Food As-Intended: Fighting Foreign Body Contamination

The webinar will begin shortly.
Thank you for attending!

Food As-Intended: Fighting Foreign Body Contamination

Expert Panel Members:

- Kelly-Jade Mulholland, Technical Manager, Safety & Quality, FSSC
- Mercè Sánchez, Food Programme Manager, LGC
- Adam Green, XR E-Platform & Market Manager, METTLER TOLEDO
- Deb Smith, Global Hygiene Specialist, Vikan

Webinar housekeeping

- The webinar will run for 1 hour, 15 minutes.
- Each speaker will present for around 10 minutes.
- This will be followed by a panel discussion with our experts. Please submit your questions via the Q&A box.
- We will reach out after the webinar to answer any questions we do not address during the session.
- The webinar will be recorded, and we will send you the recording in a few days via email.

About Vikan

Vikan is the world's leading supplier of hygienic cleaning tools for the food and beverage industry and other hygiene-sensitive environments.

For more information, visit us at vikan.com

Our panel of experts

Kelly Mulholland

Technical Manager, Safety & Quality, FSSC

Mercè Sánchez

Food Programme Manager (BRCGS), LGC

Adam Green

XR E-Platform & Market Manager, METTLER TOLEDO

Foreign bodies: What are they?

Also called:

- Foreign Objects
- Foreign Matter
- Foreign Material
- Physical Contaminants

*"Any biological, chemical or physical agent, foreign matter or other substances not intentionally added to food that may compromise food safety or suitability."**

*Codex General Principles of Food Hygiene

- FBs can include material from the foodstuff itself:
  - Bone; stalks; pips; shell; dirt; stones; insects; droppings
- or be introduced during processing:
  - Plastic; packaging; glass; metal; fabric; rubber; glues/ resins; paint/coatings; wood
- or come from people:
  - Hair; jewellery; fingernails; contact lenses; wound coverings.

Foreign bodies: What size are they?

Global regulatory & standards information regarding foreign body size

Region / Country	Regulatory Body/Standard	Key Limits & Guidelines	Notes
USA	FDA (CPG Sec. 555.425, May 2005)	**7–25 mm** hard/sharp objects in RTE foods: direct seizure **<7 mm**: action if product is for vulnerable groups **>25 mm**: action regardless of product type	Focuses on physical injury risk; applies risk-based thresholds
Canada	CFIA (Canadian Food Inspection Agency)	**2 mm** general threshold - Varies by commodity & consumer vulnerability	More conservative than US; commodity-specific flexibility
EU	EFSA / National Authorities	No fixed legal size limit Industry practices: detect **<7 mm**, ideally **2–3 mm** for metals, **5–6 mm** for X-ray	Relies on Codex & industry best practices
Codex	FAO/WHO	No specific size limits - Emphasises hazard analysis and risk-based controls	Serves as global reference for harmonised food safety standards

Foreign bodies: What size are they?

Region / country	Regulatory body/standard	Key limits & guidelines	Notes
Japan	Ministry of Health, Labour & Welfare	No universal size limit – Focus on GMP & HACCP compliance	Foreign body incidents often lead to recalls and public alerts
Australia/NZ	FSANZ	No fixed size limits – Risk-based approach under Food Standards Code	Emphasis on preventative controls and consumer protection
China	National Health Commission	No published universal size limits – Strict enforcement of hygiene and contamination controls	Foreign body contamination often treated as adulteration

- No consensus on the size of foreign body that is acceptable.
- Consensus that foreign body management should be based on Risk Assessment, taking into account the material type, size, target consumer group, & their vulnerability.
  - *Products intended for infants, elderly individuals, or immunocompromised consumers typically require stricter controls & lower tolerance for foreign body risks.*

Foreign bodies: Why are they a problem?

- One of the biggest reasons for customer complaints relating to food
- May compromise safety, quality, or suitability of food products
- Could have an adverse effect on the consumer
- A significant cause of product rejection & public recalls
- Can damage production equipment and/or the food business
- Foreign body management - common audit non-compliance

Foreign bodies: Regulatory control requirements

Effective foreign body management in the food industry must be in line with appropriate regulatory requirements & standards

- **EC 178/2002 regulation**
  - The General Food Law - lays out the general requirements for food & feed in the EU
- **EC 852/2004 regulation**
  - Sets general hygiene requirements for EU food businesses across the entire food chain

- **US FDA:**
  - Food Code
  - CPG Sec 555.425 Foods, Adulteration Involving hard or Sharp Foreign Objects | FDA
- **USDA:**
  - Federal Meat Inspection Act &
  - Poultry Products Inspection Act

Foreign bodies: Standards

The Codex Alimentarius promotes a preventive approach to foreign body management through the application of good hygiene & manufacturing practices (GHPs/GMPs), and hazard analysis & critical control points (HACCP) principles

- **Codex Alimentarius GENERAL PRINCIPLES OF FOOD HYGIENE CXC 1-1969**
  - Provides a global framework for food businesses to ensure food safety & quality throughout the food chain
  - Details Good Hygiene Practices (GHP), & the Hazard Analysis and Critical Control Point (HACCP) system
- **Codex Alimentarius CX/FH 00/13 (August 2000 + 2001)**
  - Specific document related to food hygiene principles and practices, as part of general food hygiene principles within Codex

Foreign bodies:
Food safety & quality standard requirements

The Global Food Safety Initiative (GFSI) promotes FB management through hazard analysis, hygienic design, detection controls, & GHPs/GMPs based on their benchmark requirements

GFSI Benchmarked Standard operators include;

