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RESEARCH ARTICLE

IMPLEMENTATION OF MAGNETIC CONVEYOR FOR SLUG REMOVING PROCESS

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ABSTRACT

A Magnetic conveyor design enables the efficient removal of ferrous materials. Its unique design features self lubrication synthetic track that greatly increases chain guide life and substantially reduces chain wear and stretch. Ideal for small parts and cast iron applications, the magnetic conveyor is sealed to prevent the abrasive material from contacting any moving parts the stainless steel conveying surface protects magnets from damage.

INTRODUCTION

A conveyor system for transporting wafers to and from different work stations in a clean-controlled environment includes a platform being magnetically levitated above a U-shaped rail by a magnetic cushion provided by first magnets on the platform and the rail, the first magnets having their magnetic poles arranged to repel one another. A nonmagnetic tube within which is a free-sliding magnetic piston of the same polarity as the first magnets extends along the center of the track. A second magnet is disposed on the platform such that its polarity will repel (or attract) the piston magnet such that as the pressure differential in the tube is changed the piston magnet slidably moves within the tube and pushes (or draws) the platform along the track with it. A conveyor system has trolleys propelled by the friction of a non-magnetic moving belt and the attractive force of a magnet acting through the belt to a stationary metal keeper plate behind each moving belt. Trolleys are switched between rails by means of a solenoid actuated lever roller, operatively positioned behind the driving belt, which pushes the trolley away from its keeper toward a ferrous sheave that has a non-magnetic belt thereon. A magnet on the sheave side of the trolley attracts the trolley toward the sheave and causes the guide rollers of the trolley to follow the desired switch rail.

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Components: Effectiveness and flexibility of the mechanical system is the first thing to consider while selecting a component. This low-cost mechanism needs small time for the design and manufacture and fabrication. We are making the magnetic conveyor equipment. The main aim is to reduce the man power by using the magnetic conveyor. It is a material handling equipment basically used to remove chips from metal working machinery wastes, which was extracted by the motion of the conveyor. The constructional parts used for this machine are very simple and readily available. Components of the conveyors are as follows:

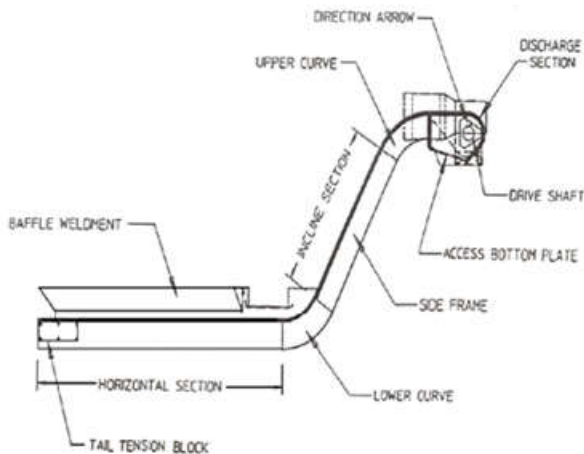
Frame design: The frame is the mechanical member which acts as a skeleton that holds the total structure of the vehicle. The frame is rigid and also withstands the static and dynamic forces, without undergoing deformation or distortion. Frames of all automobiles differ based on the load, speed, and torque and engine transmission. It may be reinforced with super materials as per the requirement.

Magnetic conveyor belt: Magnetic Belt Conveyors are conveyor belts where either a magnetic slider bed or magnetic pulley is used to transport ferrous materials vertically, upside down, and around corners. Holds ferrous parts fast to the belt. Holding parts to the belt for elevation changes or controlled positioning can also be achieved by the use of a magnetic conveyor belt that utilizes magnets under the moving belt.

Magnetic belt conveyors are created by placing permanent ceramic magnets in the bed of a standard conveyor. Strength and size of magnetic field is designed per application. Magnetic belt conveyors are one of the surest ways to control positioning of ferrous parts for further processing. These magnetic belt conveyors are available in a wide variety of configurations.

