Reasons for an X-ray Inspection Programme

Contents

1. Minimising Foreign Bodies
2. Minimising Costs
3. Protection of the Customer and Consumer
4. Protection of Brand and Reputation
5. Certification
6. Employee Buy-in
7. Risk Management and Regulatory Compliance
8. Retailer and Consumer Brand Codes
9. X-rayed Product is Premium
10. Pack Integrity
11. Conclusion
12. Glossary
Reasons for an
X-ray Inspection Programme

X-ray inspection systems represent a significant capital investment that must be justified in terms of potential cost savings, operational reliability, consumer protection, regulatory compliance, brand reputation, retailer specifications and enhanced sales opportunities.

The most effective use of an x-ray inspection system is as part of an all-encompassing, company-wide programme that seeks to prevent foreign bodies in the first instance and implements effective preventive actions if they are detected.

This white paper examines the case for investing in x-ray inspection technology. It discusses the justification for purchase, and the reasons for implementation within a well-designed x-ray inspection programme, which can be proven in terms of:

- Minimising Foreign Bodies
- Minimising Costs
- Protection of the Customer and Consumer
- Protection of Brand and Reputation
- Certification
- Employee Buy-in
- Risk Management and Regulatory Compliance
- Retailer and Consumer Brand Codes
- X-rayed Product is Premium
- Pack Integrity

1. Minimising Foreign Bodies

In 2010, more than 30% of the alerts and information notices issued by the Food Standards Agency (FSA) were a result of foreign bodies.

X-ray inspection systems provide exceptional detection of dense foreign bodies, including metal, glass, bone, mineral stone and high-density plastic and rubber, no matter what their size, shape or location within a product.

Despite this, foreign bodies can still be a cause for consumer complaints. However, such complaints are not normally due to the x-ray system failing, they are usually associated with a lack of effective controls, poor working methods, incorrect system specification and design.

A well-designed x-ray inspection programme can address these issues and should focus on how to minimise foreign bodies in the first place through good manufacturing practice, prerequisite programmes, selection of the correct equipment, location of inspection equipment and effective testing, and gaining a greater understanding of how industry standards, customer requirements and legislation impact on manufacturers.
2. Minimising Costs

The costs associated with implementing and maintaining an effective x-ray inspection programme are significantly lower than the potential costs of failure.

A contaminated product found before shipment will inevitably result in product and packaging waste, possible machinery damage and loss of output.

Costs can easily be allocated to such events and can be particularly high when they result in loss of output, especially on high-volume, automated production lines. However, such costs are easily overshadowed by foreign bodies discovered after shipment that can result in loss of customer satisfaction, product recalls, adverse publicity and potential legal action.

3. Protection of the Customer and Consumer

Although modern manufacturing techniques constantly strive to eliminate foreign bodies, processes and procedures inevitably break down.

For example, there is an inherent risk of contamination during the production process, such as breakages of glass jars and bottles on the production line as a result of conveyor vibrations or back pressure, as well as during the filling process due to misaligned filling heads striking the top of containers or closures being over-tightened (Figure 2). The probability of breakages leading to contamination is increased on high-speed bottling lines.

Manufacturers and their employees have an obligation to their customers and to the end consumer to minimise foreign bodies to ensure consistent quality is maintained and that all possible steps are taken to protect the welfare of the end user. Failure to achieve this can create potential animosity between the retailer or customer and the manufacturer, and can lead to a breakdown of the customer relationship and loss of future business opportunities.

4. Protection of Brand and Reputation

Powerful product branding gives customers a perceived assurance of safety and quality. Branding is frequently responsible for driving consumers’ repeat purchases and is an important tool in maximising sales and justifying premium product pricing for manufacturers and retailers.
For this reason, an organisation’s responsibility is not only related to protection of the end user, but also to the brand and the ongoing reputation of the company.

With consumers increasingly using the internet and other media to share and publicise information about defective products, corporate reputations have become more fragile and a single shard of glass, or sliver of metal, is enough to take the shine off a hard-won reputation.

In 2010, more than twice as many product recalls issued by the Food Standards Agency (FSA) were a result of physical contamination i.e. foreign bodies, compared to microbiological contamination.

5. Certification

The nature of the safety importance of x-ray inspection systems within the manufacturing process makes it inevitable they will form the focal point of any customer/retailer audit.