FSSC 22000

- FSSC-22000-Scheme-Version-6-Final.pdf

SQF

- sqf-code_manufacturing-ed-8-1-final.pdf

Foreign bodies:
Food safety & quality standard requirements

- IFS_Food_v8_standard_EN.pdf
- IFS_Foreign_body_management_v2_guideline_EN.pdf

- Global Standard Food Safety (Issue 9) | BRCGS
- INDUSTRY SPOTLIGHT - Foreign Body Contamination | BRCGS
- Best Practice Guideline - Foreign Body Control | BRCGS

Foreign bodies: General approach to control

Globally, regulatory bodies, food safety authorities, & guidance providers have established control frameworks for foreign body management. These vary by jurisdiction but share common principles:

- Elimination/mitigation
- Prevention
- Detection & removal

Foreign bodies: Mitigation strategies

Reduce the presence of foreign bodies at the start of the process

- Sourcing:
  - Source food/ingredients & packaging materials from reputable, trusted suppliers.
  - Source hygienically designed equipment & facilities to minimise the risk of material breakage, corrosion, or wear that could lead to product contamination.
- Inspection:
  - Implement robust supplier audit and ‘goods-in’ inspections to reduce risk of FB introduction at the start of the process.
- Installation:
  - Install facilities & equipment in a way that allows easy access for cleaning & maintenance, and minimises the risk of FB contamination of open food product, e.g., minimise overhead structures

Foreign bodies: Prevention strategies

Take actions to minimise risk of foreign body incidents

- Food safety culture:
  - Foster a cross-functional, proactive, collaborative, supportive culture regarding FB control
- Training:
  - Provide training on FB prevention, detection, & removal strategies to help employees understand the risks & follow procedures to prevent contamination.
- Risk assessment:
  - Conduct risk assessments as part of your food safety plan to identify potential sources of FB & evaluated their risks.
- Maintenance:
  - Ensure all equipment & facilities are properly inspected and maintained or replaced as needed

Foreign bodies: Prevention strategies

Establish procedures to optimise foreign body control

- Environmental controls, including:
  - Maintenance of clean zones
  - Personal hygiene
  - Pest control
  - Regular housekeeping & sanitation
- Documentation:
  - Document & implement clear processes for FB management to help prevent recurrence, support food safety & quality standards, and aid continuous improvement & audit compliance, incl.,
    - Recording of FB finds
    - Root cause analysis
    - Recording corrective actions taken

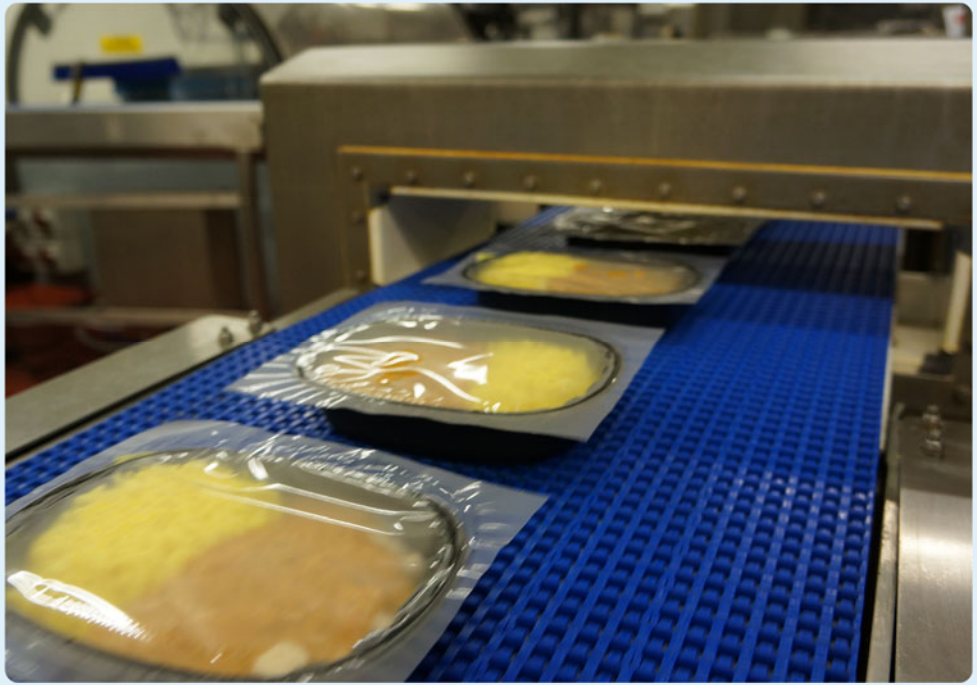
Foreign bodies: Detection & removal strategies

Establish & implement programs to effectively detect & remove physical contaminants

May include the use of:

- Metal detectors; X-ray systems; or a combination of both; with effective rejection systems
- Optical detection & rejection systems
- Manual inspection & removal
- Sieves & filters
- Magnets

Equipment used for foreign body detection & removal must be appropriately calibrated, validated, & verified to guarantee performance.



FOREIGN MATTER MANAGEMENT

Kelly Mulholland
Technical Manager at FSSC

October 2025

FSSC 22000

OVERVIEW FSSC 22000

128
CERTIFICATION BODIES

44
ACCREDITATION BODIES

39.000+
certificates issued worldwide

172
partners

Involved in international networks like **ISO**, **GFSI**, **IAF** and **WPO**

offers a **Development Program** for SMEs

covers **multiple** sectors in the **supply chain**

62 team members

global representation in China, Europe, Africa, India, Japan, Türkiye & the Middle East, North and South America

- RETAIL & WHOLESALE
- TRADING & BROKERING
- CATERING
- TRANSPORT & STORAGE
- FOOD MANUFACTURING
- FOOD PACKAGING MANUFACTURING
- ANIMAL FEED PRODUCTION

WHO MANAGES FSSC 22000?