Conveyor: The conveyor is a mechanical transmission device that is used to transmit materials, goods from one place to another over a mid-range distance in a stable position. They involve in the movement of materials in a vertical position, or inclined position, or at an elevated angle. Conveyor chains are used for longer distances and at low speeds. Rake is the frame like part which holds the weight of the transmitting object over the belt. Product design is now not confined to few creative artists, can be learned by systematic study. Fortier stress was laid on design as a synthesis of stress analysis, theory of mechanism and machines and another subject like machine design and dynamics of machinery. But current approach is to expose the student is uncovered to solve a real problem with various optimization tools. Here to transfer the garbage the conveyors are used. Conveyors are set in a way such that the garbage is made to fall over it. Then the garbage which is fallen is safely stored in the container as they directly deposit over it. Based on the size of the container the storage level may vary.

Design calculations



Conveyor Construction: 12-gauge CRS formed channel side members with welded cross braces for added strength.

Magnet slider bed: 16-gauge stainless steel slider bed with permanent magnetic platen. Decreasing magnetic force at discharge end provides smooth product release.

Magnetic Element / Platen: Single-belt model — Single-lane element used on 8" belt model; dual-lane used on 12" and 18" models. Double-belt model— 4" wide platen on 8" belt, 5 1/2" wide platen on 12" belt, and 11 1/2" wide platen on 18" belt.

SINGLE BELT / DOUBLE BELT:

One-piece and two-piece oil- and abrasion-resistant PVC or urethane belt with stainless steel clipper lacing. Other belts are available on request.

Belt Speed: Constant 60 feet per minute speed is standard. Drive can be set to match part rate.

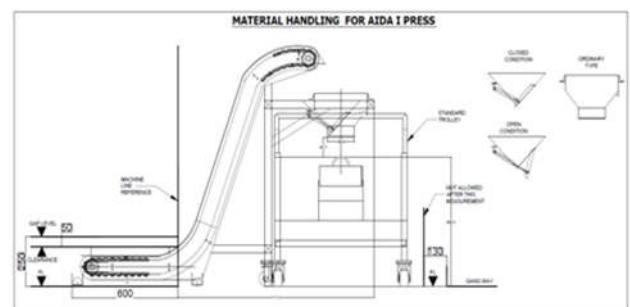
Drive Motor: 3/4 hp, 115V, 1 ph, 60 Hz, totally enclosed. Right-angle Gear motor with guarded roller chain drive is standard.

AC CURRENT REQUIREMENTS FOR MAGNETIC CONVEYORS

Voltage	Belt Drive Type	Belt Drive Horsepower	Full Amp. Load Rating
3 Phase			
230 VAC	Fixed Speed	1/2	2.20 A
230 VAC	Variable Speed	1/2	2.20 A
460 VAC	Fixed Speed	1/2	1.10 A
460 VAC	Variable Speed	1/2	1.10 A

Working: Magnetic Conveyors are designed for conveying steel parts from under machine presses, and to automate scrap and parts removal. There is no longer the need to have to struggle with heavy, hard-to-handle totes plus it also eliminates the common problem of part and scrap overflow on the production line. Parts or scrap are magnetically held to the belt and transferred to the incline up and out from under a press.

- They can run along the side of a die and be fed by multiple Low Profile Conveyors up to a scrap dumpster.
- Powered brushes are recommended under the discharge pulley where heavy concentrations of oil or small slugs are present.
- Optional skid plates are available where lower in-feed elevations are required. They maintain positive magnetic control and movement of ferrous materials from beneath the bolster plate area and out the back of the press into hoppers or containers.
- The cantilevered design allows the horizontal extension to be positioned under the machine to retrieve ferrous materials.



Advantages: By implementing of Slug removing magnetic conveyor the following benefits are achieved:-

- Output increased from 60 kgs / shift.
- Yearly 37.44 tons production increased.
- One man power reduced.
- Cost saving of project per year 3 lacks.
- 5S improved.

Conclusion

The design of magnetic conveyor prototype was designed and the design was analyzed theoretically and then fabricated with standard materials.

By introducing the magnetic conveyor the cost of the manpower has been reduced and since it is easy, maintenance cost also reduced. It can be made further efficient by redesigning and developing the fully automated magnetic conveyor.

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