Best practices for foreign body detection: 5 steps to increase product safety

Robust testing practice in foreign body detection requires validation, verification and routine performance monitoring.

by Rainer Mundt,
Marketing Manager,
Mettler Toledo
Product Inspection.
www.mt.com/pi-pr

If food contaminated with foreign bodies reaches the retailers or even the end consumer, the associated direct and indirect costs for food manufacturers are immense – high recall costs, permanently damaged brand images and customer cancellations of supply contracts.

This is why the installation of inline product inspection systems which can detect foreign bodies on the production line are so important. However, simply installing the machines is not sufficient. To be truly effective, they must be backed up with robust testing practices and staff must adhere to a number of process steps over the entire lifecycle of the inspection system.

Only regular testing can confirm that system performance is within the set detection sensitivity specification, and that product standards, whether those recognised through the GFSI initiative or by retailers and consumers, are being met. Here are five steps to robust testing practice:

STEP 1:
Use of correct test samples

The use of certified test samples and weights helps to ensure compliance with food safety standards, guidelines, and legal regulations, and guarantees that the inspection systems operate according to the correct specifications.

Test samples are available in different formats, with test cards being the most common format for dry applications, test balls or tablets suitable for applications with powdery materials, test rods recommended for free-fall metal detectors without a reject mechanism, test balls or rods for pipeline applications, and tablet-shaped test samples available specifically for x-ray inspection.

For vertical metal detection applications, an Automatic Test System (ATS) is also suitable to detect metal contaminants such as ferrous, non-ferrous and stainless steel metals.

STEP 2:
Use of suitable test products

The specification of suitable test products as well as the following requirements should be defined and integrated into the test procedures:
● The process of ensuring that a product is free of foreign bodies before test samples are inserted or attached.
● The manner in which test products are prepared, including the positioning of the test sample inside or outside the test product.
● The frequency with which the test products should be created, taking into account properties such as durability and shelf life of the product.
● The procedure for marking test products to prevent them from entering the supply chain inadvertently in the event of a failed attempt.

Test products outside of the food item can be used to test the fail-safe system. However, they should be similar in size, shape, and weight to the food products that are transported on the line.

STEP 3:
Compliance with recommended test procedures

Different test procedures may be required to comply with specific food safety codes of conduct.

When testing for different types of foreign bodies, these tests should at least meet the following requirements:
● Relevant standard recognised by the Global Food Safety Initiative.
● Possible external customer specifications.

● Rules and regulations of the retail industry.
● Company-specific guidelines/test requirements.

For metal detectors, the basic test and preferred method is to test consecutive products, with (as a minimum) one test sample in the front, one in the middle, and one in the rear section of the test product. The metallic test sample should pass through the geometric centre of the metal detector, as this is the least sensitive area.

For conveyorised x-ray systems, the tests should be carried out in the most difficult area of the product to push the x-ray inspection system to the limits of its detection performance. Test samples should be placed randomly to ensure that the system is able to detect contaminated products regardless of their position in the production line.

STEP 4:
Compliance with test intervals

GFSI-recognised standards, customer and retail requirements and company guidelines regarding shelf life and product blocking times must all be considered when setting the frequency of tests. As a general rule, the test intervals must always be situated within the quarantine period time (i.e. the time between when a product is produced and when it leaves the production site).

It is also advisable to carry out performance tests at regular intervals during the production run and at the beginning of a new product run. In addition, a performance test should be carried out with every batch change – especially if there are changes to the product type, or changes to the product and/or system settings. A performance test is also required after repair-related downtimes.

STEP 5:
Electronic data management

A secure and up-to-date data solution actively supports food safety regulation compliance and helps prove due diligence. In addition, in the event of a product recall all the product quality data can be easily retrieved.

Real-time documentation of all inspection test results, and machine parameter changes also allow production issues to be quickly identified and resolved.

The most proven method for automating data collection processes is data management software connected directly to the inspection device.

This communicates to multiple product inspection technologies, and also connects to a manufacturer's ERP or MES systems.

Conclusion

There are many considerations to make, and many procedures that must be followed, if food manufacturers are to detect foreign bodies on the production line and reduce the risks of product recall. The keys are to establish good testing guidelines at the start; to ensure that staff understand what is required and are able to perform suitable tests; and to maintain accurate, easily accessible records of testing activity.

Product inspection technology of course plays a critical role, but it must be backed up by good operational practice which is demonstrated through robust and regular testing. ∎