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Fabrication of Metal Magnetic Separator

Mohd Yousuf Ahmed[1], Mohammad Abbas Khan[2], Mohammed Abdul Junaid[3], Mohammed Abdulhameed[4], Mirza Shahed Ali Baig[5]
[1, 2, 3, 4, 5]*Mechanical Engineering Department, LIET, Hyderabad-91.*

Abstract: ***As mining industry is looking for a powerful strategy for heavy minerals separation with low cost hardware which suit the environment condition prerequisites to decrease the overhead, the work focuses on the design, development and testing of a research facility estimate magnetic separator to be utilized as a part of separating and recouping of iron metal particles like iron fillings, from alternate blends utilized as a part of foundries for casting of aluminum compounds. The machine configuration fuses the hopper system, powered by belt conveyor, speed controller and magnetic drum. The plan deals with the sustain release rate from the hopper regarding speed of the belt. The weight bearing transport is managed and worked at the base speed for enhanced separation productivity and efficiency. The work fixates on the plan, development and testing of a research facility estimate magnetic separator to be utilized as a part of separating and recuperating of iron mineral particles as iron fillings from the other mixtures. The machine configuration fuses the container gathering, system, electrically conveyer belt transport, speed controller and attractive drum. The design deals with the feed release rate from the hopper as for speed of the belt. The weight bearing transport is managed and worked at minimum speed for enhanced better efficiency.***
Keywords: Magnetic Separator, Bearing, Belt Conveyor and Pulley.

I. INTRODUCTION

Magnetic separation is a process in which magnetically susceptible material is extracted from a mixture using a magnetic force Magnetic separation is one of the various focus strategies in metal dressing. It is predominantly utilized as a part of isolating magnetic materials from nonmagnetic ore. There are different types of magnetic separators working in similar principle of separation based on the behavior of different particles within the aggregate of mixtures. Magnetic separator can be used for such purposes as a concentrator in which the bulk of magnetic material is separated from a stream of passing ore, as a purifier used to remove small quantity of deleterious magnetic materials from a product, as reclaimer used in recycling material to the circuit as in the dense medium separation cleansing magnets and as guard magnets to safeguard machines or processes by removing tramp iron or detecting dangerous magnetic objects and initiating protective action. Since the separation is based on the magnetic properties of different materials, then it could be applicable to materials in which a natural or induced degree of magnetism could be sustained during passage through a field of magnetic flux. When a particle is placed in a magnetic field, it either attracts or repels the flux flowing between the magnetic poles. Selecting the proper magnetic separator requires an understanding of magnetic properties, the process application and environmental elements that exist in each specific installation. This guide provides a basic understanding of how to choose the proper magnetic separator for different process requirements. Head roll magnets are available in various magnetic strengths. A head roll magnet is mounted as a drive roller in a conveyor belt. Next, it will attract iron particles present in the product and deflect these to the bottom of the belt. There, the iron particles will be released from the magnetic field and collected in a funnel or a slide plate. Over belt magnets can be mounted both in line with and across the conveyor belt. All magnets have a short weakening pole at the end of the main pole, in order to promote releasing of iron particles.

Table 1
List of Components

S.No.	Components	Quantity
1	Magnet	10
2	Single Row Bearing	2
3	Solid Bearing	2
4	Circular Cylinder	2
5	DC Motor	1
6	Belt	1

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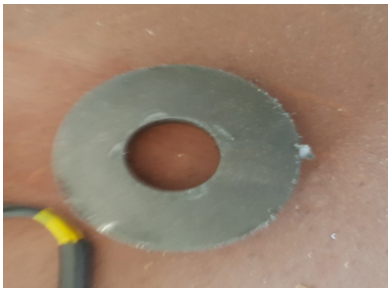


