

Metal Detection & X-Ray Improve Product Safety

BOB RIES, Lead Product Manager, Metal Detection and X-ray Inspection, Thermo Fisher Scientific



Ever since metal detection for consumer product safety was introduced almost 65 years ago, the two big questions have been how small a foreign object can you find, and how often will there be false rejects? Success in the product inspection industry depends, in large part, on how you balance these two competing requirements.

Things like price, quality, reliability and service play an important role, too, but the multi-million dollar question in our business still remains: How do you find the smallest contaminants, while ignoring what can sometimes be huge, confusing effects from the product or environment?

If you have ever been to a large airport with multiple metal detectors and X-ray systems for security purposes, you may have seen this tradeoff in action. One lane seems to be just humming along, while another is beeping and flashing, leading to unwanted manual inspections. This is usually caused by systems running with different setup parameters (too tight or too loose), systems that aren't maintained or calibrated correctly, or different generations of systems with old and new technology in the same facility.

Technical advances are made every year to metal detection and X-ray inspection systems, including those used in the food industry. Sometimes an upgrade is needed when aged metal detectors or X-ray systems begin struggling to meet HACCP policies or experiencing too many false rejections.

Metal Detection & X-Ray Improve Product Safety

Published on Chem.Info (<http://www.chem.info>)

In the case of food metal detection using radio frequency electromagnetic fields and digital signal processors, companies like Thermo Fisher Scientific are constantly improving the transmitters, receivers, shielding, frequency control, noise reduction filters (analog and digital) and detection algorithms. Complex computer simulators are used to determine the optimal fields for detection, and state-of-the-art digital signal processors are employed to extract even the smallest signals from the background noise.

Another very important area with recent innovations is how to compensate for strong and variable product signals (usually from wet or salty food products). The signals from these products essentially look like metal. A new signal cancellation scheme called Intellitrack XR (IXR for short) is an active signal cancellation technique that does more than just mask product signals like traditional phasing. This new idea can improve sensitivity by up to 50 percent in the most difficult applications.

Thanks to the use of metal in consumer packaging and the requirement to improve safety by finding non-metallic contaminants like stones and glass, X-ray is also used to protect a wide range of products. Here the challenge remains the same: Find the smallest contaminant while not false rejecting too much material. These systems use a different part of the electromagnetic spectrum (X-rays), and detection decisions are made utilizing image analysis or machine vision algorithms.

Thermo Fisher Scientific has made several innovations in the areas of the X-ray source, X-ray detector and image processing algorithms, all designed to improve detection while minimizing false rejects. The company's X-ray system called the Xpert that utilizes 75 percent less X-ray power to find smaller contaminants in larger packages (when compared to the previous generation). This is accomplished using a highly efficient X-ray source and detector, and by running more than 20 state-of-the-art algorithms simultaneously on each product image.

Sensitivity for both metal detectors and X-ray systems is a function of product composition and size. In general the best detection is accomplished on small product flows typically found earlier in the process. Under these conditions, metal detectors can find metallic contaminants in the 1- to 2-mm size with ferrous metals being the easiest to find and non-magnetic stainless steel the most difficult.

X-ray systems with a high-resolution source and detector usually perform better, and find metallic contaminants in the 0.7- to 1.5-mm range and glass/stones in the 1.5- to 3-mm range, depending on composition. All this is possible while ignoring or eliminating product effects, and thus reducing false rejects to a frequency that production managers can live with, typically less than 1 in 10,000.

For more information, please visit www.thermofisher.com [1].

Source URL (retrieved on 11/24/2014 - 10:40am):

Metal Detection & X-Ray Improve Product Safety

Published on Chem.Info (<http://www.chem.info>)

http://www.chem.info/articles/2012/03/metal-detection-x-ray-improve-product-safety?qt-most_popular=1

Links:

[1] <http://www.thermofisher.com/>