

ELECTRO MAGNETIC SUSPENSION SYSTEM

Manosuspension

Natraj¹, Rudresha N², Kiran Kumar B J³, Dr. Vijay Kumar M⁴

¹Assistant Professor, Mechanical Department

²Assistant Professor, Mechanical Department, PACE Mangalore,

³Assistant Professor, Mechanical department, PAPT Mangalore

⁴Associate Professor, IEM Department, JSSATE Bengaluru,

ABSTRACT

A shock absorber is a mechanical device designed to smooth out or (A slight wetness) damp a sudden shock impulse and dissipate kinetic energy.

In a vehicle, it lessens the impact of going over unpleasant ground. Without safeguards, the vehicle would have a bobbing ride, as vitality is put away in the spring and after that discharged to the vehicle, perhaps surpassing the permitted scope of suspension development. Control of inordinate suspension development without stun ingestion requires stiffer (higher rate) springs, which would thus give a cruel ride. Safeguards permit the utilization of delicate (lower rate) springs while controlling the rate of suspension development in light of knocks.

In our project, permanent magnet is used to shock absorber the vehicle. The shock absorber is designed by controlling for equipment, auto mobiles and movers are suitable arrangement.

I INTRODUCTION

The body of an Automobile is mounted on the axels of both rear and front with some spring support and shock absorbers support. When wheel roll on the road the damp or vibrations transmitted to frame via shock absorbers. All these systems which perform to prevent these shocks are called suspension system. Thus this suspension system consist shock absorbers, springs and their mountings. In vehicles his system further classified as front end suspension and rear end suspension.

1.1 Functions of Suspension System

1. To keep the street stuns from being transmitted to the vehicle outline
2. To safeguard the steadiness of the vehicle in pitching or rolling, while in movement.
3. To protect the inhabitants from street stuns.
4. To give great street holding while driving, cornering and braking.
5. To keep up legitimate directing geometry.

II PROBLEM DEFINATION

Vehicles which on hard or rough roads also in our country road humps (speed breakers) always there on roads, to prevent vibrations while driving vehicle in these circumstances a good shock Absorber has to choose.

III OBJECTIVE

- Design and fabricate a Electromagnet suspension for Automotive Light Vehicle.

IV METHODOLOGY

Magnetic suspension system works in the principle that the magnetic repulsion force of the same pole was to be used for performing the braking system. At the same time the hydraulic oil is used to suspension the magnetic field. The two pneumatic magnetic suspensors are fixed to the frame stand. The one single wheel is fixed to the frame stand.

This magnetic shock arrangement is the additional suspension arrangement for the existing shock absorber arrangement. This magnetic suspension system arrangement will be activated automatically for the weight of the vehicle is exceeded for the particular load.

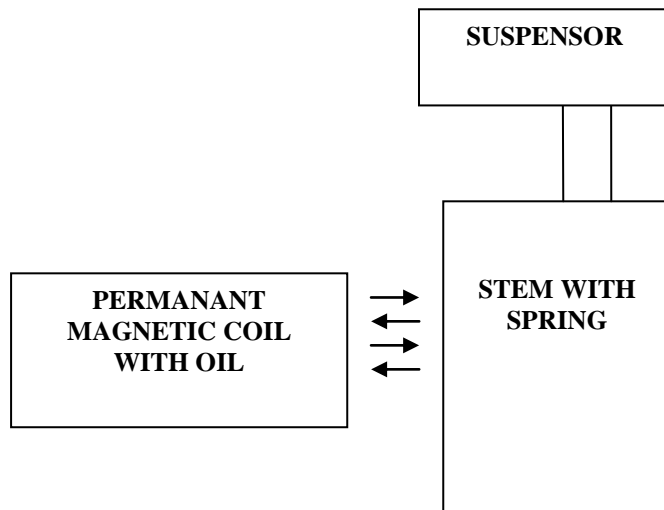


Fig 1. Block Diagram of an Electromagnetic Suspension

The load is applied to the suspensor which oils get hardened to repulsion the permanent magnet. This repulsion force causes the plunger to reciprocate. This reciprocating motion is converted to convert to the liner motion of the suspension system.