Fig. 1. Magnets

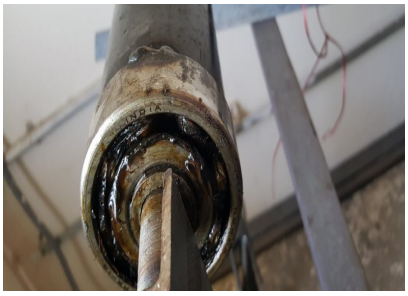


Fig. 2. Single Row Bearing



Fig. 3. Solid Bearing



Fig. 4. Circular Cylinder



Fig. 5. DC Motor

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Fig.6. Belt

II. OBJECTIVE

The main objective of the project is manufacturing of magnetic separator which can be able to sort ferrous and non ferrous metal. As mining industry is looking for a powerful strategy for heavy minerals separation with low cost hardware which suit the environment condition prerequisites to decrease the overhead, the work focuses on the design, development and testing of a research facility estimate magnetic separator to be utilized as a part of separating and recouping of iron metal particles like iron fillings, from alternate blends utilized as a part of foundries for casting of aluminum compounds. The machine configuration fuses the hopper system, powered by belt conveyor, speed controller and magnetic drum. The plan deals with the sustain release rate from the hopper regarding speed of the belt. The weight bearing transport is managed and worked at the base speed for enhanced separation productivity and efficiency. The work fixates on the plan, development and testing of a research facility estimate magnetic separator to be utilized as a part of separating and recuperating of iron mineral particles as iron fillings from the other mixtures. The machine configuration fuses the container gathering, system, electrically conveyer belt transport, speed controller and attractive drum. The design deals with the feed release rate from the hopper as for speed of the belt. The weight bearing transport is managed and worked at minimum speed for enhanced better efficiency.

III. FORMULATION

For the use of circulation for the material and not to be wasted, this project was aimed to separate the metals from other materials for recycling process. The mixture is feuded to the conveyer belt that is attached to the circular rods. Where the rods are rotated by the motor which leads to rotating of the belt. The mixture is separated due to the magnets that are placed in one end under the belt. The metals will be in stuck to the belt where non ferrous metals will be dropped to one bucket, When the magnetic field goes of from belt the metals start falling from the belt.

IV. WORKING PRINCIPLE

The principle of operation for Magnetic separator is a process in which magnetically susceptible material is extracted from a mixture using a magnetic force, when the motor runs it rotates the bearing which then rotates the shaft rod. The magnetic rod rotates with the rotation of the shaft by the means of the belt. As the magnets are placed under one side of belt which is also utilized to carry the feed of ferrous and non-ferrous metal from the source or feed to the final destination. At the end of the belt the non-magnetic metals leave the belt, moreover the magnetic materials will lodge to till the magnetic field becomes lower and the metal start falling all at the same bucket.

V. FABRICATION PROCESS

A. Marking of materials
B. Cutting of materials
C. Derusting of material
D. Drilling
E. Welding
F. Assembly

The marking process has been done after taking the measurement by the steel scales and measuring tape where the marks by the chisel to mark and on the mild steel. Moreover, the chalks also used for marking process. In this the cutting machine is used to cut the mild steel up to the required lengths for designing the frame for the separator assembly purpose. As most of the components are consisting of the steel, the rust may formed on it, though the grinding machine is used to remove the rust from the steel which help to prevent the steel weakness. The removing of rust is an essential part of fabrication also it is done for the further application on steel like welding and painting. The Drilling operation is used to hole the metals for the required diameter that match the rod

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diameter with bearing internal diameter through a intermediate part which is also drilled to match the both alignments. The total assembly depends on steel as primary equipment for supporting and holding the parts, not only this but also as mandatory rotators material. For putting all those things together the welding process is made to weld all the parts along for convention the equipment and materials. The connections are first made to the motor which was welded on the frame. Moreover, the bearings were connected to the motor by means of the shaft presented. One side of the shafts is feuded with a donut type magnets and filled up all through the shaft rod. While the other is placed and welded along with bearing to a hollow rod for maintaining the belt rotation . A conveyer belt is made to connect the two shafts as one of the shafts has magnets on it the belt is made to cover up the magnetic shaft. At the end of the belt and under the machine the buckets were put to collect the magnetic metals as well as the non magnetic materials.The motor has a specification of 0.5 hp direct current input, as the speed of the motor to be adjusted to the required value and for achieving better separation efficiency regulators has been added to control the over all speed. And to regulate the amount of the current supply to the driver motor.



Fig. 7. Magnetic Separator

VI. RESULTS

The assembly of metal magnetic separator has done in which the metals that has magnetic properties are separated from other materials. Furthermore, the wanted speed of the motor was achieved to the level that gives a better rotation for belt which keeps the mixture and later keeps the magnetized metal on belt till it reaches the point where it should be collected from different vessels. Also the welding for the frame and the supporting system was done in a way to organize all the things on the frame in proper way.

