8 THINGS
YOU NEED TO KNOW ABOUT X-RAY APPLICATION TESTING

Mekitec Group
White Paper

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Before you invest in an X-ray detection system, wouldn't it be nice to test the equipment to see if it meets your needs? Fortunately, X-ray equipment suppliers offer a common lab test, called an "application test," which replicates your production line and scans your sample products. You will learn exactly what the X-ray system can and cannot do before you make a purchase decision. What do you need to know about the application test?

1. WHY SHOULD I REQUEST AN APPLICATION TEST?

Common reasons for application testing include:

- to test a specific equipment model with your products to ensure it meets your needs
- to establish X-ray detection standards for your exact products
- to compare equipment from different suppliers
- to determine if a quality control feature is suitable for your products. (Many X-ray systems can detect missing, broken or misshapen contents, as well as overfills and underfills, at the same time as contaminant detection.)

2. WHERE IS THE APPLICATION TEST PERFORMED?

The application test usually takes place at the supplier's lab, where your production conditions are replicated as closely as possible. Some suppliers may also bring their system to your facility to test under your exact conditions and demonstrate their system capabilities.

3. WHAT DO I NEED TO PROVIDE FOR THE APPLICATION TEST?

Production Line Specifications
The goal in application testing is to replicate your production line as closely as possible. The more specifics you communicate about your products and operating conditions, the more accurate your test results will be.

The supplier will need a complete list of your products from the line being considered for quality control. For each product, include height, width, depth, and weight so the supplier can suggest the right system, one that can accommodate all product sizes within the imaging area of the X-ray system.

To replicate your production conditions, at a minimum, you should provide the line speed (packs/products per minute) and the inspection location on the line (see section 4 below). Also inform the supplier if you have any unusual temperature specifications (e.g., frozen or partially thawed product) for a product during production. Finally, a photo or short video of your production line can help a supplier simulate your operating environment.

If you plan to compare results for different suppliers, be sure to provide consistent line specifications to each supplier and know the densities of the foreign objects used. For example, there are many varieties of "glass" foreign objects. Make sure the density is the same if you are comparing test results from different suppliers.

Product Samples
For accurate results, consult with your X-ray equipment supplier to determine the right

number of product samples needed for your test. Usually application testing requires 5 to 10 samples of each test product but there might be factors that affect the number of samples needed.

Common Foreign Objects
Glass and stainless steel are the standard contaminants tested. Since X-ray detection is based on using density to find foreign objects in the products, the application test results are tied to certified foreign object samples with a proven density. But, providing the supplier with potential foreign objects from your production helps to determine what other contaminants you may detect with X-ray.

4. WHAT IS THE BEST LOCATION ON THE PRODUCTION LINE FOR X-RAY SCANNING?

X-ray inspection should occur after the package is sealed and once there is no further opportunity for contamination. Producers then determine where to place the X-ray equipment, how many points of inspection to establish, and at what packaging level (e.g., primary or secondary) they will conduct X-ray inspections.

Primary level refers to inspecting a product after it is sealed in the first layer of packaging. Secondary level refers to inspecting packaged products which are consolidated into cases or a second packaging unit. While it may be tempting to install as few units as possible and scan for contaminants as close to the end of the packaging process as possible, primary packaging inspection is more reliable and cost-effective than secondary packaging inspection.

5. HOW DO RESULTS COMPARE FOR PRIMARY AND SECONDARY PACKAGING DETECTION?

X-ray scanning at the primary packaging level provides the best contamination detection rates (see table below). Inspection at the primary level can accurately detect metals sized at less than 1.2 mm (about 1/32 inch), and low-density objects like glass as small as 2 mm to 4 mm (about 1/16

to 3/16 inch). In the worst case, inspection at the secondary level may detect metal objects down to 5 mm to 7 mm (about 3/16 to 1/4 inch). As an example, a metal washer from a filling machine could be detected at the secondary level.

X-Ray Detection	Size of Contaminant Detected	
	Primary Packaging	Secondary Packaging
Stainless Steel	< 1.2 mm	5 mm +
Glass	2 - 4 mm	6 mm +
Low Density Objects	3 - 5 mm	TBD

6. WHAT ARE THE MAJOR DIFFERENCES BETWEEN X-RAY AND METAL DETECTION?

Often, customers who are experienced with metal detection will ask about ferrous and nonferrous inspection standards for X-ray. While X-ray systems do detect metals, the inspection standards are stated differently. Here are the basic differences you should know:

- X-ray systems identify contaminants based on *density differences*. Thus, X-ray detects a broader range of foreign objects than metal detectors. High-density objects, including glass, calcified bone, stone, stainless steel, and hard plastics are detected by X-ray with

high accuracy. With lowerdensity objects, accuracy depends on the food product. Thus, testing with your exact products is important.

- Metal detectors utilize magnets to detect metal foreign objects, whereas X-ray utilizes software programmed to define the density of the object being inspected. Therefore, inspecting products with metalized film or aluminum packaging are no problem for X-ray inspection.

- X-ray systems will not forget your product once it is learned. During initial set-up of an X-ray system, a product is taught to the system five to ten times depending on the system. Once the system learns your product, you do not have to reteach it. This is another key difference between metal detectors and X-ray detectors. Metal detectors often need to be recalibrated.

7. WHAT CAN I LEARN FROM THE APPLICATION TEST REPORT?

The Application Test Report (ATR) will provide you with:

- performance standards by product and contaminant, which can be used for your own internal auditing of quality accuracy

- observations about how your product works with the X-ray system (e.g., the supplier may make operating recommendations such as the best way to eliminate rejects)

- applications of any software inspections, in addition to foreign object detection, that can improve the quality of the product (e.g., counting, virtual weighing, missing items, overfills, underfills, length of product, shape of product).

8. DO I NEED TO BE PRESENT FOR THE APPLICATION TEST?

Customers are not required to attend, but are welcomed. Some customers participate in the application test to learn about the user-friendliness of the equipment.

NEXT STEPS

Are you considering an upgrade from metal detection to X-ray detection? See the sidebar checklist for selecting an X-ray detection supplier.

8 STEPS FOR SELECTING AN X-RAY DETECTION SUPPLIER

1. Recognize the need for high quality inspection systems that go beyond the capability of metal detectors.

2. Research X-ray system suppliers, discuss their offerings, and request product testing. This is common practice for customers, and their competitors, actively looking to improve their QA/QC standards.

3. Identify the inspection location on your line. Share your location ideas when you approach a supplier and be open to the supplier's suggestion.

4. Send product samples to the supplier.

5. Review the Application Test Report.

6. Understand how the test was performed.

7. Compare results.

8. Make a decision.

Mekitec Group

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We are committed to ensure safe food by providing inspection systems
with the best value in the industry.

Our MEKI™ X-ray systems are a part of the food production line
guaranteeing the quality by detecting and removing food products
that contain unwanted foreign objects or other defects by using
the latest X-ray imaging and processing technology,
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