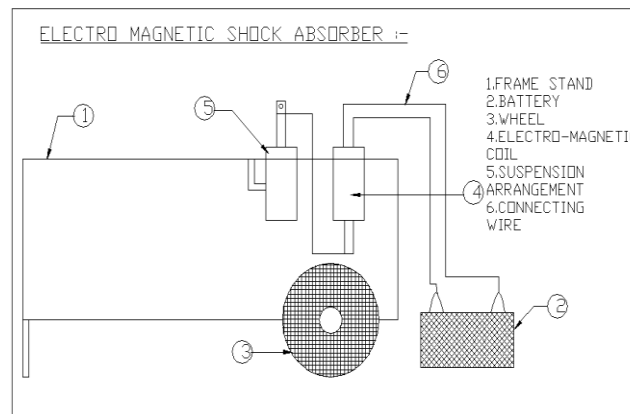


Fig 2 Parts of Working Model

The major components of the “Electro-Magnetic suspension system” are follows

- ◆ Hydraulic Oil
- ◆ Permanent Magnet
- ◆ Pneumatic Suspension System
- ◆ Frame Structure
- ◆ Bearing with bearing cap

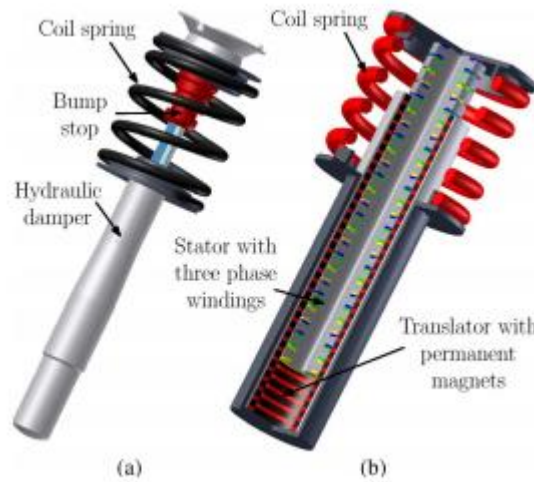


Fig 3. a) Conventional passive suspension system b) Electromagnetic suspension system

Electrical materials used in the construction of all commercial machines may be broadly classified into three groups,

1. Conducting
2. Insulating
3. Magnetic materials.

The design of electrical machines and equipment’s mainly depend on the quality of these materials. Inflow grade materials are used; the machine or the equipment would be too heavy and costly.

Solution to the problem is to select, insulating, conducting and magnetic materials properly, so as to improve the efficiency of the machine or the equipment, reduce the size, weight and the cost and increase the reliability of operation.

4.1 Design Calculations

CALCULATION FOR Force to operate suspension system (F)

$$F = (m + M/C)$$

$$\text{Allowable pressure for Asbestos} = 0.7b \text{ N/mm}^2$$

Total moment of Normal force (M)

$$M = \frac{1}{2} p b r OA [(\theta_2 - \theta_1) + \frac{1}{2} (\sin 2\theta_1 - \sin 2\theta_2)]$$

$$= \frac{1}{2} \times 0.75 \times 5 \times 97 \times 85 [(1.83 - 0.175) + \frac{1}{2} (\sin 20 - \sin 216)]$$

$$= 39959.47 \text{ N-mm.}$$

Total momentum of the friction force (M)

$$M = \mu p b r [r (\cos \theta_1 - \cos \theta_2) + OA/4 (\cos 2\theta_2 - \cos 2\theta_1)]$$

$$= 31947.52 \text{ N mm.}$$

$$\text{Therefore Force (F)} = (M + M)/C$$

$$= (39959.47 - 31947.52)/155$$

$$= 51.69 \text{ N.}$$

Force to operate suspension system = 51.69N.



Fig 4. Demo model of electromagnetic suspension system

V. APPLICATIONS AND FEATURES

5.1 Applications

- Utilized as a part of Crane Control System
- Utilized as a part of Winch Controlling
- Utilized as a part of Lift Controlling
- Utilized as a part of Automobile reason

5.2 Features

Hydraulic suspensor operates on liquid pressure. In case there is a leakage in hydraulic lines. Magnetic suspensor which is very sensitive (concentrate only on mechanical linkage) can be used as an emergency time. Simultaneous application of both Hydraulic and electromagnetic suspensor provide more smooth suspension action, there by very effectively slowing the vehicle. Cost-wise Electromagnetic suspensor are very cheap as the number of element are less and construction also very simple. Running cost also reduced since maintenance of the suspensor is not required.

VI. CONCLUSION

This venture work has given us a fantastic open door and experience, to utilize our learning. We picked up a great deal of functional learning with respect to, arranging, obtaining, amassing and machining while doing this venture work. We feel that the work is a decent answers for scaffold the entryways amongst organizations and businesses. We are proud that we have completed the work with the limited time successfully. The **MAGNETIC SUSPENSION SYSTEM** is working with satisfactory conditions. We can comprehend the troubles in keeping up the resistances and furthermore quality. We have done to our capacity and expertise making most extreme utilization of accessible offices.

In conclusion comments of our venture work, let us include a couple of more lines about our impression extend work. Thus we have developed a “**MAGNETIC SUSPENSION SYSTEM**” which helps to know how to achieve smooth suspension system. The application of this system is high when compared to the cost. By utilizing more procedures, they can be changed and created by the applications. This project is an experimental effort to demonstrate a new type of Electromagnetic suspension system using a solenoid coil.

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