Foundation FSSC is the owner of the FSSC 22000 Scheme for the certification of Food Safety Management Systems.

The FSSC 22000 Scheme is governed by an independent Board of Stakeholders.

An Advisory Committee ensures transparency and involvement of the consumer goods industry and related supply chain.

The Advisory Committee advises the Board of Stakeholders.

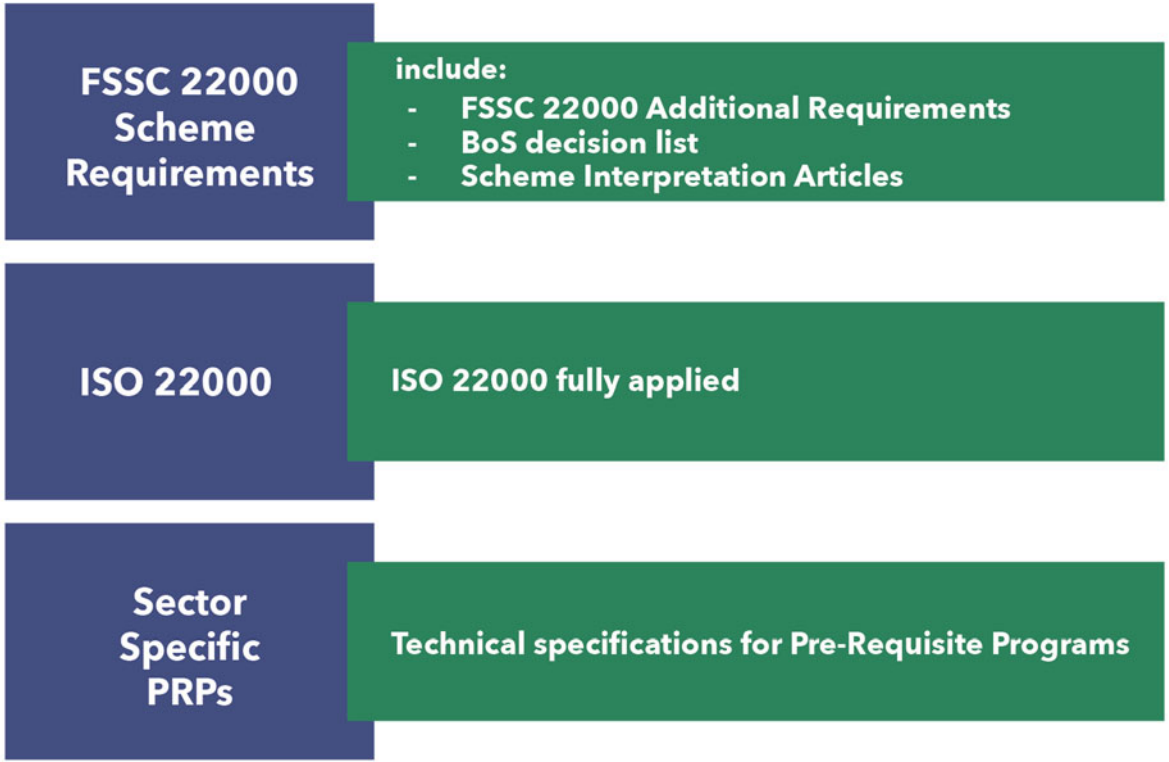
CONTINUOUS IMPROVEMENT

2010	2011	2013	2016	2019	2023
version 1	version 2	version 3	version 4	version 5	version 6

FSSC 22000

SCHEME REQUIREMENTS

STRUCTURE OF FSSC 22000



FSSC 22000

ISO 22000:2018

4. Context of the organization
5. Leadership
6. Planning
7. Support
8. Operation
9. Performance evaluation
10. Improvement

ISO/TS 22002-1:2009

4. Construction and layout of buildings
5. Layout of premises and workspace
6. Utilities — air, water, energy
7. Waste disposal
8. Equipment suitability, cleaning and maintenance
9. Management of purchased materials
10. Measures for prevention of cross-contamination
11. Cleaning and sanitizing
12. Pest control
13. Personnel hygiene and employee facilities
14. Rework
15. Product recall procedures
16. Warehousing
17. Product information and consumer awareness
18. Food defence, biovigilance, and bioterrorism

FSSC 22000

ISO/TS 22002-1:2009

10. Measures for prevention of cross-contamination

10.4 – Physical contamination

Includes requirements for brittle materials:

- Periodic inspections
- Procedures in place for breakage
- Avoiding brittle materials in/on equipment, where possible
- Retaining glass breakage records
- Risk based measures to prevent, control or detect potential contamination

ADDITIONAL REQUIREMENTS

1) Management of services and purchased materials (All Food Chain Categories)

2) Product labelling and printed materials (All Food Chain Categories)

3) Food defense (All Food Chain Categories)

4) Food fraud mitigation (All Food Chain Categories)

5) Logo use (All Food Chain Categories)

6) Management of allergens (All Food Chain Categories)

7) Environmental monitoring (Food chain categories BIII, C, I & K)

8) Food safety and quality culture (All Food Chain Categories)

9) Quality control (All Food Chain Categories)

10) Transport, storage and warehousing (All Food Chain Categories)

