

Metal Detectable

The biggest threat to any company in the food preparation industry is foreign material entering the production line and ending up in something the consumer then buys. The potential costs to a business are extremely high not only in possible fines but also loss of income and damage to reputation. More and more companies are implementing extra processes in order to guard against the possibility of some piece of foreign material ending up in the finished product. The introduction of metal detection and x-ray scanners is the last line of defense against foreign bodies ending up in food containers. The introduction of cleaning products that incorporate a metal detectable additive that can then be detected by metal detection and x-ray scanners, is another tool in the arsenal that food producers can wield in order to protect the public from encountering something other than food in what they buy.

How a Metal Detector Works

A metal detector consists of three sets of balanced coils that are made of copper wire, this wire is wound around a coil former. The coil former can be round in shape but is usually rectangular as this is the most common shape for the apertures in metal detectors through which the products being tested pass. The three coils run in a line of each other so the product being tested passes through each one, the center coil is called the Transmit Coil (TX) and the outer coils are the Receive Coils (RX1 & RX2).

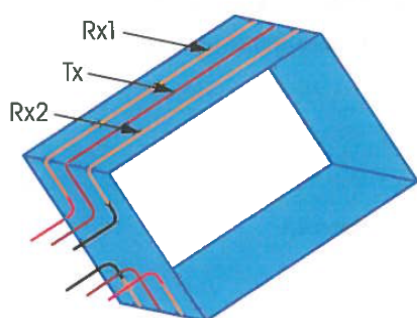


Fig. 1a

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The Receive Coils are wound in opposite directions to each other and each have one end of the wire connected to the other.

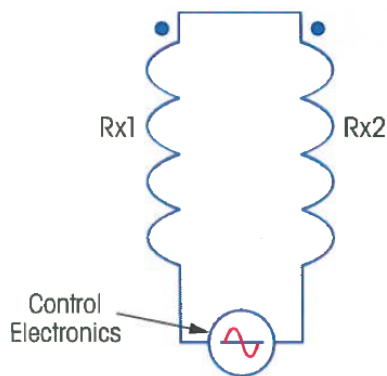


Fig. 1b

The metal detector works by transmitting a high frequency signal into the Transmit Coil which generates a magnetic field within the aperture. The magnetic field induces a small voltage into each of the Receive Coils, the induced voltage reverse the polarities (due to the fact the Receive Coils are wound in opposite directions to each other). The control unit of the metal detector will measure the difference between the voltages and for a well-balanced detector the reading should be zero volts. There are however many different metal detectors on the market and not all are of a high specification, it is down to the company what specification the machine they install is, but any detection then is reliant on how sensitive the machine is. High specification machines once set up will register anything that is passed through the detection aperture, however a poorly designed and lower specification machine could result in false detection or no detection.

Product Effect

It should be stated that metal is not the only material that is capable of conducting electricity or generating a magnetic field. Many of the food and pharmaceutical products we consume have the ability to generate both, though to a lesser extent than metal. Salt water (Saline) is a good example of a material that is a good conductor of electricity. If a saline-rich product passes through the magnetic field of a metal detector it will create eddy currents and produce a magnetic field of its own. If the saline-rich product were big enough it could generate a field strong enough to disrupt

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the field the metal detector has in the same way a piece of metal would. When a product is able to affect a metal detector in this manner it is known as 'product effect'.

Product affect is important to be aware of when setting up a metal detector and what settings are used. The detectability of a material can be affected (as stated above) and the settings for scanning 'dry' products (cereals, biscuits, bread etc) is different than the settings for 'wet' products (fresh meat, fish, soups, ready meals etc). Wet products have a high moisture content and so can generate their own magnetic field and give a false reading. Because of this difference between 'wet' and 'dry' scanning it is common to find the size of the material that can be detected differs, 'dry' detection can find smaller particles.

Summary

Any product scanned has the ability – to a lesser or greater degree – to influence the ability of the metal detector to detect any metal in the product.

Factors that influence this ability are as follows:

1. The moisture content of the product
2. The temperature of the product
3. Position and orientation of the product being scanned as it passes through the detector
4. Size and shape of the product
5. Consistency and density of the product
6. Packaging material
7. Frequency the product passes through the scanner

'Dry' Products – have a very minimal effect on the ability to detect and the metal detector can be set to detect smaller particles, it is also possible to pass products through the detector at higher speeds due to the greater ability to detect any foreign matter.

'Wet' Products – due to Product Effect there is a greater possibility that the product itself can influence the detectability of foreign matter. The metal detector would need to be adjusted to scan for larger particles and also passed through the scanner at a slower rate.

Metal Detector – The choice of metal detector should be carefully considered and tailored to the products and specifications required by the food producer. Dependent on what you want to be detectable the detector specification can be as high or low as required, but the manufacturer should ask for all the parameters required when quoting. Best practice is to make an extensive list of what you want to detect before approaching manufacturers.

100% Detectable – whilst additives are refined and detection machine improved you will never be able to detect foreign material in 100% of the items you scan for the reasons mentioned above, though food producers are now in a better position than they ever have been to show due diligence to the public that they are doing everything they can to ensure foreign material does not end up in the product they buy.

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Hillbrush Metal Detectable

Hillbrush Metal Detectable products are made in the same way as our standard hygienic products except they have a metal detectable additive. We use Eriez Magnetics Polymag Grey additive that comprises 70% Stainless Steel with the active carrier 30% Ethylene Ethyl Acrylate, both ingredients have been passed as Food Contact compliant under FDA article CTS75807. Eriez Magnetics is a world leader in metal detection and we have worked with them to ensure we have the right grade of additive that is suitable for the food industry.

Total MDX – the Total MDX range has Eriez metal detectable additive infused through the components used.

Colour Coded MDX – only available with Polyester filament infused with metal detectable additive, the Polypropylene backs are standard with no additive.

Polypropylene (injection moulded parts) – all the moulded parts used in the Total MDX range have the metal detectable additive added, due to the grey colour of the additive the moulded parts are only available in Dark Blue. If a customer requires colour coding then the Colour-Coded MDX range is available but this range only the Polyester filaments are metal detectable.

Polyester (brush filament) – our filament comes has metal detectable additive added, due to the grey colour of the additive the filament is only available in Grey.

Epoxy Resin (Total MDX Only) – the epoxy resin used in the Total MDX brushes has Eriez metal detectable additive added during the resin process.

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