"STUDY OF ELECTROMAGNETIC LEVITATION CONVEYOR SYSTEM, ADVANTAGES AND ITS APPLICATIONS"

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ABSTRACT: *Today in our modern developing area there is a need for an improvement in every sector. So we implement a conveyor which will use electromagnetic effect to levitate and which will overcome all ill effects over convectional conveyors. This levitated conveyor is known as electromagnetic air conveyor. This kind of conveyor differs from convectional conveyors as it does no requires any surface contact for traction and is able to move on many kind of surfaces supported by a self-generated levitation of air. The effects such as jerks, friction, lack of speed in conveying systems, etc. can be minimized. As the same is seen in maglev trains which levitate vehicles a short distance from a guide ways using the magnets to create both lift and thrust. So we imagine magnetic field generated through the copper coil which is conveying by the control system from start to end rapidly.*

Keywords: electromagnetic levitate, Conveying, electromagnetic air conveyor

1. INTRODUCTION

The rapid growth in modern developing countries globally has increased the use of conveyors in industrial fields for the flow of materials. So the handling of materials is essential as per the customer demands and the requirement of speedy transportation system is essential. The convectional conveyors faces certain drawbacks due to its mechanism and other things such as it consumes more time for material handling, the increase in variation of properties due to thermal effects, it is slow to meet the manufacturing supply as well as in capital sectors as it plays more important role in industrial sectors. The electromagnetic conveyor is a kind of conveyor in which the conveying will be done through the electromagnetic power or force produced through a magnet and coils. This type of conveying system will overcome all ill effects of convectional conveyors and will be quick. Surely it will be better and will be a new kind of flexible material handling system.

2. CONCEPT OF LEVITATION?

Use Magnetic levitation is a method of giving lift to a substance. The magnetic pressure of the coil opposes the gravitational force on a substance through which the lift is created. The basic concept of the levitation is to apply the electric current to an electromagnet to levitate. The space of both the phase is maintained by the magnets and voltage applied. According to the Earn Shaw's theorem. It is not possible to stably levitate against gravity with only use of the ferromagnetic materials so Use of diamagnetic materials involving eddy currents should be used to achieve that. Therefore the construction of are conveying system is just like rails but the difference is that between both the guide ways many coils are arranged both the guide ways are separated with a distance. On the carriage made of aluminium and beneath which coil is install. To magnetic tapes are flattened as the length of guide ways which keeps the repulsion action on sideways. The power is supplied to the copper coils which is fixed between to guide ways. MCB which acts as a safety instrument and which controls the safe transfer of current is installed before the coil for safety and flexible working.

3. LITERATURE REVIEW

Abhishek Tandel et. al. [1] presents project is very more favourable to the nature and can be operated on the electromagnetic force which is a renewable source of energy and which overcome most of the ill effects of convectional conveyors like friction, Noise, speed reduction, workers problems etc. however some work is to be done for improvement in the project. So we are publishing result and hopefully desire that this working principle will be a reason for a new start in material transportation systems.

Monika Yadav et. al [2] present work, extensive literature survey has been carried out A demo model has been prepared and the same has been put to operation. The results are very encouraging .Maglev trains use magnets to levitate and propel the trains forward.

- Only the part of the track that is used will be electrified, so no energy is wasted.
- Since there is no friction these trains can reach high speeds.
- It is a safe and efficient way to travel.
- Governments have different feedbacks about the technology. Some countries, like China, have embraced it and others like Germany have balked at the expense.

Ki-Jung Kim et al. [3] the use of a multibody dynamic model for EM-PM hybrid-type maglev conveyor was proposed in order to accurately predict dynamic characteristics, and this was carried out using the Virtual Lab. Motion program. Based on the results of the dynamic simulation and experiments, the following conclusions can be drawn. First, through the use of designed controller with PD feedback loop, the suspension system with EM-PM can be levitated steadily without contact. Secondly, using dynamic model with the detailed levitation system, this paper presents more realistic dynamic simulation of maglev vehicle which takes into account the irregularities of guiderail. Therefore, dynamic simulation could be useful in designing an air gap control system.