11) Hazard Control and Measures for Preventing Cross-Contamination (All Food Chain Categories, Excl. FII)

12) PRP Verification (Food chain categories BIII, C, D, G, I & K)

13) Product Design and Development (Food chain categories BIII, C, D, E, F, I & K)

14) Health Status (Food chain category D)

15) Equipment Management (All Food Chain Categories, Excl. FII)

16) Food Loss and Waste (All Food Chain Categories, Excl. I)

17) Communication Requirements (All Food Chain Categories)

18) Requirements for Organization with Multi-site certification (Food chain categories E, F & G)

FSSC ADDITIONAL REQUIREMENTS

2.5.11 - Hazard control and measures for preventing cross-contamination:

2.5.11 (d) – Foreign matter management

Includes requirements for:

- Risk assessment to determine the need and type of foreign body detection equipment required.
- Justification maintained where foreign body detection equipment is deemed unnecessary.
- Procedure for the management and use of the equipment selected.
- Controls for foreign matter management, including procedures for the management of breakages.

NONCONFORMITY TRENDING

TOP 15 NONCONFORMITIES

	Requirements		
1	Quality Control	9	Food Loss and Waste
2	**Physical Contamination**	10	Control of Monitoring and Measuring
3	Food Safety and Quality Culture	11	Competence
4	Traceability System	12	Equipment Management
5	Preventive and Corrective Maintenance	13	Storage of Food, Packaging Materials, Ingredients and Non-Food Chemicals
6	Internal Structures and Fittings	14	Cleaning and Sanitizing Programs
7	Environmental Monitoring	15	Management of Services and Purchased Materials
8	Management of Allergens		

*Table is based on 2024 Data Trending for FSSC 22000 Version 6

FSSC 22000

FOREIGN BODIES AND BRCGS

MERCE SANCHEZ
FOOD PROGRAMME MANAGER

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Our Vision

Science for a safer world

Part of the LGC Group, we believe in the power of science to create a safer world.

- Our **mission** is to improve brand confidence through rigorous supply chain assurance
- **With a heritage in British retail, we have evolved over 25 years into a range of global standards**
- **With over 33K certificated sites in 130+ countries, we are the Global Standard underpinning Brand Reputation through Compliance**

35k
certificated sites

130+
adoptive countries

25+
years experience

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FOOD SAFETY issue 9 Foreign body contaminants

4.9 Chemical and physical product contamination control: raw material-handling, preparation, processing, packing and storage areas

Appropriate facilities and procedures shall be in place to control the risk of chemical or physical contamination of product.

4.9.1 Chemical Control

4.9.2 Metal Control

4.9.3 Glass, brittle plastic, ceramics and similar materials

4.9.4 Products packed into glass or other brittle containers

4.9.5 Wood

4.9.6 Other physical contaminants

4.10 Foreign-body detection and removal equipment

The risk of product contamination shall be reduced or eliminated by the effective use of equipment to remove or detect foreign bodies.

4.10.1 Selection and operation of foreign-body detection and removal equipment

4.10.2 Filters and sieves

4.10.3 Metal detectors and X-ray equipment

4.10.4 Magnets

4.10.5 Optical sorting equipment

4.10.6 Container cleanliness – glass jars, cans and other rigid containers

4.10.7 Other foreign-body detection and removal equipment

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FOOD SAFETY issue 9 Foreign-body detection and removal equipment

4.10.1 Metal detectors and X-ray equipment

4.10.1.1	A documented assessment in association with the food safety plan (see section 2 – The food safety plan) shall be carried out on each production process to identify the potential use of equipment to detect or remove foreign-body contamination. Typical equipment to be considered may include: ▪ filters and sieves ▪ metal detection and X-ray detection equipment ▪ magnets ▪ optical sorting equipment ▪ other physical separation equipment (e.g. gravity separation, fluid bed technology).

4.10.3 Metal detectors and X-ray equipment

4.10.3.1	Metal detection equipment shall be in place unless risk assessment demonstrates that this does not improve food safety. Where metal detectors are not used, justification shall be documented. The absence of metal detection would only normally be based on the use of an alternative, more effective method of protection (e.g. use of X-ray, fine sieves or filtration of products).
4.10.3.2	Rejection device /belt stop system / in-line detectors
4.10.3.3	Procedures for the operation and testing of MD and X-Ray equipment
4.10.3.4	Metal detector testing procedures
4.10.3.5	X-ray testing procedures

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FOOD SAFETY issue 9 Foreign-body detection and removal equipment

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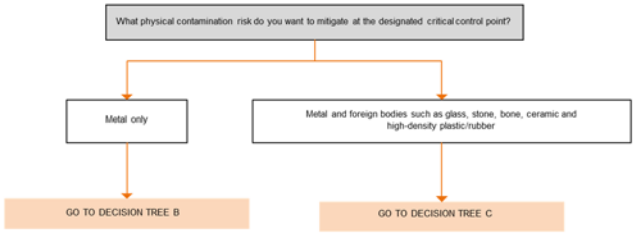

