

1) Electromagnet **:** Electromagnets are made out of a coil of wire (wire curled in series). This is more effective in producing a magnetic field than just a wire running straight. This effect can be strengthened by winding a wire tightly around a powerful core made of magnetic material, such as iron. The picture above shows a coil wound around an iron nail. On its own, the iron nail is not magnetic.

2) Battery :

Fig.3 Battery

Even though most car, motorcycle and tractor batteries are sold as "12-volt" batteries, the nominal voltage of a fully charged battery is closer to 12.6 volts. The electrochemical reaction between the lead plates and the battery electrolyte is what produces the voltage differential between the positive and negative terminals on a battery.

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3) ***Chain*** :

Fig.4 Chain

DC geared motor with rubber wheel are suitable material for this project. This DC motor are suitable to replace 2 WD and 4 WD car chassis. The working voltage for DC motor is around 5V to 10 V DC. While the ratio of the gear is 48:1. Suitable current for this motor is 73.2 mA. DC motor is used to move the robot to the fire location.

4) ***Bike 14 teeth sprocket& chain set***

1. *High-quality product*
2. *Wide variety of Applications*
3. *Improves efficiency and extends the range of Electric Bikes*
4. *Ensures efficient transfer of Power and prolongs Battery Life*

III. CALCULATIONS

• Area of the Electromagnet = 12.4 m
• Current & Voltage supplied (I/V) = 7amp/230volts.
• Length of electromagnet (L) =90 mm.

Let the plate & wheel assembly maximum weight is to be consider approx. 2kg. which is 19.62N so that will be,

F is the force in Newton.
B is the magnetic field in teslas.
A is the area of the pole faces in square meters.
μ is the permeability of free space.
In the case of free space (air)
19.62 = B2 (12.4)
2x4πx10-7
B=0.00199wb/m2
4.1. TOTAL MAGNETIC FLUX IN CORE:
Ø = B ×A
Ø = 0.00199×12.4
Ø = 0.0246 wb.
4.2. THE MAGNETIZING FORCE:

H = B/μ = 0.00199/4π×10^-7
= 1583.59 AT/m.
For air gap of 0.5 mm magnetic force is given by between magnet & plate.
AT = H×L
= 1583.59×90×10^-3
= 142.52 AT
To find the power of electromagnet which is manually constructed
Assuming N = number of turns in the electromagnetic = 800
F= (NxI)2 μa / (2xg)
g = air gap between electromagnet & plate
F= (8x1)2 4πx10-7 x0.00199 / (2x0.5)2
F= 16.045N for each electromagnet

IV. RESULT

To format your paper and style the content, the output of the model is recorded, tabulated, and the outcom e is displayed by computing and submitting.Please follow the necessary margins, column widths, line spac ingand text font.You might detect oddities.For instance, this template's head margin is proportionately larg er than usual.This measurement and others are intentional, utilising guidelines that assume your work will be a component of the full proceedings and not stand alone.

V. CONCLUSIONS

Effective braking is achieved with minimal wear and tear by frictionless braking.This braking has a low m aintenance cost.Because this braking mechanism is noncontact, there is no friction and little wear and tear. Because the debris created while braking is little, it is environmentally benign.This method of braking is cl eaner.As the wheel does not lock, wheel skidding is avoided.It is excellent for high speeds.It uses electricit y operate and consumes relatively little power for a brief time.Installation is simple because it simply take s up a little space. It can successfully take the place of conventional braking systems.

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