# IMPLEMENTATION OF MAGNETISM IN MATERIAL HANDLING SYSTEM

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**Abstract:** *The project focuses on the design and production of a ground floor crane fitted with a load locking unit at any level as a special feature, to address the problem of failure due to a fixed load. The mobile crane is designed to carry a maximum load of about 5 kg, and a counterweight of 50 kg. The materials used are; sheet metal, profile bars, bolts, nuts, metal rolls etc. Processing procedures include cutting, filling, welding and assembling. For permanent contact, the arc welding process was used. As mentioned earlier, a ground floor crane gains its value in the transport of heavy machine parts inside and outside the workspace. It can also be used to load and unload machine parts onto trucks.*

***Keywords:*** **Material Handling, Uses of Magnets in Crane, Mobile Floor Crane, Manufacturing Processes.**

## INTRODUCTION:

In material handling, the cranes play a vital role in modern manufacturing industries. A crane is a type of machine generally equipped with a hoist, wire, ropes or chains and sheaves that can be used both to lift and lower materials and to move them horizontally. It is mainly used for lifting heavy loads and transporting them to other places. It uses one or more simple machines to create mechanical advantage and thus move loads beyond the normal human physical lifting capability.

Magnetic holder pick-up the finished product on the outfeed conveyor with the help of magnetic force. Movement taken into the magnetic handling system and the deactivating the magnetic force, material is place into the outfeed table. Magnetic self-closing permanent magnet lifting has become the development trend of permanent magnet lifting technology by virtue of its advantages in unloading. Compared with traditional electromagneticlifting, permanent magnet lifting technology has a unique advantage and a bright future. Magnetic self-closing permanent magnet lifting has become the development trend of permanent magnet lifting technology by virtue of its advantages in unloading. Compared with traditional electromagnetic lifting, permanent magnet

lifting technology has a unique advantage and a bright future, but there are still some key problems to be solved satisfactorily.

The automation of material handling is one of the solutions that many companies are relying on to reach their goals related to productivity increment, floor space optimization, higher standards for factory's safety, and allocation of workers to value added activities. Therefore, the objective of this study was to evaluate the current state of the material flow of finished goods for an automotive parts supplier plant and the technology available on the market to verify if it was worthwhile to invest in material handling automation.The project is to implement the engineering concepts in order to increase the production of the industry and to reduce unfavorable factors such as maintenance time required, reduce the workforce were ever possible in order to maintain proper hygiene and sanitation and also to reduce the relaxation allowance given to the labor in order to carry the task. The aim of this project is the design of a mechanical machine. Research about different solutions has been done so that the decision about which type of crane suits all the requirements imposed by the project. With all that information as starting point the design has been constantly changing due to different proposals for its different mechanical components.

Floor crane is a very economical, time saving, safe, and easy to handle device which can be used for varying load from 50 kg to 2000 kg. It can be a very useful device in improving the productivity in day today industrial setup. Further improvement can be done in floor crane design by making it more compact, light in weight and portable. A space for operators sitting arrangement is also feasible. This additional weight of operator can be used as a counter weight.

## DISCUSSION:

Nowadays, automation of material handling system is the thing many industries rely on. It provides easy work to the man and also uses less man power, work is done quiet speedily and there is also safety to the mankind. Floor cranes using implementation of magnetism will be the future for the industries. Magnetism requires less maintenance and and can be very cheaper. Ahead of this, there are many industries where where over head cranes can not be fitted due to the space, there floor crane plays a vital role to load and unload materials and to transport from one place to other.

These low-performance cranes provide an efficient, cost-effective alternative property management equipment. They are sturdy, durable, strong and built with high quality, these cranes are controlled by loading, unloading and changing heavy loads. Crane structure consists of a pillar, boom, magnetic hook, wheels and magnetic mechanism attached to the cylinder. The crane can carry loads effectively, avoiding damage under the rough and unskilled to manage. The mobile floor crane is a machine with portable features that make it attractive and it is

recommended for both internal (workplace / storage area) and external purposes, so that one purpose for lifting and moving heavy objects from one place to another. Some of them features found in it include; a flexible boom, pillar and balance due to the construction of the rest base. These elements are adjustable to suit the various lengths and sizes of the items to be made raised.

