

X-Ray Detectable Plastic & Rubber Application Considerations

The Food Safety Modernization Act (**FSMA**) requires Agricultural Producers, Food Processors & Packers to implement Hazard Analysis & Risk-Based Preventative Controls (**HARPC**) to prevent physical contaminants like glass, metal, plastic, and rubber from entering the market. The FDA considers contaminants greater than .275" (7 mm) to present a hazard. Growers, packers, and food processors are using their existing X-ray inspection systems with detectable plastics & rubber to prevent plastic contaminated foods from reaching consumers.

Typically, plastics & rubber are not metal or X-ray Detectable; however, Eriez offers several PolyMag® additives to impart X-ray visibility, metal detectability, and magnetic susceptibility into plastic & rubber products. These are produced with EU & FDA compliant raw materials and made using GMP (Good Manufacturing Practices).

Low energy cabinet X-ray inspection equipment is a sophisticated method to inspect food products for unwanted contaminants, proper packaging integrity, and the correct product volume. Like metal detectors, X-ray inspection can spot metal contaminants and it can do much more. For instance, you can inspect packaging containing metal foils and reject products containing calcified bone, certain glass, and stone.

X-ray inspection utilizes sophisticated algorithms that look for differences in three basic product characteristics to generate a "rejection" condition. These are:

- **Morphology** – abnormalities in shapes like sharp edges, slivers, and spheres.
- **Atomic Weight** – most foods are lower in atomic weight so a higher density product is suspicious.
- **Grayscale Imaging** – anomalies in neighboring pixels can indicate contaminants or volume issues.

The amount of the PolyMag® additive included in a plastic part and the size & thickness of the plastic piece partially determines how "visible" the piece is. The food product density, the packaging materials, and product thickness also influence how much additive is required.

It is more difficult to spot a piece of detectable plastic or rubber in dense, thick, non-homogeneous products like crunchy peanut butter or trail mix – especially in a large package. Another challenging example is X-Ray inspection of foods packaged in steel cans since higher levels of energy are required to look through the can, reducing the contrast to evaluate the food product.

The typical PolyMag® loading ranges from 5% to 30% by weight. We offer additives that impart X-ray contrast only and additives that impart both Metal Detectability & X-ray contrast.

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Here are some questions you should ask about the application.

- What is the food product? How thick is it when inspected? Is it frozen? Is it packed in water?
- Is the product homogeneous or a mixture of different foods, shapes, and sizes? Does it contain bone?
- Describe the customer's X-ray equipment. Single or dual beam. Vertical or horizontal beam.
- What is the X-ray mAs (milliampere-seconds) & energy level? kVp (kilovoltage peak) is typically 20 to 120. Higher kVp reduces contrast. A higher mAs can help to reduce the need for a high kVp to improve image contrast.
- Describe the material packaging and how it is situated on the belt. What is the belt speed?
- What contaminates or packaging characteristics are the customer most interested in rejecting?

The concentration or "let down ratio" of the FDA compliant PolyMag® additives, included in plastic or rubber moldings, can be changed to suit the demands of the food processor's application and inspection conditions.

Please contact Eriez regarding any application or technical questions that you have.

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