

Effective contamination protection for sugar processing

Protecting the estimated 180 million tonnes of sugar produced annually worldwide from 'foreign bodies' entering the process and contaminating the finished product is undoubtedly one of the biggest challenges facing sugar manufacturers today.

by The Technical Team,
Eclipse Magnetics, UK.
www.eclipsemagnetics.com

In a highly regulated environment, manufacturers must ensure maximum food safety, not only to protect the consumer, but also their brand. The rising cost of raw materials and price reduction from bulk buyers means that the profit margins are being squeezed more than ever. It is, therefore, absolutely vital that batch wastage is kept to a minimum.

There is a real risk of contamination at all stages of the sugar production process across both cane and beet processes. In addition to concerns regarding consumer welfare, the consequences of having to recall product or failing a site audit can have catastrophic effects on the reputation of a brand, as well as adverse financial implications.

Whilst protection should be considered at all stages, one of the most critical areas is near the end of the process post screening and scalping, before the granulated sugar is fed into a storage silo for delivery to bulk discharge or packaging lines.

This is the last line of defence against small metal particles which may have entered the process through wear and degradation of equipment.

Protecting sugar processes

The sugar processing industry is a highly regulated environment in which manufacturers face a constant challenge to ensure food safety by preventing foreign body contamination.

Measures such as EU Regulation 852/2005 and ISO 22000 Food Safety Guidance are in place to drive manufacturers toward carrying out full risk assessments and implementing prevention plans.

This internationally recognised method of managing food safety is known as Hazard Analysis and Critical Control Point (HACCP) analysis.

risk. This can result in the decline of customer confidence in a brand, loss of sales, and in some instances, closure. Food manufacturers take customer perception very seriously, in addition to food safety and legislative compliance.

Preventative measures

Technologies exist to help identify problems with finished product, but prevention techniques will ultimately have greater impact on reducing potential failures. Sugar manufacturers have recognised that the best way to 'control hazards' is to prevent them entering in the first place.

Robust prevention procedures include stringent vendor audits to ensure any incoming ingredients are from suppliers who adhere to strict food hygiene standards, regular machinery maintenance and replacement cycles also help to prevent contamination from faulty or worn machinery.

A proactive pest control system is also important to minimise the entry of insects or rodents into the process. In addition employee training, safety wear and strict codes of practice are important to prevent user error which may lead to food contamination.

Prevention procedures eliminate most problems but foreign bodies do still enter or are created within the process. An HACCP plan identifying critical points in the process, and the fitting of the correct removal or detection device can reduce contamination to virtually zero.

Removal and detection

There are a range of magnetic separation and metal detection systems available. Generally they can be installed in-line at critical control points without reducing production efficiency.

Before specifying an effective foreign body removal system, there are several factors to be taken into consideration:

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The main concerns

● Risk of injury:

Injury to the consumer can occur as a direct consequence of consuming food that contains foreign bodies. For example, pieces of broken glass or metal could cause a significant amount of damage if ingested, including possible lacerations to the gastrointestinal tract.

● Complying with legislation:

