EDDY CURRENT SEPARATOR

Introduction

An **eddy current separator** uses a powerful magnetic field to separate non-ferrous metals from waste after all ferrous metals have been removed previously by some arrangement of magnets. The device makes use of eddy currents to effect the separation. Eddy current separators are not designed to sort ferrous metals which become hot inside the eddy current field. This can lead to damage of the eddy current separator unit belt.

The eddy current separator is applied to a conveyor belt carrying a thin layer of mixed waste. At the end of the conveyor belt is an eddy current rotor.

Non-ferrous metals are thrown forward from the belt into a product bin, while non-metals simply fall off the belt due to gravity.

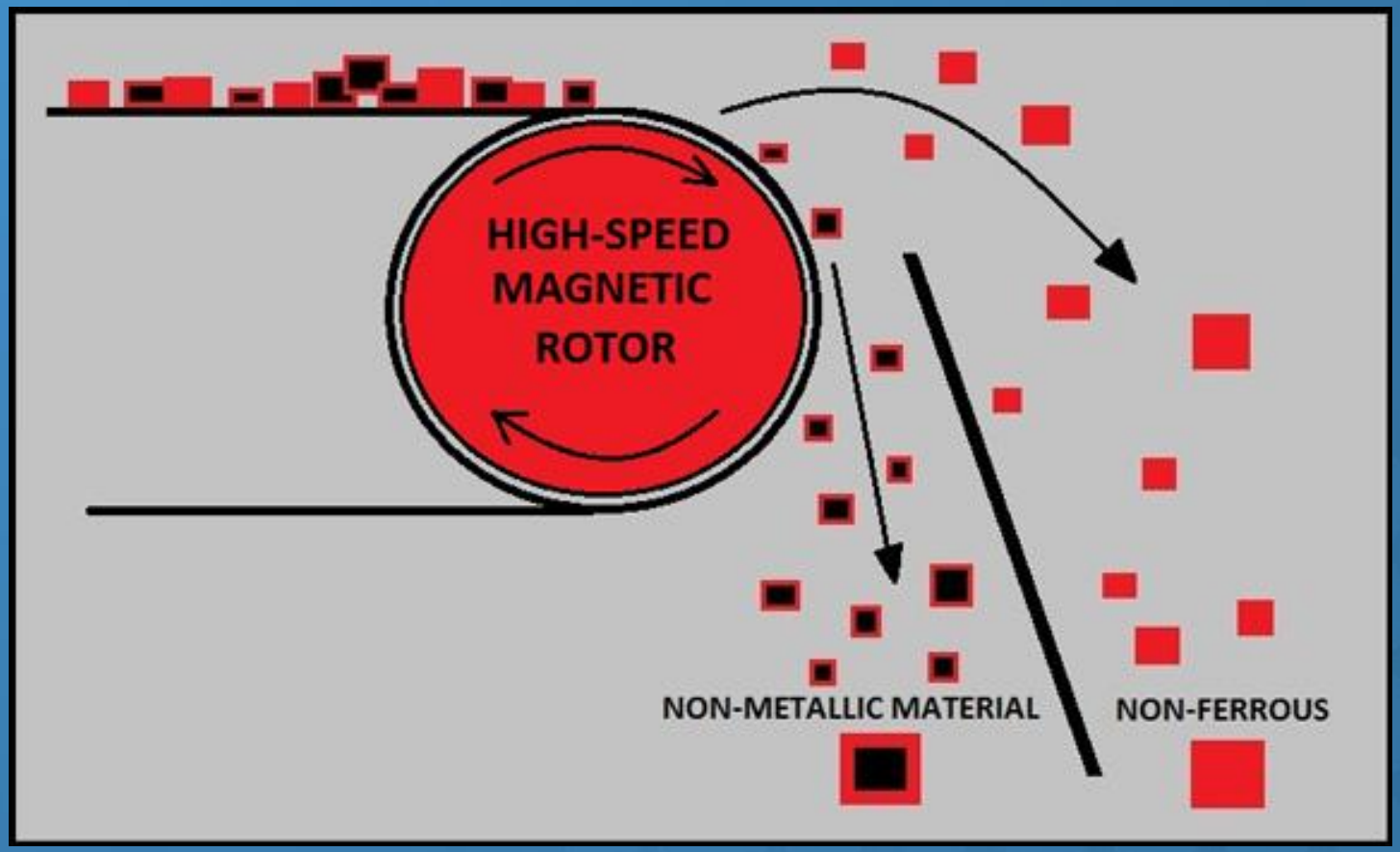
Eddy current separators may use a rotating drum with permanent magnets, or may use an electromagnet depending on the type of separator.

