

Metal Detectors in the Food Industry



In the food processing industry one of the most common foreign materials found in food is metal. Metal fragments can be unintentionally introduced to food products and become a safety hazard to consumers. Food processors need to minimize and control the risk of foreign materials in food. One approach to detect metal contamination of food products is the use of metal detectors.

Sources of Contamination

Most food processing equipment is made of metal, thus there is a high probability for metal contamination. Sources of contamination are numerous:

- loose screws
- bolts
- machine parts
- metal bits (copper staples)
- metal tags
- lead shot in meat
- screen wire
- blades, etc.

What Can Be Detected

Metal types and ease of detection include:

Metal	Example	Detection
Ferrous	Iron	Easy
Non-ferrous	Copper, lead	Relatively easy
Stainless Steel	304L (EN58E) grade	Relatively difficult

Keep in mind that metal detectors cannot find bones, plastic, glass and other dense non-metallic contaminants.

Metal Detector Sensitivity

The sensitivity of a metal detector is affected by several factors of food products, those include:

- Product composition. For instance, a high content of salt in products like ham can make metal detectors give a false response (due to electrical conductivity). Also, blood and iron content in meat can affect sensitivity.
- Product characteristics, for example: in meat products, metal detection can be influenced by the type of product present either as whole muscle or emulsion. Product density also has an effect if metal is present, denser products can give a different signal than less dense products.
- Temperature variation in food affects the signal even though metal is not present, causing misinterpretation of metal detected (e.g., warm bread can produce a different signal than room temperature bread).
- Packaging material such as aluminum foil can produce a misleading signal due to metal composition of the packaging material.

Your metal detector supplier should indicate the specific adjustments required to compensate for product effects to avoid false detection.

Metal Detection Program

Metal detectors do not guarantee a metal-free product, but a properly installed and maintained unit, along with a metal detection program can control metal contamination in food and insure product quality. A metal detection program should consider:

- *Sensitivity* - Identify the type of product so a sensitivity standard can be set up for the process.
- *Location* - A metal detector can be placed within the production line or at the end of the process once the product is packaged. Usually, a metal detector is placed after a size-reduction process that could introduce metal materials.
- *Verification* - Testing of the equipment against standards done by trained personnel to ensure proper metal detector operation.
- *Maintenance* - Determined by your supplier and carried out by trained personnel.
- *Document* - Keep records of any metal detected, identify and correct the source of contamination.
- *Calibration* - Conducted by an accredited agency or the manufacturer at determined frequencies to ensure equipment accuracy.

Selecting a Metal Detector

A metal detector should at least meet the following aspects:

- accurate
- reliable
- easy to clean-sanitize
- simple and safe to operate
- matching the production line speed

Advantages of Using a Metal Detector

Important reasons to consider the use of metal detectors in a food processing plant include:

- ensure food safety for the consumer
- achieve food quality standards
- protect equipment from damage
- prevent product recall
- comply with food regulations