VII. CONCLUSIONS

Magnetic separation equipment plays various important roles in mineral processing flow sheets. Also the machine was assessed to have performed a little above average and could be used for small scale experimentation.

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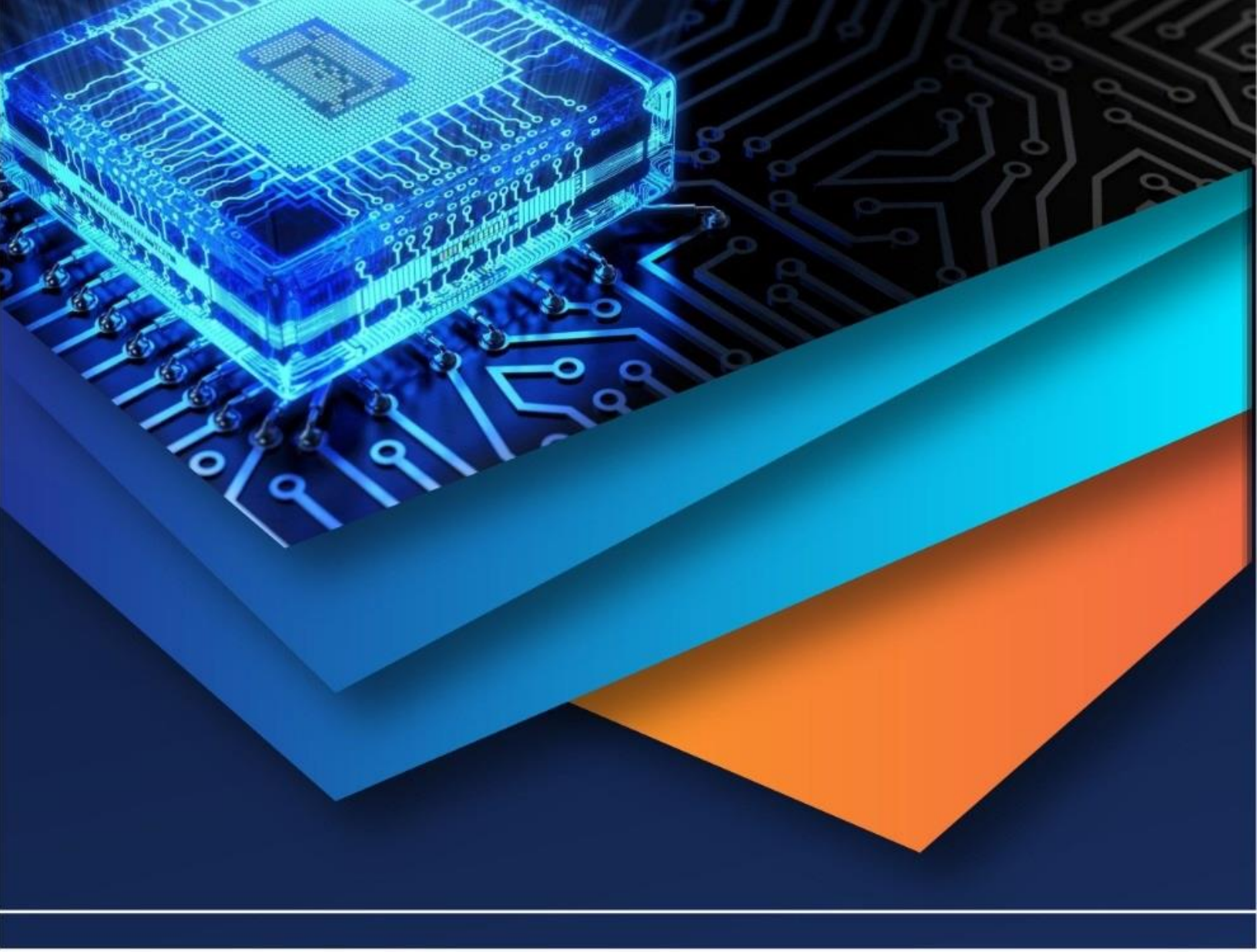
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