

Advanced Magnetic Tramp Removing Method for Industries to Prevent Equipments

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Abstract

This paper proposes the magnetic technologies to remove the tramps from the industrial process. The magnets can able to remove the tramps from solids and liquids this will help to separate the tramps from the industrial materials. The tramp is an unwanted material that damages the manufacturing equipments; it must be removed from the raw materials. The magnetic based separators provide a purified product outputs and removing ferrous oxide contamination. The reason for using the magnetic material to separate the traps is it never produce unwanted heat and no need of power supply.

Keywords— Tramp, Magnetic Separators', Thermal heat generation.

I. INTRODUCTION

The generation of heat energy in industries due to heavy process of raw materials will cause the industrial equipments to damage.

Otherwise the unwanted tramps in the raw materials will damage the processing equipments. So that the cost of maintenance is increased than investment. To avoid this problem the tramp materials and heat produced by the machine must be reduced or removed. The magnetic separation system provides a better solution to overcome these two problems. There is lot of effects due to tramps; in coal mining process the tramps causes serious effects on machineries. The magnetic separators provide a better separation from tramp materials; generally permanent magnets are used for separation process.

II. INDUSTRIAL TRAMP'S

The tramp is unwanted materials which are combined in the raw material of industrial process. These types of trams cause industrial equipments such as feeders and crushers, so that the cost of maintenance increased. Influence of tramp elements on surface defects, metallurgical structure and on the properties of structural beams. Due to the surface defects the copper will cracks because it is oxidized. Ferrous metal contamination damages the equipments and produces

the low quality product that must take as scrap. In liquid raw materials there may be the presence of oil tramps.

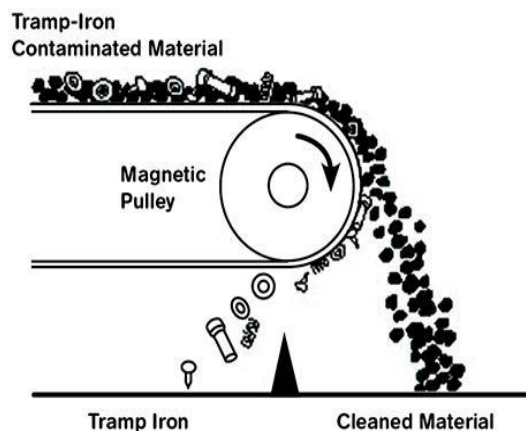


Fig.1 Tramps

III. MAGNETIC SEPARATOR

The magnetic separators are used for separating the tramps from the raw materials of industrial process. Generally magnetic separators' are as two type's cartridges or plate magnets. The cartridge magnets are designed to withstand for material flows, vertical gravity flow control and avoid the formation of clumps. The plate magnets are used for the materials which are having poor flowing capacity and protect from the grinding of manufacturing equipments. The ceramic magnets are very suitable for removing the metal tramps, but it doesn't withstand the higher temperature. There are variety of tramp removing magnets cartridge, plate magnets, pulley and magnetic drums. There are some advantages in the magnetic separators such as

- Preventing process equipment damage
- Removing ferrous materials
- Reducing the fire hazards due to tramp materials
- Protect product purity

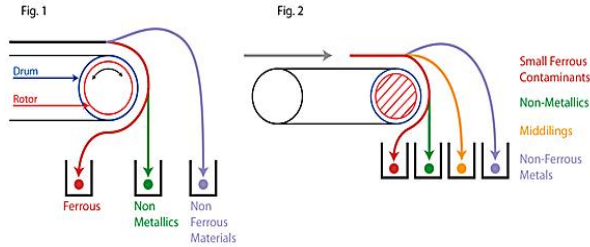


Fig.2 Magnetic Tramp Separator

The permanent magnets are good for most of the industries because it is easy to maintenance and it never produce unwanted heat and no need of the power supply; it works even though power is shutdown. The separated materials are recycled to improve the purity of product. When the large amount of tramp materials are collected on the magnet, their magnetic capacity and the holding capacity will reduce, because the collected tramp material covers the magnet. For that the manual or self cleaning process is needed. The magnets can be removed and cleaned by employees of maintenance department. There are some automation technologies to remove the tramp materials from the magnets; these types of magnetic separators are self-cleaning.

IV. APPLICATION CONSIDERATION

The need of tramp removal in industrial process is as follows

- Temperature
- Flow rate
- Flow characteristics
- Process issues

The temperature produced by the process equipments will cause the strength of the magnets. Once the temperature is increased and the magnetic strength reduces, it can't be recovered back to normal strength even though the magnet is cooled by coolant. The control of flow rate in the process will eliminate the ferrous contaminant. The placement of the magnetic plates depends on the flow rate of the processing materials. The processing of materials must be presented to the separators in pre planned manner, whether the system needs to shut down for cleaning process. The important problem of magnetic tramp removal installation is raise of temperature.

V. SELECTING THE PROPER MAGNET

The considerations of processing materials are the key to select the proper magnetic tramp remover. The processing materials are categorized as dry, liquid and moist. For dry free-flowing granularity product grates magnet is a better choice to remove the tramps. For self-cleaning of collected tramps drum, pulley and

suspended magnet can be used no need to stop the running process. Moist and starchy products are not flow smoothly in grates magnets and plate magnets; they need rotating grates magnets they allow the flour materials to flow smoothly. For liquid materials traps are used, it is available in grates and plate types, it provide a better rate of eliminating the ferrous contamination in the processing materials.

VI. SEPERATION EQUIPMENTS

There is lot of separating magnetic equipments available for removing the traps these are as follows

- Plate magnet
- Grate magnet
- Liquid line trap magnet
- Pneumatic line magnet
- Suspended magnet
- Pulley and Drum magnet
- High intensity magnet
- Magnets for non-ferrous metals



Fig.3 Magnetic Tramp separators

The plate magnets are used at the top of conveyor belts or on the vibrator to remove the ferrous contamination on processing materials. The ceramic plates are better than magnetic plates, because the ceramic plates remove almost ferrous contamination and metal traps. The plate magnetic separators are further classified as round pipe separator, deep reach separators and hump magnets. The grate magnetic separators consist of metals tubes which are arranged as a grill, the materials which are passing through the grill, these types of magnets are easy to clean. Liquid pipe trap magnets are generally used for liquid materials, it consist of inlet and outlet to feed the liquid materials to remove the tramp materials from that. The radial field pneumatic magnets are used for the materials which are conveyed with air. This type of magnetic tube can be removing and clean easily. Suspended magnets are just hanging over the conveyor assembly; it used to reduce the burden of conveyor load by taking heavy materials and the collected tramps must be removed manually.

The pulley and drum type magnetic separators are self cleaned because pulley and drum itself made by magnet, this type of magnetic tramp removers are commonly used in coal mining.

VII.CONCLUSION

This paper proposes the magnetic tramp remover from the industrial processing materials because these types of trams cause the industrial equipments heavily and makes the product more impurity. By removing these unwanted materials by purifying the process materials with magnetic separators. Even though there are a lot of tramp removers the magnetic tramp remover provides a better performance in both product quality and protection to the machine.

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