Metal detector specialist reinforces 'Love Food, Hate Waste' pledge

Reducing food waste in production is a growing priority for manufacturers, and false rejects from all-important metal detectors can be a major contributing factor. Phil Brown, European Sales Director, Fortress Technology explains how the challenge is being addressed.

Factory food waste is a huge - and growing - issue for manufacturers, and one where choices about production equipment, including metal detection and other quality control, can have a surprisingly significant impact on outcomes.

While consumers hear messages about cutting food waste in the home and retailers publicise their own efforts, losses from businesses supplying those retailers cannot be ignored. According to the Waste and Resources Action Programme (WRAP), surplus and waste food from UK manufacturing (including third-party logistics) was 2.4M tonnes in 2014 – ten times the volume from retail, and 4.2% of the country's food production. Of this, some was redistributed to food banks and other beneficiaries, some was recycled as animal feed, but 1.7M tonnes remained as food waste.

It is indicative of the seriousness with which these losses are now viewed that reductions in food waste play a prime role in the UK's Courtauld 2025 Commitment. This voluntary scheme has as its first objective a 20% reduction of food & beverage (F&B) waste. It also aims to cut F&B-related greenhouse gas emissions by the same proportion and reduce the impacts of supply-chain water use. Signatories include the major grocery retailers and brand-owners such as Unilever, Nestlé, Arla, Coca-Cola and Premier Foods.

Environmental accountability and reporting are now facts of life for most food manufacturers, whether they are Courtauld 2025 signatories or not. But of course, as well as demonstrating corporate social responsibility (CSR), being able to reduce food waste in the first place has - like energy efficiency - a direct impact on any company's bottom line.

The mechanics of production waste reduction
Staff training and improved processes are helping to cut factory waste, yet so too are decisions about which equipment to buy and how best to control it.

In the case of product inspection, specific features of likely contaminants, the product, packaging, processing and supply chain may determine whether metal detection or x-ray is chosen for a particular point on the line. For example, x-ray technology cannot be applied to product in free-fall, such as snacks above a bagging machine.

In other settings, x-ray may make better sense where it can add further quality control functions, such as checking fill levels or the completeness of a multi-component pack.

Yet, in many cases, the decision will depend on a very careful evaluation of the pluses and minuses of each technology. No supplier of either x-ray or metal detection can guarantee 100% infallibility. Some businesses may run away with the idea that x-ray, as the more 'modern' technique, should be the default choice. In fact, arguments either way are more nuanced, and the assessment needs to be approached with much more of an open mind.

X-ray will always come at a higher (and often significantly higher) installation and lifetime cost than metal detection: up to 100 times the cost of ownership, in extreme cases. Food manufacturers should be wary of any advice implying that 'you cannot put a price on food safety'. In fact, every major decision involves a minute assessment of cost versus risk, and it is disinguous to suggest otherwise.

The sensitivity of both types of system will depend on a series of variables, from the potential size and composition of possible contaminants to the liquid content and consistency of the product matrix.

Factory space and the radiation safety requirements of x-ray systems may be among other considerations influencing food manufacturers.

Enough … and too much
As discussed, neither an x-ray nor metal detection system can be expected to identify every contaminant in the course of its lifetime. Because the size, orientation and density of contaminants - among other variables - will affect detectability, both types of technology are inevitably set up and calibrated in order to err on the side of caution.

But of course, manufacturers will want to avoid excessive levels of false rejects, too. This is precisely where the competing demands of food safety and food waste overlap – and where the latest metal detection technology can help to cut waste while maintaining safety levels.

False rejections, which occur when perfectly good product is identified as containing a contaminant, are most common on lines handling 'wet' items. While this way of categorising products does include literally wet or moist consistencies, in anything from dairy products and dips to meat, it also refers to any food matrix containing high levels of salt or other mineral fortification. The common element is a strong 'product effect', which registers relatively high conductivity and magnetic permeability, mimicking the signal picked up from metal, and so making any distinction between the two hard to establish. Traditionally, stainless steel has been especially difficult to detect in wet products since any signal can be effectively disguised by the product effect.

Fortress Technology's most recent innovation in this area, the Interceptor metal detector, applies both high and low frequency ranges in order to isolate the product signal, and more readily identifies any contaminant signature beyond that. Trials with stainless steel in wet products have shown that Interceptor enables the pinpointing of contaminants as little as half the size of those detectable by the previous generation of equipment.

Finally, false rejects don't just impact the physical waste where perfectly good food is discarded. Lower factory yield can undermine the cost-effectiveness of an entire operation, while repeated stoppages and trouble-shooting will incur unnecessary cost. Reliable industry estimates put the cost per line of false rejects at up to £14,000, depending on the scale of the problem.

Optimising detection
Demonstrating its innovative approach, Fortress has taken an industry lead in reducing food waste in other ways.

High-speed, multi-line packing operations have a number of options when it comes to contaminant detection. Manufacturers can channel multiple lanes through a single, large metal detection aperture. The clear drawback here is that the larger aperture size sacrifices valuable levels of sensitivity. In addition, any reject system will remove an entire line of product across all of the lanes being checked, so creating unnecessary waste.

Of course, there is the option of positioning a separate metal detector over each lane. This will mean product is only ever rejected from one lane, but the approach has major impacts in terms of cost and space efficiency. In today's food factories, many of them working around legacy equipment and within severe spatial limitations, compact design is often a prime consideration.

The Fortress solution, already installed on multi-line operations checking sachets of herbs & spices and snack pots, is a single metal detection system with multiple apertures for each lane and a single operator panel. Each aperture is sized as closely as possible to the product. On the sachet line, Fortress recently became the first company to deliver a five-lane, ferrous-only multi-aperture detector.

The potential benefits are immense. On five conveyors, end-users can save up to 50% of the space required by individual metal detectors, around 17% of the installation cost, and up to 65% of the total cost of ownership, taking into account reduced maintenance and parts requirements.

Most impressively of all, on a five-lane configuration, the system automatically reduces food waste by 80%, even before the benefits of increased sensitivity are taken into account.

This is only one of the more recent developments in metal detection with a direct bearing on the amount of food waste manufacturers generate. It serves to demonstrate that food safety on the one hand and concerns about cost and wastage on the other do not necessarily pull the food industry in opposite directions. Technological improvements can help to contain costs, maximise space and reduce food waste.