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On closer inspection...

New x-ray technologies like one-button auto learning simplify operation, while plug and play replacement modules speed repairs. David Rizzo explores recent advances in food inspection

David Rizzo

The tide has turned. With heavyweight big box grocery retailers now demanding that packaged food producers utilise x-ray for inspection of product, the switch to x-ray over metal detection for physical contamination has become more a question of 'when' rather than 'if'.

By now, most food producers recognise the advantages that x-ray inspection offers over ageing technology like metal detectors and optical scanners. The list is extensive, but leads with the fact that x-ray equipment readily identifies stainless steel – the most common metal used in food processing equipment. X-ray also spots non-metallic objects such as bones, stones, glass and even sugar conglomerates. X-rays can even 'see' through metallised packaging, and work around other obstacles such as metal retaining clips without degrading the ability to find unwanted foreign objects.

All of these advantages, and the benefits they bring, are undeniable. So why aren't more food producers jumping on the x-ray bandwagon?

Cost no longer ranks as a major issue. Like so many other technologies, competition and improvements in manufacturing efficiency have dropped the price point of x-ray inspectors to within striking distance of high end metal detectors. Even a spread of $20,000-$30,000 pales in comparison to the potential loss of brand loyalty if just one foreign particle harms or alarms a consumer and its source gets traced back to the food producer.

Instead, feedback gathered over the years from major food producers points to two big issues that still give some of them pause before making the inevitable leap to x-ray: the perceived difficulty in operating these devices and the feeling that factory technicians are required to maintain and repair them. In light of the newest x-ray inspection designs, a closer examination of these concerns reveals the fact that these fears are no longer founded.

Shortening the operational learning curve

Traditionally, metal detectors have appealed to food producers because they are simple systems; hence they appear less complicated to repair. Also, metal detectors are easier to operate and adjust than traditional x-ray machines.

> ‘The newfound ease of operating and repairing today’s x-ray inspection devices means that a food producer can maintain these machines with their own, existing personnel’

For instance, because x-ray machines currently used in the food inspection industry are unmanned, they require advanced image processing software to determine if a foreign object is present in the food or its packaging. As a result, they require highly trained personnel to adjust, set up and maintain the image processing to get optimum performance.

However, any further extrapolation of these legacy assumptions stops at the point where the latest iterations of x-ray devices come in. With the introduction of new automatic training algorithms, these devices can now be set up quickly and easily.

For example, manufacturer of x-ray inspection systems Novus X-Ray utilises fully automatic training technology in its x-ray machines to learn what normal products should look like under the light of x-ray energy and reject anything else. This includes undesired contamination such as stainless steel, glass and stone, but can also be used to identify undesirable process variations.

A one-button auto learning system allows a technician to visually inspect an x-ray image that has been falsely detected, and with one button tells the machine to ignore similar detections in the future. No further adjustments, or even knowledge of how the image processing system works, is required, making operation completely intuitive.

These advancements in image processing enable x-ray inspection to run almost on autopilot.

Maintenance and repair simplified

Food manufacturers have traditionally shied away from x-ray machines due to the belief that they are complicated, requiring factory trained technicians for service and repair.

In the past, the breakdowns justified the fear of extended production delays while a specialist had to be called in to repair the device. Hence, food manufacturers have traditionally put up with the shortcomings of metal detectors for the simple reason that they were easier to fix.

That was then. Nowadays, the clever modularisation of x-ray construction has made repairing these devices almost as easy as changing a light bulb.

By reason of example, Novus’ CCPX line of packaged food x-ray machines groups the various components of the system into just five modules: processing detection, the human machine interface, input-output electronics, x-ray generator and the cooling system.

To further speed the repair process, embedded software readily identifies which module needs replacement. The worker simply unplugs it from its cabling, unbolts that faulty module, inserts the replacement module and reconnects the cabling. Any recalibration, mechanical alignment or settings recovery takes place without worker intervention. Such ability makes repair and maintenance a matter of plug and play, lowering the knowledge and training bar to levels commonly found in plant maintenance personnel.

This modularisation of x-ray inspection systems means that any necessary repairs can now take place quickly and easily. Access to replacement modules is available on a 24/7 basis from some vendors, while most food production facilities go the extra step to purchase spare modules in advance for on-the-spot replacement. In the time it takes to change a bearing on a conveyor, for instance, the x-ray critical control point is back up and running again without even calling the factory for parts. The service model changes from factory technicians on site to mail the defective module back for replacement.

The newfound ease of operating and repairing today’s x-ray inspection devices means that a food producer can maintain these machines with their own, existing personnel. Since no special training is required, employee turn over is no longer a problem to ensure that the machine operates at maximum uptime.

The best of both worlds

Enabled by new technology, the simplification of operating and maintaining an x-ray inspection system allows packaged food producers to benefit from all of the advantages that x-ray inspection offers, with the same ease and quick repair that legacy metal detection systems offered.

With the lower price differential, and the very recent plug and play service model offered by some vendors, food producers still using metal detection have run out of excuses.

Now that some of the largest food retailers are demanding x-ray inspection, and competing food producers are adopting x-ray, the question of ‘when’ to make the switch has been answered: now. ■

David Rizzo has penned three trade books, 200 technical articles and 500 newspaper columns. He covers a wide range of topics, specialising in technology, medicine and transportation.