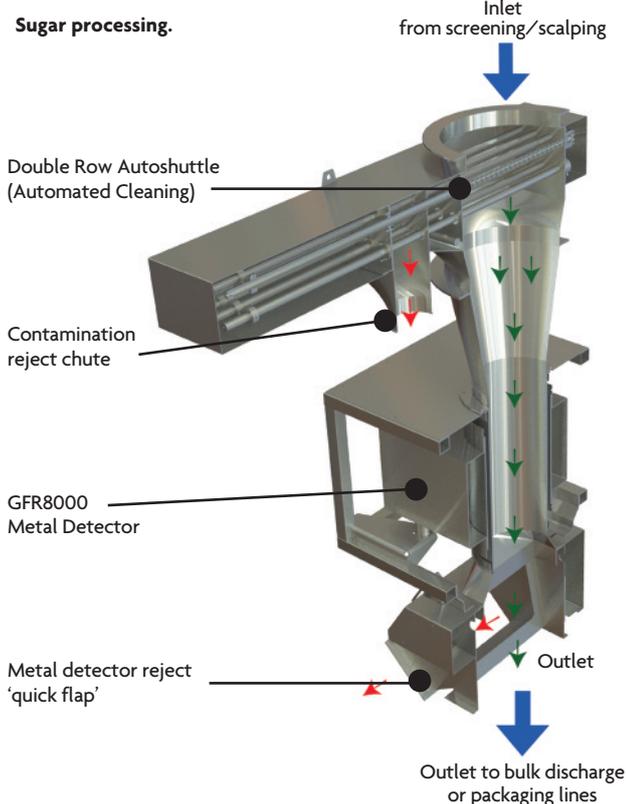
The Food Safety Act 1990 provides the framework for food legislation in Britain. Section 7 of the Food Safety Act lists 'rendering food injurious to health' as an offence, along with similar provisions in the General Food Regulations 2004 of marketing unsafe food.

These acts maintain the concept of 'due diligence' which allows a manufacturer or seller to claim that, whilst the foreign body is present in the product, they have done as much as is 'reasonably practicable' to prevent the contamination.

● Brand reputation:

Incidents involving foreign bodies in food can be extremely detrimental to the reputation of a brand.

Although historically stories involving foreign bodies in food have been widely reported by the media, the increasing use of social media by both the general public and the brands in question make the potential for adverse publicity a real



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● **Device location.**

Is it in a critical location where contamination could have occurred? Is it accessible for cleaning and inspection? Are critical areas post screening and scalping protected?

● **Product flow characteristics.**

Can the device installed deal effectively with the capacity required without negatively impacting output? For example, large sugar gravity feed applications need to handle up to 200 tonnes per hour.

● **Particle size.**

The typical particle size needed to be removed must be considered as this will influence the device required.

● **Cleaning method.**

In continuous high volume processes such as sugar refining, it is important that any separation or detection device used is fully automated. This enables cleaning and servicing to occur without stopping the line, thereby eliminating downtime and loss of efficiency.

● **ATEX approval.**

Does the product have full ATEX certification to operate in a potentially explosive environment?

It is vital that these simple criteria are considered to ensure effective detection and removal systems, and to show due diligence if an incident was to occur. Auditors and other independent bodies are keen to establish that systems are not just present but are of the correct specification.

Methods of protection

Magnetic separation systems and metal detectors are widely used in sugar processing post screening and scalping to remove fine metal particles which may have entered the process as a result of process wear.

Magnetic separators with high intensity, rare earth magnets effectively remove very fine particles and para magnetic particles such as stainless steel. The effective removal of these particles is crucial at this critical stage of the process.

In many sugar applications a metal detector is also installed to provide effective protection against ferrous and also non-ferrous metals such as aluminium and stainless steel, etc.

Separation systems are much more effective and reduce product wastage as the magnets only remove contamination and do not eject good product. They also eliminate the possibility of contamination



Eclipse Magnetics' Auto-Shuttle magnetic separator.

finding its way into finished product.

Due to high volume output, most systems are fully automated and have been engineered to meet strict hygiene standards. High specification magnetic separators enable screening of processed products 24 hours a day, seven days a week, with no need for manual intervention.

Systems can even carry out full cleaning without stopping the process, keeping the material flowing and enabling continuous production. In an automated separation system, granulated sugar flows in process through a series of magnetic rods. These rods collect ferrous particles, and the metal

particles are periodically diverted to collection points.

Summary

In an ever demanding commercial environment and with increased scrutiny being placed on food safety, a foreign object detection program is vital for sugar processing lines. Each stage of sugar production must be carefully assessed and robust contamination prevention methods implemented. With the latest technology in separation and detection technology, however, ensure that HACCP and legislative requirements are satisfied. ■