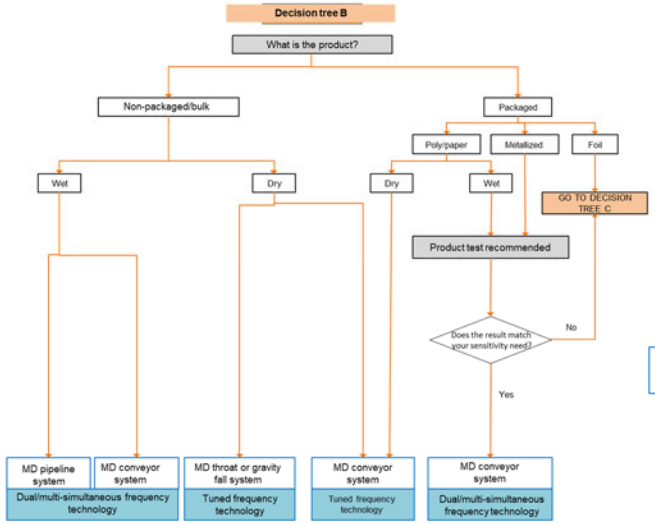

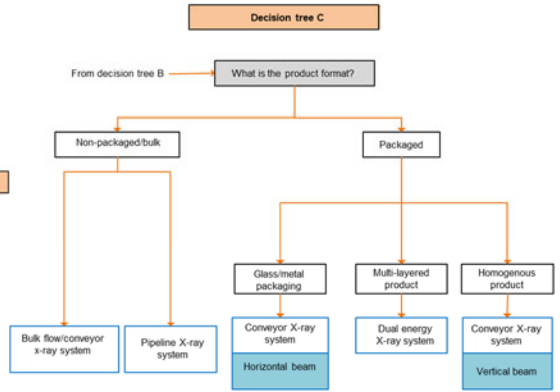

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FOOD SAFETY issue 9 Foreign-bodies detection and removal equipment as CCP

2.9 Establish validated critical limits for each CCP (equivalent to Codex Alimentarius Step 8, Principle 3)

2.9.1	For each CCP, the **appropriate critical limits** shall be defined in order to identify clearly whether the process is in or out of control. Critical limits shall be: ▪ measurable wherever possible (e.g. time, temperature, pH) ▪ supported by clear guidance or examples where measures are subjective (e.g. photographs).
2.9.2	The HACCP food safety **team shall validate each CCP, including critical limits**. Documented evidence shall show that the control measures selected and critical limits identified are capable of consistently controlling the hazard to the specified acceptable level.

2.10 Establish a monitoring system for each CCP (equivalent to Codex Alimentarius Step 9, Principle 4)

2.10.1		A **monitoring procedure** shall be established for each CCP to ensure compliance with critical limits. The **monitoring system shall be able to detect loss of control of CCPs** and, wherever possible, provide information in time for corrective action to be taken. As a guide, consideration may be given to the following, although this is not an exhaustive list: ▪ online measurement ▪ offline measurement ▪ continuous measurement (e.g. thermographs, pH meters). Where discontinuous measurement is used, the system shall ensure that the sample taken is representative of the batch of product.
2.10.2		**Records** associated with the monitoring of each CCP shall include the date, time and result of measurement, and shall be signed by the person responsible for the monitoring and verified, when appropriate, by a suitably competent and authorised person. Where records are in electronic form, there shall be evidence that records have been checked and verified.

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FOOD SAFETY issue 9 TOP 5 Non-Conformities

4.10.3.4	Metal detector testing procedures
4.10.3.2	Metal detector or X-ray equipment
4.10.3.3	Procedures for the operation and testing of the metal detection or X-ray equipment
4.10.2.2	Filters and sieves inspection
4.10.4.1	Magnets

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FOOD SAFETY issue 9 TOP 5 Non-Conformities

TOP 1

4.10.3.4	Metal detector testing procedures shall, at a minimum, include: • use of test pieces incorporating a sphere of metal of a known diameter selected on the basis of risk. The test pieces shall be marked with the size and type of test material contained • tests carried out using separate test pieces containing ferrous metal, stainless steel and typically non-ferrous metal, unless the product is within a foil container where a ferrous-only test may be applicable • a test to prove that both the detection and rejection mechanisms are working effectively under normal working conditions • tests of the metal detector by passing successive test packs through the unit at typical line operating speed • checks of failsafe systems fitted to the detection and rejection systems. In addition, where metal detectors are incorporated on conveyors, the test piece shall be passed as close as possible to the least sensitive area of the metal detector (usually the centre of the metal detector aperture). Wherever possible, the test piece shall be inserted within a clearly identified sample pack of the food being produced at the time of the test. Where in-line metal detectors are used, the test piece shall be placed in the product flow wherever this is possible, and the correct timing of the rejection system to remove identified contamination shall be validated. Testing of in-line metal detectors shall be completed during both line start-up and at the end of the production period.

Lack of control / fail of rejection mechanism

Location of test pieces

Size of the test pieces

Test conducted out of the typical line operation speed

Control not conducted at the least sensitive area of the metal detector

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FOOD SAFETY issue 9 TOP 5 Non-Conformities

TOP 2

4.10.3.2	The metal detector or X-ray equipment shall incorporate one of the following: • an automatic rejection device, for continuous in-line systems, which shall divert contaminated product either out of the product flow or to a secure unit accessible only to authorised personnel • a belt stop system with an alarm where the product cannot be automatically rejected (e.g. for very large packs) • in-line detectors which identify the location of the contaminant to allow effective segregation of the affected product.

Insecure containers

Malfunction of belt stop system

Ineffective segregation of the affected products

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FOOD SAFETY issue 9 TOP 5 Non-Conformities

TOP 3

4.10.3.3	The site shall establish and implement procedures for the operation and testing of the metal detection or X-ray equipment. This shall include, at a minimum: • responsibilities for the testing of equipment • the operating effectiveness and sensitivity of the equipment and any variation to this for particular products • the methods and frequency of checking the detector • recording of the results of checks.