Implementation of magnetism in floor crane can be very economical and maintenance can be also less. This type of crane is very useful, time saving and very easy to handle it. It's load capacity can be vary from 20 kg to 2000kg and can also handle more load. Magnetic lifting using self closing permanent magnetic field has now became the most developing trend. Nowadays permanent lifting has bright future and many advantages then electromagnetic lifting. Here the magnetic holder picks up the finished or the product to be transferred with the help of magnetic force and then movement is taken through where the material is to be put and then deactivating the magnetic force the material is lifted down. With increasing use of fiber reinforced polymer composites follows a natural pursuit for more rational and effective manufacturing. Robotic pick-and-place systems can be used to automate handling of a multitude of materials used in the manufacturing of composite parts. There are systems developed for automated layup of prepreg, dry fibers and thermoplastic blanks as well as to handle auxiliary materials used in manufacturing. The review shows that it is hard to find generic solutions for automated material handling due to the great variety in material properties. Few cases of industrial applications in full-scale manufacturing could be identified.

The concept of study through mechanical/engineering design by which there is continuous production, to reduce the maintenance time required and reduce the work force for the men. Due to this there is relaxation to the labours and the work is done very easy and fast. Due to fast growing in the industrial sector there are many industries that goes completely automatic work with robotics using magnetism principle. Automated robots picks and place the things with the help of command and using magnetism built-in. , a novel logistics handling equipment —Rare Earth Lifting Permanent Magnet is presented. It can completely eliminate the disadvantages found in conventional lifting electromagnets. At the same time, a neural network model of magnet circuit design is developed. The Concept was generated for design, analysis and production of a hydraulic floor crane that is easy to handle, does not require any electrical supply and can be stored in a relatively small space, and To vary the load carrying capacity from ½ ton to 2 tons are studied.

This mechanical machine is designed in such a way that it can suit all type of the industries and can met all type of requirements to the industries. Also, the design for the floor crane keeps on changing continuously, to met the future requirements for the industries. Further, changes is done to make the crane light weight, easily portable and of less maintenance. It's load carrying capacity varies according too the need of the specific industries. It can carry the load about 25kg to 2000kg. Nowadays floor cranes are made in such a way that the operator can sit in the crane

and can carry the load and put it at the specific location. Magnetic holder pick-up the finished product on the outfeed conveyor with the help of magnetic force. Movement taken into the magnetic handling system and the deactivating the magnetic force, material is place into the outfeed table. According to the required crane the design, calculation are made which will be relatively easy to handle and which does not require any electrical supply and can be stored in the small space.

## CONCLUSION:

By studying different review paper we got to know about the different patterns and by using mechanical activities how to design the floor crane. The objective for this study was to replace the hydraulic of the floor crane by magnetic mechanism. The principle used in this design is zero contact transmission by using of magnets. From all these we can design the floor crane that is light in weight and can pull maximum load, which can be portable and less maintenance. This type of cranes boosts the production of the industries with the help of material handling system and reduce the working time and men power.

Following is an result of main benefits using magnetism in material handling system:

- It reduces the maintenance cost of the floor crane.
- It gives safety to the human
- It reduces the maintenance time and total time for the production, as it completes the work speadily
- Also increases the productivity rate of the industry
- Can be stored in small place

**References:**

1. *Olorunleke, A., Ukwuaba, S. I., & Akpan, S. E. Modification of Floor Hydraulic Crane. Nigerian Journal of Engineering Science Research (NIJESR), 1(1), 88-98.*

2. *Safarzadeh, D., Sulaiman, S., Aziz, F. A., Ahmad, D. B., & Majzoobi, G. H. (2011). The design process of a self-propelled floor crane. Journal of Terramechanics, 48(2), 157-168.*
3. *Ding, N., Cui, S., Liu, C., Duan, J., & Jiang, S. (2020, November). Review of Permanent Magnet Lifting Technology. In Journal of Physics: Conference Series (Vol. 1635, No. 1, p. 012057). IOP Publishing.*
4. *Kay, M. G. (2012). Material handling equipment. Fitts Dept. of Industrial and Systems Engineering North Carolina State University, 65.*
5. *Vieira, G. B. B., Pasa, G. S., do Oliveira Borsa, M. B. N., Milan, G. S., & Pandolfo, A. (2011). Materials handling management: A case study. Journal of operations and supply chain management, 4(2), 19-30.*
6. *Augustaitis, V. K., Gican, V., Jakstas, A., Spruogis, B., & Turla, V. (2014). Research of lifting equipment dynamics. Journal of Vibroengineering, 16(4), 2082-2088.*
7. *Björnsson, A., Jonsson, M., & Johansen, K. (2018). Automated material handling in composite manufacturing using pick-and-place systems–a review. Robotics and Computer-Integrated Manufacturing, 51, 222-229.*
8. Yaman, R. (2001). A knowledge-based approach for selection of material handling equipment and material handling system pre-design. *Turkish Journal of Engineering and Environmental Sciences*, *25*(4), 267-278.
9. *Heragu, S. S., & Ekren, B. (2015). Materials handling system design. M. Kutz, Mechanical Engineers' Handbook, Manufacturing*