White Paper.

Contaminant Detection in the Meat Industry



The Fish, Poultry and Meat (Protein) Industries present a series of challenges when it comes to foreign material, it can be said based on current knowledge that one of the highest risk food groups in terms of foreign material inclusions and the most demanding in terms of the operational environment.

The incidence of foreign material within protein can also be slightly different as compared to all other food-stuffs. Extrinsic foreign materials include items such as all metals, glass, plastic, wood and stones. Protein products may also contain bones. Bones are classes as intrinsic foreign bodies related to the raw material used in the food, and deemed undesirable and potentially dangerous when the product is sold as ‘boneless’. Bone along with metal and plastics are the three most unwanted foreign materials in meat.



Every type of meat has its own requirements

If we look at the three most common animal species used in meat production, beef, pork and poultry each have their own specific risks of foreign material within their individual processes. The primary production of meat products is really a disassembly process since the animal is separated into many components and used in many ways. The majority of other food production processes can be considered analogous to assembly lines.

Contaminant inspection systems used in protein processing should be installed in three following areas of the process; front-end primary, mid-process and end-of-the-line inspection.

Contaminant detection in production process

The front-end primary contaminant inspection is generally a metal detection system. These are often used for protecting machinery and are a secondary aspect of detecting of foreign materials, but are nevertheless essential. Metal detectors are the main inspection technology that is placed in front of grinders, meat recovery systems, hammer mills at the start of further processing primal cuts or offal materials. These systems remove metal before it is reduced in size making it harder to detect at the end of the line and before the foreign material propagated throughout the process.

If trim is being produced from a boning line, metal detection is important to ensure the trim does not contain any metal from the cutting process or before it is shipped to a further processing line or facility.

X-ray inspection is the safest method to find bones

X-ray is used for bone detection in different species of protein, but has the highest demand in poultry at the front end primary processing to eliminate as much bone as possible before further processing. Removing the bone early, when the bones are larger, reduces the risk of small undetectable fragments in consumer packages.



Mid Process contaminant detection can include x-ray systems that perform the same function as above. This inspection can be considered a crossover between primary and mid process detection. Young poultry that is slaughtered at about the 5 – 6 week mark have bones that are less well developed and are therefore difficult to detect due to the low amount of calcification in the bone as compared to beef and pork bone that is older and more developed at the time of slaughter. Fish bones in some species of fish can however be difficult to detect due their size and composition.

X-ray systems for different conveying types

Mid process inspection can include pipeline systems on products that are pumped such as sausage emulsions or chicken trim. Using pipeline x-ray systems for poultry was a trend a few years ago. However, when combined with a pump, the complete system can over work the product resulting in damage to the look and texture of the chicken, particularly if the product is re-inspected more than once. Poultry inspection these days tends to be completed on a conveyor belt with the product presented in a single layer for best performance.

Bone detection with x-ray is best done when the product is raw, because the process of cooking causes density convergence between the meat and the bone and potentially some leaching of the calcium within the bone, which provides a marker for x-ray detection.

Safe detection of metals in pipelines

Pipeline metal detection systems are quite effective when located on the inlet pipe to a sausage linker or between a stuffer/clipper or stuffer/linker arrangement. The small apertures and good product presentation allow for higher frequencies and better detection performance, especially stainless steel, as compared to many conveyor systems. Chubs being clipped with aluminum clips cannot be inspected by a metal detector conveyor because of the clips are detected, so the pipeline metal detector is a good alternative. Pipeline metal detectors are available with water-jacket pipes for applications where the product texture is fragile and prone to smear, such as ground beef or beef sausage or salami. The water jacket allows for warm water to be circulated

warming the pipe enough such that the fat does not stick there by reducing the amount of particle definition loss. They can also be configured to fit in line with automatic linking systems, to provide the mid-process detection that otherwise would not have been possible.



Food safety is a top priority

End-of-the-line inspection is still the most common form of contaminant detection, driven by legislation, BRC, IFS and codes of practice used by many retailers. The principle being that once the product is in its final packaging the risk of an extrinsic contaminant entering the food product is significantly reduced. To determine the installation a metal detector or x-ray system at the



end of the line should be based on selecting which technology best addresses the food safety hazards; balancing cost, risk and performance. However, reducing the probability of foreign materials being detected by the end of line x-ray or metal detector is now becoming the focus of many food safety plans.

The proactive approach to reducing risk is making the installation of mid process and primary process systems more common place. Along with changes in planned maintenance, once installed, these types of systems also demonstrate a payback by reduced downtime from machinery breakage and less product waste.

Sesotec - an overview
The Sesotec group is one of the leading manufacturers of machines and systems for contaminant detection and material sorting. Product sales primarily focus on the food, plastics, and recycling industries. Sesotec's global presence includes subsidiaries in Great Britain, Singapore, China, USA, France, Italy (2), India, Canada, Thailand, a representative office in Turkey, and more than 60 partners all over the world.

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