Incomplete operations and testing procedures

Lack of records

Incomplete records

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Adam Green
XR E-Platform &
Market Manager

Foreign Bodies

How Product Inspection Equipment can help prevent food recalls.

METTLER TOLEDO

Why the Need for Contamination Detection?

To **PROTECT AGAINST** damage to brand reputation

To **REDUCE the RISK** of contaminated products reaching supermarket shelves and consumers' tables

To help **AVOID** failed audits or loss of contracts

To **PROTECT** expensive equipment further downstream

Understanding Potential Contamination Risks

Risk assessments are critical to identifying appropriate product inspection solutions

Metal	Stones	Dense Rubber / Plastic	Glass	Bone

Additional points to consider.....

1

- **Metal Detection**
  - Can detect metal contaminants only
  - Can be subject to "product, e.g. wet or dry product and orientation effect"

2

- **X-ray Inspection**
  - Can detect more than metal contaminants
  - Can be subject to material density and orientation effect"

For internal use - Confidential

Different Insertion and Critical Control Points

Contamination risks should be kept as low as can reasonably be achieved by following good practices, are all risks at each CCP the same?

Goods in:

- Eliminate potential risks at the earliest possible stage
- Protect upstream equipment
- Reduce costs of manufacturing products which may have contaminants inside
- Reduce product waste and increase profitibality

- Eliminate

- Prevent

- Detect

In Process:

- Improved contamination detection
- Rework contaminated product and reduce waste

End of Line:

- Final product quality checks
- Brand protection

Why Metal Detection?

Modern metal detectors are highly sensitive and can be installed at several points along the line

Metal detection systems can detect:

- Ferrous metals
- Non-ferrous metals
- Stainless steel

Typical Critical Control Points for MD:

- At the **front-end** of production for early contaminant detection
- **In-process**, to prevent product waste or the need for rework

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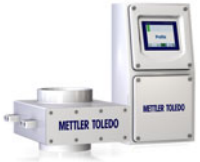
Metal Detection Portfolio



Conveyorized

- Bulk, unpacked and wrapped foods

Gravity Fall

- Flour
- Grains
- Powders

Throats

- Potato chips
- Confectionary

Pipeline

- Soups, sauces, baby food
- Pumped sausage meat

Pharma

- Tablets
- Capsules
- Powders

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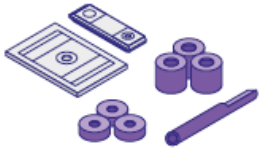
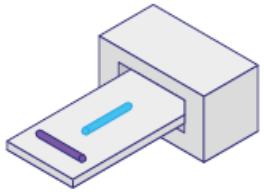
Factors That Contribute to Metal Detection Sensitivity Performance

When measuring the sensitivity of a metal detector, a test piece must be reliably detectable when passed through the center of the aperture.



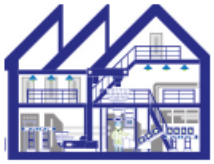
Metal Type



Orientation Effect

Aperture Size and Product Positioning

Packaging Material



Environmental Conditions

Product Characteristics

Processing Speed

Detector Frequency

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Why X-ray Inspection?

X-ray inspection systems detect a variety of contaminants and conduct quality checks

X-ray technology can detect the following contaminants:

- Metals
- Glass
- High-density rubber and plastics
- Calcified bone
- Mineral stone

NB: Materials with a lower density than water are undetectable by X-ray technology

Typical Critical Control Points for XR:

- **In-process**, to prevent product waste
- At **end-of-line**, to perform final quality and integrity checks

	Typical Food Contaminant	Typical Density g/cm³	Detectability
	Wood, stalks, insects, fruit stones	0.7	Typically not detectable
	Low density plastics	0.9 - 1.2	
	Water (reference)	**1.0**	**Typical food density**
	Dense rubber, bone, agglomerates	2.5	Detectable in sizes typically >3mm
	Glass ('low mineral'), ceramics	2.5	
	Aluminium	2.7	Detectable in sizes typically >2mm
	Mineral stone, dense plastics	3.0	Detectable in sizes typically >0.5mm depending on material and product
	Glass ('high mineral')	6.0	
	Non-ferrous metal	7.5	
	Ferrous metal and stainless steel	7.5 - 8.0	
	Lead	11.30	
	Gold	19.30	

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X-ray Inspection Portfolio

Bulk Flow	Pumped Products	Loose flow	Tall Rigid Containers	Packaged
▪ Loose unpackaged bulk products	▪ Liquids ▪ Slurries ▪ Semi-solids	▪ Unpackaged frozen formed products	▪ Cardboard / plastic Cartons ▪ Metal Cans ▪ Glass / Ceramic	▪ Individually wrapped ▪ Small Single Packs ▪ Multi / Large packs ▪ Continuous Web

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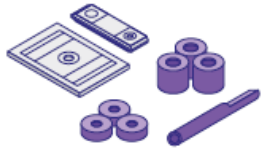
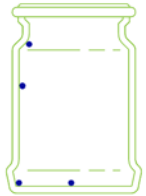
Factors That Contribute to X-ray Inspection Sensitivity Performance

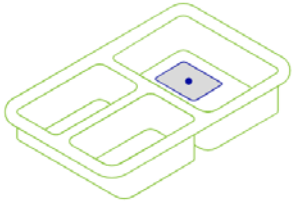
When measuring the sensitivity of an X-ray inspection system the control of different test pieces is key, specifically lower density test pieces such as glass