Working

- The principle is that an electrical charge is induced into a conductor by changes in magnetic flux cutting through it'. Such changes in magnetic flux can be achieved by moving permanent magnets past a conductor.
- The effect of these currents is to induce a secondary magnetic field around the particle; this field reacts with the magnetic field of the rotor, resulting in a combined driving and repelling force which literally ejects the conducting particle from the product stream.
- In the Eddy Current Separators, a high speed magnetic rotor is fitted within a non metallic drum which travels much more slowly than the rotor so as to produce flux

variations at the surface of the drum; the drum also acts as the head pulley of the conveyor carrying the product to be separated

- As the conducting particles (any metallic objects) are carried by the conveyor over the drum, the magnetic field passing through the particles induces currents into them.
- Since these particles are of random shapes, it is difficult for the induced current to flow within them in an orderly manner and the currents therefore tend to swirl around within the particles - hence Eddy Current.
- The magnetic flux and magnetic frequency is determined by the design of the rotor. All of the above factors must be considered before any design recommendation can be produced.

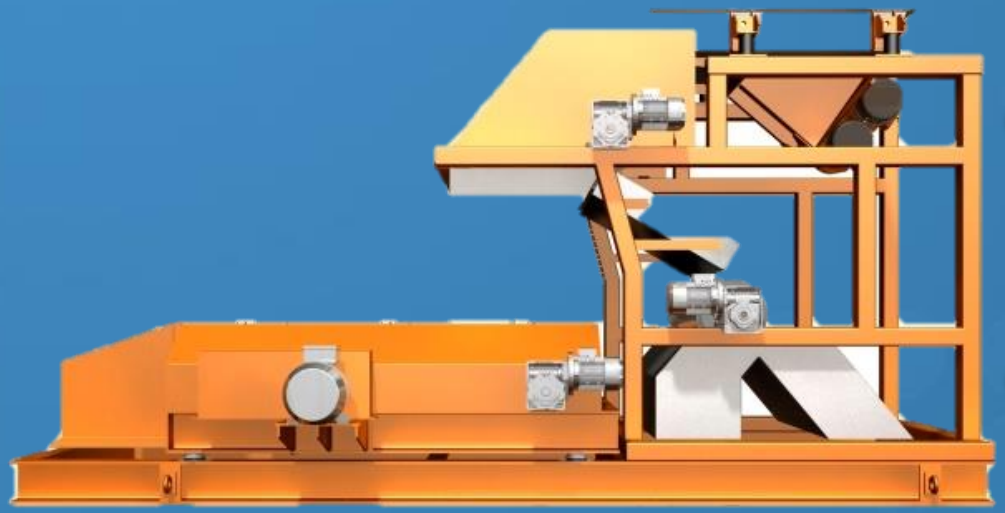

HIGH-SPEED
MAGNETIC
ROTOR
NON-METALLIC MATERIAL
NON-FERROUS

Industrial Uses

- Eddy Current Separators are used for various recycling applications to separate non-ferrous metals, e.g. aluminium cans in a materials recycling facility (MRF).

- Once fed with material the Eddy Current Separator creates an eddy current which causes non-ferrous metals to repel the magnetic rotor and be collected separately from the waste stream.
- They are typically positioned post ferrous separation and can be combined with a Magnetic Separator to make a complete metal separation unit.
- They are used is in recycling, waste reduction, raw material production or any other process whereby separation is beneficial.