The importance of an effective programme can’t be ignored as evidence will undoubtedly be requested, if not immediately then sometime in the future, by any one of a number of audit processes, for example:

- Internal food safety and management system audits
- Customer audits
- Quality management system audits, e.g. ISO9001:2000
- Food safety management system audits, e.g. Food and Drug Administration (FDA), United States Department of Agriculture (USDA), International Food Standard (IFS), British Retail Consortium (BRC), ISO22000:2005, SQF1000/2000 Code

6. Employee Buy-in

Implementing formalised procedures and working practices will support overall quality and help this philosophy to permeate throughout the entire organisation. For an x-ray inspection programme to be successful, buy-in from uses/employees is essential, and needs to come from everyone involved in the production process.

7. Risk Management and Regulatory Compliance

There’s currently no broad-based legal requirement forcing manufacturers to install x-ray inspection equipment or implement an x-ray inspection programme. However, in any legal proceedings that result from a foreign body being discovered in a food or pharmaceutical product, manufacturers could be called upon to prove they have implemented procedures to manage and prevent all identified risks in their processes. Failure to do so could have serious consequences.
This is easier to prove when an organisation has a documented system that continually assesses the risks to food and drug safety and allocates resources to minimise them.

Due to the superior levels of detection provided by an x-ray inspection system, particularly in glass jars and bottles, metal cans, and products in foil or metallised film packaging, installing x-ray technology is widely acknowledged as implementing the highest level of inspection available and can help manufacturers adhere to a diligent Hazard Analysis and Critical Control Points (HACCP) programme.

In the absence of any definitive legislation with regards to x-ray inspection requirements, several regulatory bodies have emerged with standards and codes of practice for manufacturers to abide by, such as the Global Food Safety Initiative (GFSI) and Good Manufacturing Practice (GMP) (Figure 4). These require that manufacturers make their processes as safe and transparent as possible, and advocate universal inspection of all food and allied products by x-ray inspection equipment.

Some of these standards are beginning to play a part in supplier selection, and the specification of x-ray inspection standards for manufacturers, and they generally require control in the form of a documented programme.

8. Retailer and Consumer Brand Codes

Major retailers and the custodians of many household brands have also developed their own codes of practice that must be fulfilled and adhered to in order to satisfy supplier agreements.

These standards vary across geographical territories, and more and more leading supermarkets are insisting upon the implementation of a formal x-ray inspection programme throughout their supply chain.

9. X-rayed Product is Premium

Food and pharmaceutical manufacturers/packers are increasingly keen to tell their customers they are using x-ray inspection as it is regarded as bestowing a higher level of quality and production to a premium product (Figure 5).

As well as increasing consumers’ confidence that the food they are purchasing and eating is safe for consumption, evidence demonstrates it can also help manufacturers to win new business from competitor suppliers who don’t have product inspection systems in place.

10. Pack Integrity

Although a foreign body detection system will not normally earn a food or pharmaceutical manufacturer/packer any revenue or return on investment at the same level a filling machine or checkweigher can, modern x-ray systems are multi-tasking defenders of product and brand quality and can help increase Operational Equipment Effectiveness (OEE).
In addition to offering exceptional foreign body detection, x-ray systems can simultaneously perform a number of in-line product integrity checks (Figure 6), which can prove economically beneficial, such as:

- Identifying missing or damaged products
- Counting components
- Measuring mass
- Monitoring fill levels, and
- Checking for damaged packaging

![Image showing in-line product integrity checks](image)

Figure 6: Shows a range of in-line product integrity checks

11. Conclusion

Purchasing an x-ray inspection system involves a significant capital investment, but the expense is relatively small compared to the potential costs of product contamination.

As this white paper demonstrates these can be colossal, which is why food and pharmaceutical manufacturers are increasingly relying on x-ray inspection systems to detect foreign bodies and guarantee the safety and quality of their products.

However, on its own x-ray inspection technology can't guarantee a product is in a suitable condition for sale or free from foreign bodies.

An x-ray inspection system is most effective when purchased as part of a wide-reaching foreign body reduction programme; the objective being to prevent foreign bodies, not simply catch them before they leave the factory.

By thwarting customer complaints and expensive product recalls, implementing a product inspection programme which incorporates x-ray inspection can increase the confidence of food and pharmaceutical manufacturers, and their retail channels, and play a key role in protecting their brand’s reputation and helping them reach new markets.

And, in addition to assisting with regulatory compliance, in the event of a legal claim, a product inspection programme will help to demonstrate that all reasonable precautions were taken throughout the manufacturing process, thereby providing a due diligence defence.

12. Glossary

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The Product Inspection Division of METTLER TOLEDO is a leader in the field of automated inspection technology. Our solutions increase process efficiency for manufacturers while supporting compliance with industry standards and regulations. Our systems also deliver improved product quality which helps to protect the welfare of consumers and reputation of manufacturers.

Metal Detection  X-ray Inspection  Checkweighing  Vision Inspection

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