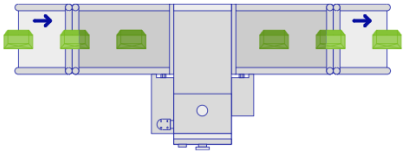
Contamination Type



The Location of the Contamination vs Dense Packaging



Product Height



Product Presentation

Product Characteristics

Processing Speed

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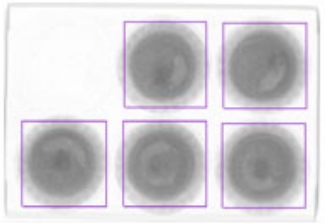
Simultaneous Product Integrity Checks X-ray Can Perform

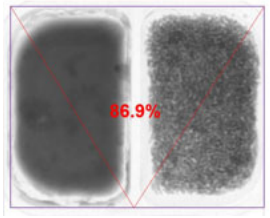
Completeness Check

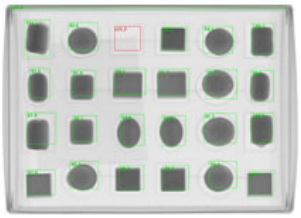
Overall Product Fill Level

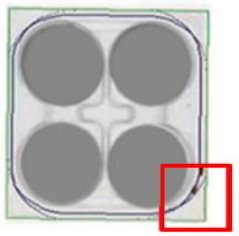
Individual Product Fill Level

Product Trapped in Seal









- **Other checks include**: Product dimension checks, clip detection, damaged products, caps / closures in place

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Contamination Solutions for Different Applications

Both contamination solutions have different strengths in different applications

	Bulk	Pumped	Loose Flow	Gravity Fall / Vertical Filling	Metal Cans	Metalised Packaging	Cardboard / Plastic Packaging	Glass / Ceramic Packaging
Metal Detection	✓	✓	✓	✓	✗	– *	✓	✗
X-ray Inspection	✓	✓	✓	✗	✓	✓	✓	✓
Metal Detection Contamination Detection	**Metal**							
X-ray Inspection Contamination Detection	**Metal / Stones / Glass / Ceramics / Bone / Dense Plastics & Rubbers**							

* Metal detection sensitivity impacted by metalised packaging

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Metal Detection or X-ray Inspection...

Metal Detection is often the best choice when:

- Metal is the only likely contaminant risk
- Aluminum is a specific contaminant risk
- Products must be fed under gravity-fall conditions
- There is a need to protect downstream equipment

X-ray Inspection is the preferred choice when:

- Non-metallic contaminants could be present
- Product is in metal packaging
- Additional quality and integrity checks are needed

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Benefits of Each Technology

Metal detection

- High sensitivity to metallic contaminants
- Incredibly reliable as a CCP
- Easy set-up and fast product changeovers
- Durable system needing little maintenance

X-ray inspection

- Detects multiple types of foreign body contaminants
- Performs product completeness checks
- Highly sensitive

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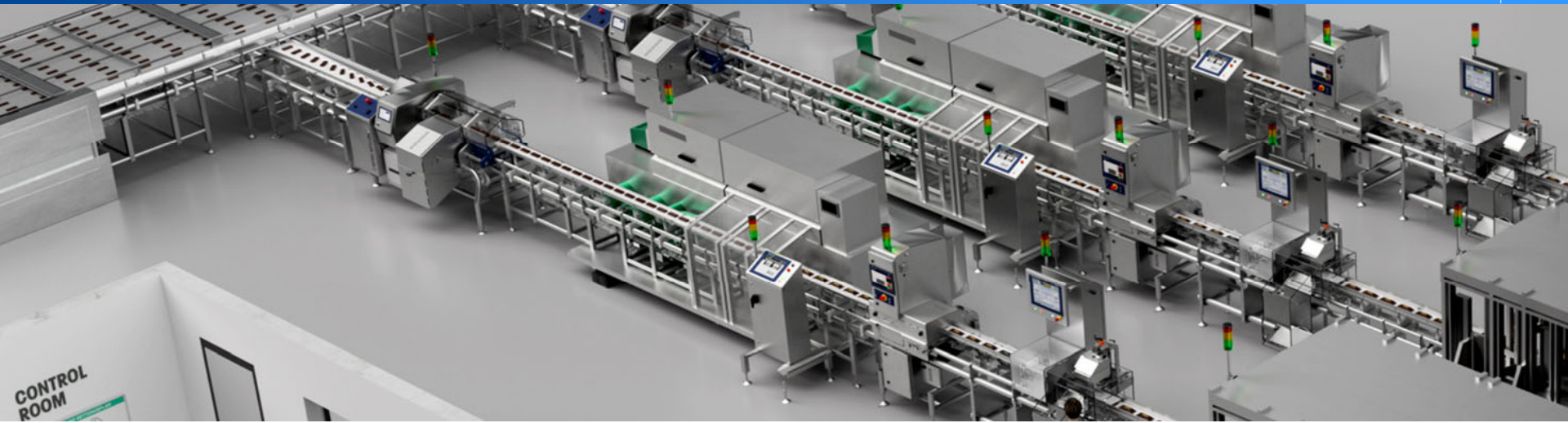
...or Both?



