decision precision

Choosing the Proper Equipment to Reduce Contamination, Increase Purity

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The processing industry faces many unique challenges, including the daunting task of protecting products from all forms of metal contamination. Adding to the challenge, many processing operations with ferrous contamination problems also experience contamination by nonferrous metals, such as brass, aluminum and stainless steel.

Because every metal contamination problem is unique in some way, the appropriate equipment for detection (and rejection) is not always apparent, particularly to end users who may not be aware of all of the possible options, advantages and disadvantages of various detection (and rejection) methods.

The following is the most common equipment used today in material handling, packaging and processing operations to detect and eliminate metal contamination. This equipment is either used independently or in combination, depending on the product characteristics, packaging line set-up and requirements of the end-use customer — such as meeting FDA regulations.

Magnetic Separators

Many problems associated with ferrous metal contamination can be reduced or eliminated by using magnetic separation equipment. Magnetic separators, available in a wide variety of designs, will remove ferrous material such as nails, rust, scale, bolts, welding rod and other contaminants from dry or liquid products. Using this equipment also helps protect downstream packaging machines, mills, pumps and other sensitive process machinery from damage caused by stray metal.

Plate Magnets

Plate magnets are utilized in the bottom of an inclined chute, suspended above a thin burden of material on a belt conveyor or stainless steel vibratory feeder, or at the discharge of a conveyor or screener to remove occasional pieces of ferrous contamination. In a typical chute installation, the magnetic material adheres to the magnet while the product slides across the face of the magnet. The magnetic field attracts and holds ferrous material until the plate is removed for cleaning. The magnet is usually hinged and swung away from the chute and cleaned manually. Plate magnets are simple and economical to install as well as very efficient at removing sporadic pieces of tramp metal.

Round Pipe Separators

Round pipe separators (RPS) are actually plate magnets with a fabricated transition from a round pipe to the rectangular chute that contains the plate magnet. The RPS features an inlet and outlet transition to match the existing pipe or tubing. A neoprene deflector is used to deflect the product against the plate magnet. The material flow must be stopped to clean the accumulated tramp metal from the plate magnet.

Hump Magnets

Hump magnets are similar to round pipe separators except there are two plate magnets instead of one. This extra plate effectively doubles the chances of collecting ferrous material. The hump consists of a dog-leg chute that allows the product stream to cascade from one magnetic

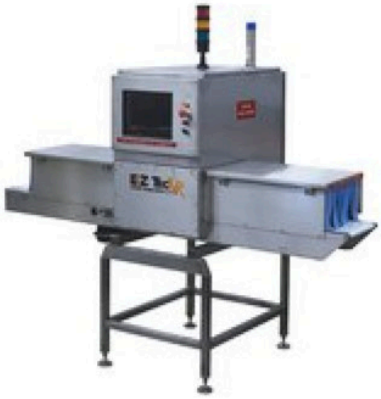


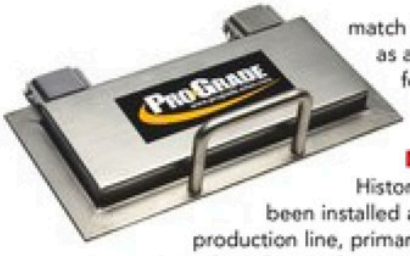
plate to another as material moves through the dogleg. Units are available for pressure, vertical or horizontal pneumatic applications.

Grate Magnets

Grate magnets consist of 1-inch diameter (25mm) magnetic tubes in a grid formation designed to allow dry feed material to cascade through the grate, effectively spreading magnetic protection through the cross sectioned area of a pipe, chute or hopper. There are a variety of grate magnet designs available for almost any application. The simplest of these incorporate a single magnet layer for use in a hopper. Raw materials must pass through the single layer grate as material feeds from the hopper. Multiple row units improve separation effectiveness.

Liquid Line Trap Magnets

Magnetic traps employ the same powerful tube magnets used in grate magnets, but are specifically designed for liquid product flows. Traps are available in a variety of designs and include ports (ends) to match the existing pipeline, as well as a magnetic element, to collect ferrous tramp metal contamination.



Metal Detectors

Historically, metal detectors have been installed at the end of a production line, primarily to reduce liability for contaminated product and to provide processors with "peace of mind" that their products have been inspected for metal contamination prior to shipment to their customers.

Metal detectors should be used at several stages in a process, not just at the end of the line. In fact, metal detectors should be used wherever there is the chance that metal particles may contaminate a product stream or at Critical Control Points (determined by the customer), especially if a company is seeking or needs to maintain HACCP Certification. This is especially true when the product is one that may be consumed by humans or animals (whether intentionally or not), when product purity is a safety consideration (such as explosives) or when the contaminant particles may be of a size and type that could damage downstream packaging equipment. If the quality of raw materials is questionable, it is highly recommended to install a metal detector at the front end of production lines to challenge the suppliers.

Metal detectors can also be used to verify that desired metal objects

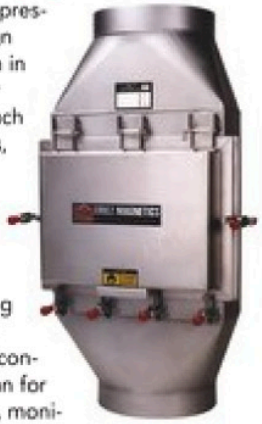
are present in packaged products, such as novelties in breakfast food boxes. It is important to monitor the product before and after the step where the metal item is inserted, verifying the detected metal is the desired object and does not include any metal contamination.

Many types and styles of industrial metal detectors are readily available. For some, the selection process may seem overwhelming and confusing. However, the answers to a few simple but critical questions can narrow the choices dramatically, to the point where one can understand the situation well enough to ask more detailed questions and make appropriate decisions, which will lead to a "best" choice from several likely candidates.

It is vital to work with a trusted manufacturer who will serve as a true partner throughout the selection process. To ensure proper selection, your unique application needs must be clearly defined and understood.

Because interference from environmental noises and metal-free zones are critical concerns with most detectors, the simple provision of adequate space for a detector at the early stages of planning a production line is crucial.

Cabinet X-Ray Systems



Due to the presence of foreign contamination in product other than metal (such as bone, glass, stone, etc.) cabinet x-ray systems are now being incorporated into processing lines. Cabinet x-rays detect contaminants, scan for missing items, monitor mass control, ensure product integrity and verify fill levels. They can also confirm the presence of leaflets and confirm count. This technology is useful for those dealing with both solid and liquid products.

A cabinet x-ray system is effective in scanning products for foreign objects after they are packaged and sealed in containers with aluminum liners and seals, such as foil blister packs and tablet/capsule containers with foil safety seals. The best process is to inspect the final package so there is no danger of a contaminant getting inside the package before shipment. Simple metal detectors are not as effective in detecting contaminants in foil packaging as cabinet x-ray systems.

Cabinet x-ray machines are excellent for scanning finished, packaged goods and confirming the product is both present and has its integrity. For example, if a blister pack is supposed to have 10 tablets, the x-ray system will examine the product to ensure that all 10 tablets are present. Moreover, as for product integrity, if the system analyzes the product and detects that one or more tablets are crushed or broken, it can automatically reject these as well.

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