Do-Kwan Hong et. al. [4] presents an optimum design of a lightweight vehicle levitation electromagnet, which also provides a passive guide force in a magnetic levitation system for contactless delivery applications. The split alignment of C-shaped electromagnets about C-shaped rails has a bad effect on the lateral deviation force, therefore, no-split positioning of electromagnets is better for lateral performance. This is verified by simulations and experiments. This paper presents a statistically optimized design with a high number of the design variables to reduce the weight of the electromagnet under the constraint of normal force using response surface methodology (RSM) and the kriging interpolation method. 2D and 3D magnetostatic analysis of the electromagnet are performed using ANSYS.

4. HOW TO LEVITED?

When a current is supplied from the circuit to a coil a magnetic field is developed. This activates the repulsive action of the bar magnet and so the whole carriage is lifted by a definite amount. So this proves easier to place a load on it and convey it from one end to another. Thus this is the main concept behind this magnetic air conveyor. In construction it is alike as the rail, but just the difference is that here in between the two guide ways a copper coil is to be installed. There are two guide ways separated by a distance made of Aluminum or M.S. On this guide ways carriage is suspended freely to navigate from one end to other. A bar magnet is placed beneath the carriage which comes above the coil. Two magnetic tapes are also flattened along the length of guide ways which keeps the repel action on sideways. A Copper coil is fitted in between two guides which is supplied by a power supply. A control MCB is to be installed before the coil for having a safe transfer of current and have a protective environment.

5. WORKING PRINCIPAL

Magnetic air conveyor works on principal of "LEVITATION" conveyor. When the power (Electric) is given to the coils, the coils produces the electromagnetic effect which is generated below the floor, This provides the floor to float above the ground level and provides the ra.mp to have its lift.

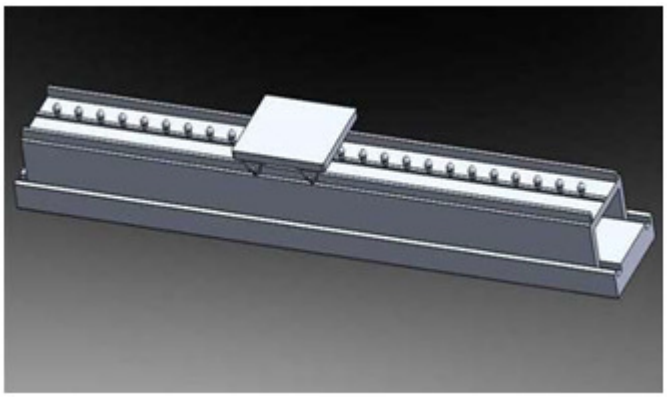

Figure 1: Principal of Levitation

As shown in above figure, conveying mechanism works. The constant electrical current flows through the coil and due to this constant flowing current the coil develops magnetic field around it. A chamber of an array is created around so this results in opposing of magnetic field created between the spaces of ramp. Levitation is useful for motion of magnetic materials and this technique is very useful to convey the materials from one place to another in short time period and speedily.

6. ADVANTAGES

1) Speedy: The conveying system creates less friction so the time which is required to transport material is less and also the whole system is quick so the time consumed is also less which helps the system to speed up

2) Reduces pollution: As the system is energized through electricity the emission control can be done more easily and effectively as the source of electricity generation at many point of generation. The surroundings has no effect through this conveying system and this magnetic system creates no kind of noise which is good for environment and also the working atmosphere for labours.

3) Less Maintenance: This system does not have motion relative to other objects in contact and behaves as contactless conveying system so the wear and tear is less compared to other convectional conveying systems so it has less or low maintenance.

4) Less skill labours: Low skill working can also do the same work as the skilled once so there is no need for skill workers in this system and ultimately the cost and time for training the workers is also saved.

5) Investment: The cost for installment is to be considered and some kind of operation cost which will be reduced, there

is not much of additional cost to be spend in future. It acts as one time investment.

7. APPLICATION

- Automobile Industries
- Coal Industries
- Airports
- Food packaging Industries
- Pharmaceutical drug Industries
- Paper Industries
- Cosmetic Industries
- Bottle Industries etc.

8. CONCLUSION

It is conclude that, the Electromagnetic Conveyor has been started and operated indoors without creating pollution. The Magnetic Air Conveyor is eco-friendly, which does not produce harmful emissions. However, we believe that there is still much work to be done in optimizing the conveyor for various different designs, determining the effect of variation in power, adapting it to various changing parameters and developing other uses. In this paper we are going to study of electromagnetic conveyor system and also discuss the advantages and application.

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