Applications

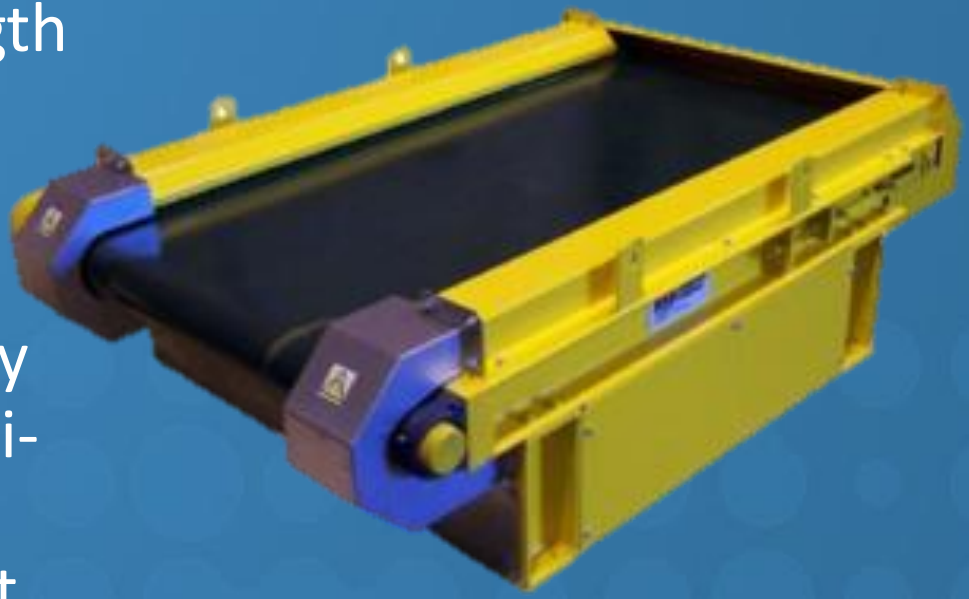


- Separation of non-ferrous metals in auto shredder residue
- Separation of non-ferrous metals from solid waste incinerator ash
- Sorting of aluminium beverage cans from non-magnetic recyclables

- Non-ferrous metal removal in WEEE recycling plants
- Removal of aluminium components in UPVC window recycling
- Separation of non-ferrous metals from wood waste
- Separation of non-ferrous metals from plastics
- Separation of non-ferrous metals from electronic scrap
- Separation of non-ferrous metals from car recycling applications
- Separation of non-ferrous dross from foundry sand.
- Removal of non-ferrous contamination from crushed glass cullet.

Advantages

- **Sensitivity to surface defects.** Able to detect defects of 0.5mm in length under favourable conditions.
- **Can detect through several layers.** The ability to detect defects in multi-layer structures (up to about 14 layers), without interference from the planar interfaces.



- **Can be automated.** Relatively uniform parts can be inspected quickly and reliably using automated or semi-automated equipment, e.g. wheels, boiler tubes and aero-engine disks.
- **Little pre-cleaning required.** Only major soils and loose or uneven surface coatings need to be removed, reducing preparation time.
- **Portability.** Portable test equipment is very small and light, some of the latest equipment being as small as a video cassette box and weighing less than 2kg.
- **Can detect through surface coatings.** Able to detect defects through non-conductive surface coatings in excess of 5mm thickness.
- **Accurate conductivity measurements.** Dedicated conductivity measurement instruments operate using eddy currents.

Features

- Designed with top grade rare-earth magnet material
- 98% recovery of aluminium cans from commingled recyclables
- Stainless steel, copper, aluminium, brass from shredder residue and fluff
- Non-ferrous metal recovery in refuse streams and ash streams in Waste-to-Energy facilities
- Separation of non-ferrous chips
- Aluminium scrap recovery in foundry sand reclamation
- Rugged heavy-duty tubular construction
- Heavy-duty motors, controllers and electrical service
- Designed for reliability and efficient maintenance
- Permanent rare-earth magnetic technology offers high-strength and long life

Contact

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