Factors to consider when selecting an X-ray inspection solution

Food quality and safety have always been of paramount importance for manufacturers and processors, but in today's highly competitive markets, with pressures on margins and the need to maximise throughput and efficiencies on production and packing lines, the need for effective quality control systems has never been greater.

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Retailers are also imposing increasingly stringent quality standards and with the proliferation of social media channels making the consumer's voice – particularly when it comes to complaints – ever louder, even a minor quality issue can have a marked effect in terms of both financial penalties and loss of brand reputation.

The versatility of X-ray technology makes it a valuable addition to any company's quality control procedures. X-ray inspection systems are able to look for a far wider array of foreign bodies, including metal, dense plastics, rubber, glass, and stones, and can also carry out a variety of additional quality checks, such as detecting missing, undersized, and broken items, deformed product and packaging, under-filled compartments, the presence of cracks and fissures in products, and weight estimation.

As with any equipment purchase, careful consideration is needed to identify the most appropriate model for each application, matching the particular detection requirements with the varying capabilities of the different X-ray inspection systems available.

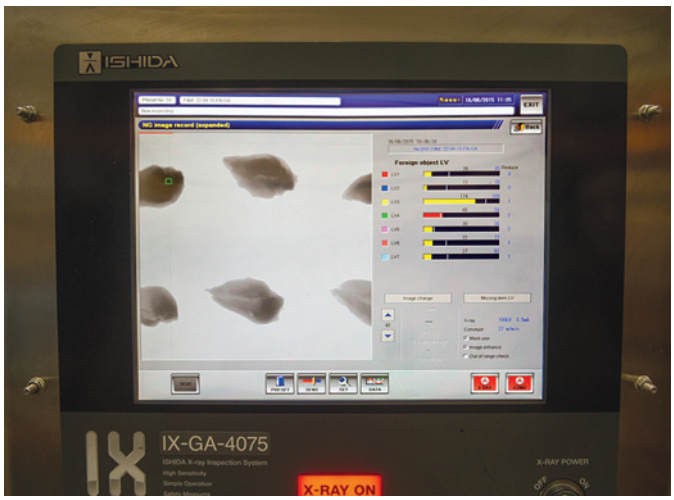
The right location

One of the first things to consider will be where to place the machine. Unpacked products such as raw materials for further processing, or meat and poultry, salad, vegetables, and nuts may need screening at the start. Packed product will be inspected much later, where the placement of the X-ray may depend on whether the machine is required to assess primary packs or check for missing packs in a transit case.

It may sometimes be necessary to install two separate X-ray inspection systems at different points on the line. For example, inspected bulk product could require a second inspection once packs have been fully sealed. This will ensure product quality before they leave the factory and is usually the preferred option for retailers.

X-ray inspection systems are able to look for a wide array of foreign bodies and can carry out additional quality checks.

Different X-ray models have different levels of sensitivity.



The right sensitivity

X-ray technology produces X-ray wavelengths from a generator tube which traverse through the product onto a line sensor. The line sensor converts the X-ray wavelengths into visible light which creates the greyscale image that can be seen on the screen. The darker the area of the image, the higher the density. In this way foreign bodies which are denser than the product can be detected.

Different X-ray models have different levels of sensitivity. Entry level systems are able to detect foreign bodies with a reasonably high density. Softer or less dense items like glass or rubber will require machines with greater sensitivity.

Generally speaking, the further down the line the inspection takes place, the more challenging the detection process becomes.

The type of packaging therefore may also be a factor in the selection of the X-ray machine.

Small or large pack sizes

The size of the pack or product to be inspected is a critical factor. A large block of cheese will require a much larger chamber than one for small retail packs.

Most X-ray systems operate from the top down, sending the X-ray wavelength through a product vertically. For tall or stand-up pack formats, such as bottles, cartons and tubes, side-beam X-ray models project the wavelength horizontally. As well as detecting foreign bodies, this gives them the ability to check for the correct fill level and that the closure is in place.

Specific challenges

Some bulk and unpacked product also have inspection challenges. For meat and poultry, a typical quality

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inspection requirement is the detection of unwanted bones or bone fragments in fillets.

Because there is a relatively small difference in density between the bone and the meat, the bone can be particularly difficult to spot.

Dual energy X-ray inspection systems have two line sensors, one which takes images at high energy and one at low energy.

This provides a better overall image of the product with a clearer contrast between the product and the bone or other foreign bodies.

Effective removal of foreign bodies

In the event of a foreign body or other quality issue being detected, an appropriate reject system is necessary to ensure the offending pack or product is reliably removed from the line.

The selection of the reject system will depend on their size and weight and the speed of the line. Typical choices include arm, air, pusher and drop belts.

Many retailers also require confirmation that out-of-specification items have been effectively rejected and have not continued down the line.

A complete solution

In most installations, the X-ray inspection system will be part of a fully integrated line. The machine therefore needs to be able to work effectively and link with other equipment to maintain line speeds and efficiencies. Look for suppliers with the relevant combination of technical and applications knowledge, who will have in-depth expertise in the supply and installation of other related packing equipment, together with wide-ranging experience of handling many different product types.

Protect your company's reputation at all costs

With any investment it is important to consider the cost of ownership in terms of the initial purchase price of the machine and ongoing running and servicing costs.

One cost, however, that is almost impossible to put a value on is a company's reputation – and quality issues can be extremely damaging.

This underlines the importance of making the right decision when it comes to choosing an X-ray inspection system, and of consulting the experts early on in the selection process. ■

Reject systems ensure that a contaminated product or pack is reliably removed from the line.