X-ray inspection **combined** with metal detection is particularly useful when:

- There is a mix of different likely contaminants e.g. metal, aluminium and other low dense materials
- The risk of contaminants varies at different points on your production line
- Inspection of both unwrapped and wrapped products is required
- There is a range of Critical Control Points (CCPs) along the line

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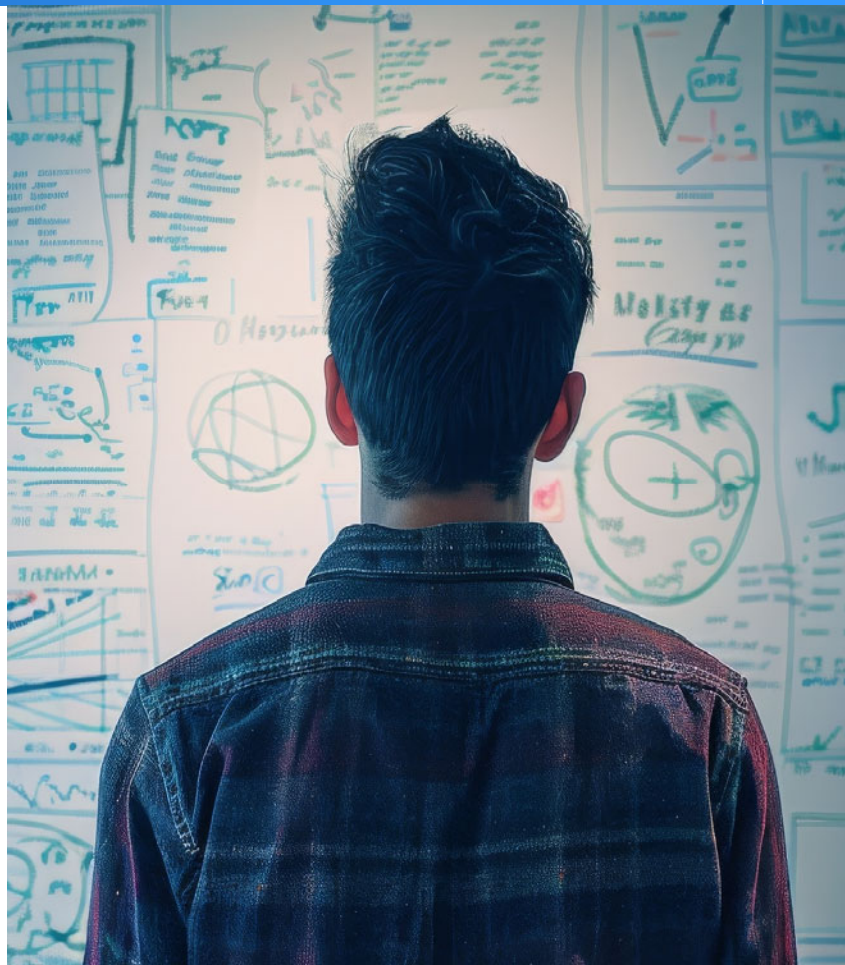
Conclusion

Metal detection, x-ray inspection or both?

Each manufacturer has their own challenges and there is no one-size-fits-all solution.

Consider the following:

- Contaminants types
- Location of CCPs
- Product format
- Sensitivity standards
- Additional quality checks
- Minimizing waste
- Productivity targets and OEE
- Total Cost of Ownership (TCO)



Further information and support

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Foreign bodies: Further information & guidance

EHEDG Guideline 8, Hygienic Design Principles, outlines five key principles essential for minimising foreign body risks.

Foreign body risk management is addressed in EHEDG Guideline 58.
EHEDG: Guideline Catalogue

PowerPoint Presentation

https://www.ifst.org/sites/default/files/Nestle%20Foreign%20Body%20PD%20Best%20Practices%20For%20Our%20Suppliers%202019%20Final.pdf

https://pmc.ncbi.nlm.nih.gov/articles/PMC10558841/#:~:text=4.,neutralize%20the%20hazard%20before%20consumption.

Foreign bodies: Further information & guidance

- Control of foreign bodies from cleaning equipment and utensils - Vikan
- Understanding SQF Edition 9 Changes from a Hygiene & Sanitation Perspective | Vikan
- Vikan Metal Detectable Plastics Knowledge Hub

Vikan

WHITE PAPER

Metal detectable plastics use in cleaning tools and utensils - does it reduce foreign body risk?

Debra Smith, Global Hygiene Specialist, Vikan A/S, Ravnevej 1, 7900 Sæby, Denmark

BACKGROUND

Foreign body contamination of foods can be a safety or quality issue, or both. Regardless, if a food is contaminated by a foreign body, the repercussions for the food business can be expensive and damaging.

Metal detection is a well established and effective method of reducing the risk of metal fragments in commercial food products. Control of plastic foreign bodies is more difficult. Metal detectable plastics have been developed with the intention that metal detectors can also be used for their detection but how detectable are these plastics?

In collaboration with Detectronic and Mettler Toledo, manufacturers of metal detection systems, and Zwick Roell, a materials testing group, Vikan have investigated the detectability of metal detectable plastics.

The investigations focussed on two key areas,
1) the detectability of different metal detectable plastics and
2) the detectability, durability, functionality and cleanability of metal detectable plastic brush bristles.

DETECTION TECHNOLOGY

Many food manufacturers are unaware that the metal detectability of any metal containing foreign body will depend on a number of things, including the;

- vibrations (physical and electronic)
- metal content of the contaminant, both the quantity and type of metal
- size of the metal containing contaminant
- orientation of the metal containing contaminant
- food product – size, composition
- food packaging
- speed of the conveyor belt
- detector used
- detector calibration

Each of these interfering factors has an effect on the detectability of the metal containing contaminant and the interferences are often cumulative and independently variable, as illustrated in Figure 1.

Figure 1. Factors affecting the metal detectable threshold

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Vikan's food safety webinar series

Topic:

Colour-Coding for Contamination Control

Date & time:

26 February 2026
3 p.m. CEST (9 a.m. EST)

Presenter:

TBA

What's next?