

FOREIGN BODY PREVENTION IN POWDER PROCESSES

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Introduction
Product Recall Data
Prevention
Process Overview
Foreign Bodies
Solutions

- When should a product be recalled...
- Legal requirements: Articles 14 and 19 of Regulation (EC) No. 178/2002
- In determining whether any food is unfit for human consumption, regard shall be had to whether the food is unacceptable for human consumption according to its intended use, for reasons of **contamination**, whether by extraneous matter or otherwise, or through putrefaction, deterioration or decay
- If a food business operator considers or has reason to believe that a food which it has imported, produced, processed, **manufactured** or distributed is not in **compliance with the food safety requirements**, it shall immediately initiate procedures to **withdraw the food in question** from the market where the food has left the immediate control of that initial food business operator and inform the competent authorities thereof. Where the product may have reached the consumer, the operator shall effectively and accurately inform the consumers of the reason for its withdrawal, and if necessary, recall from consumers products already supplied to them when other measures are not sufficient to achieve a high level of health protection.
- High costs will occur

- Product recall common reasons

Reason for alert	Suggested wording
Confirmed contamination of product with salmonella/listeria monocytogenes/E.coli etc	"X product" is being recalled because salmonella/listeria monocytogenes/E.coli etc has been found
Inadequate procedures to control Clostridium botulinum	"X product" is being recalled because of concerns over procedures to control Clostridium botulinum
Confirmed contamination of product with foreign objects	"X product" is being recalled due to the presence of "foreign object"
Allergens not mentioned on the product label * "coeliac disease" should only be referenced in relation to cereals containing gluten	"X product" is being recalled because it contains "allergen ingredient" which is not mentioned on the label. This means the product is a possible health risk for anyone with "coeliac disease"/an allergy to/an intolerance to/a sensitivity to" "allergen"

- Ref - Guidance on Food Traceability, Withdrawals and Recalls within the UK Food Industry

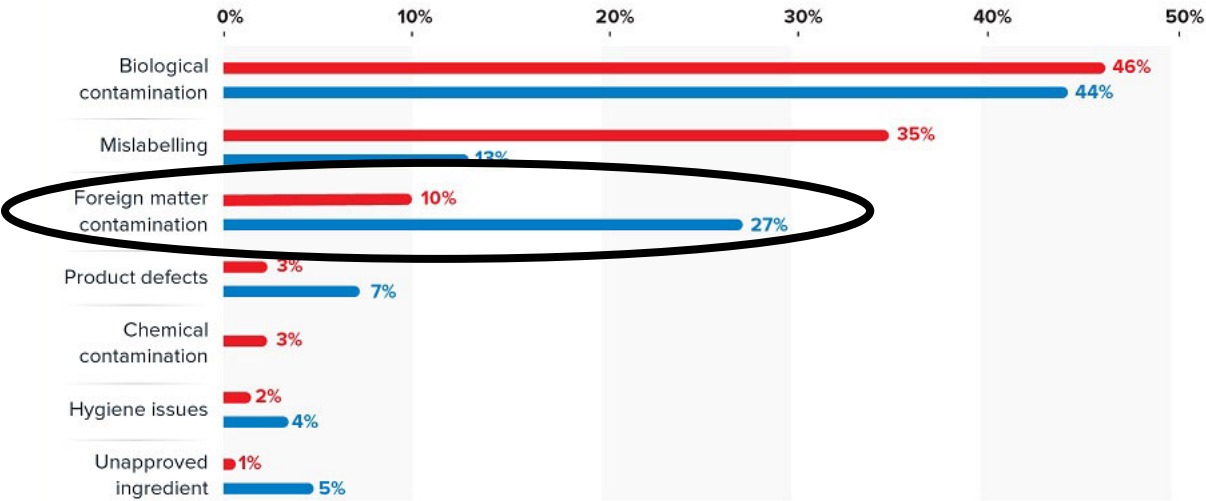
The Common Causes of Food Product Recalls

US Recalls

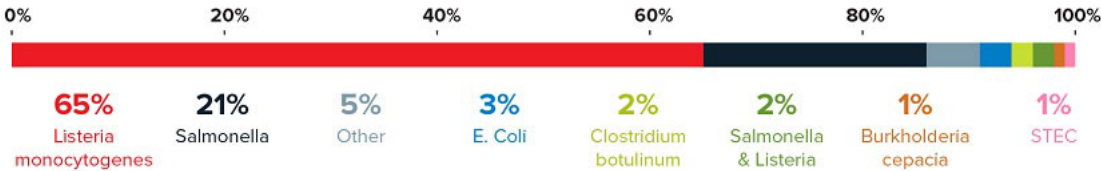
540 food products were recalled in 2016, up 24% from 437 in 2015.

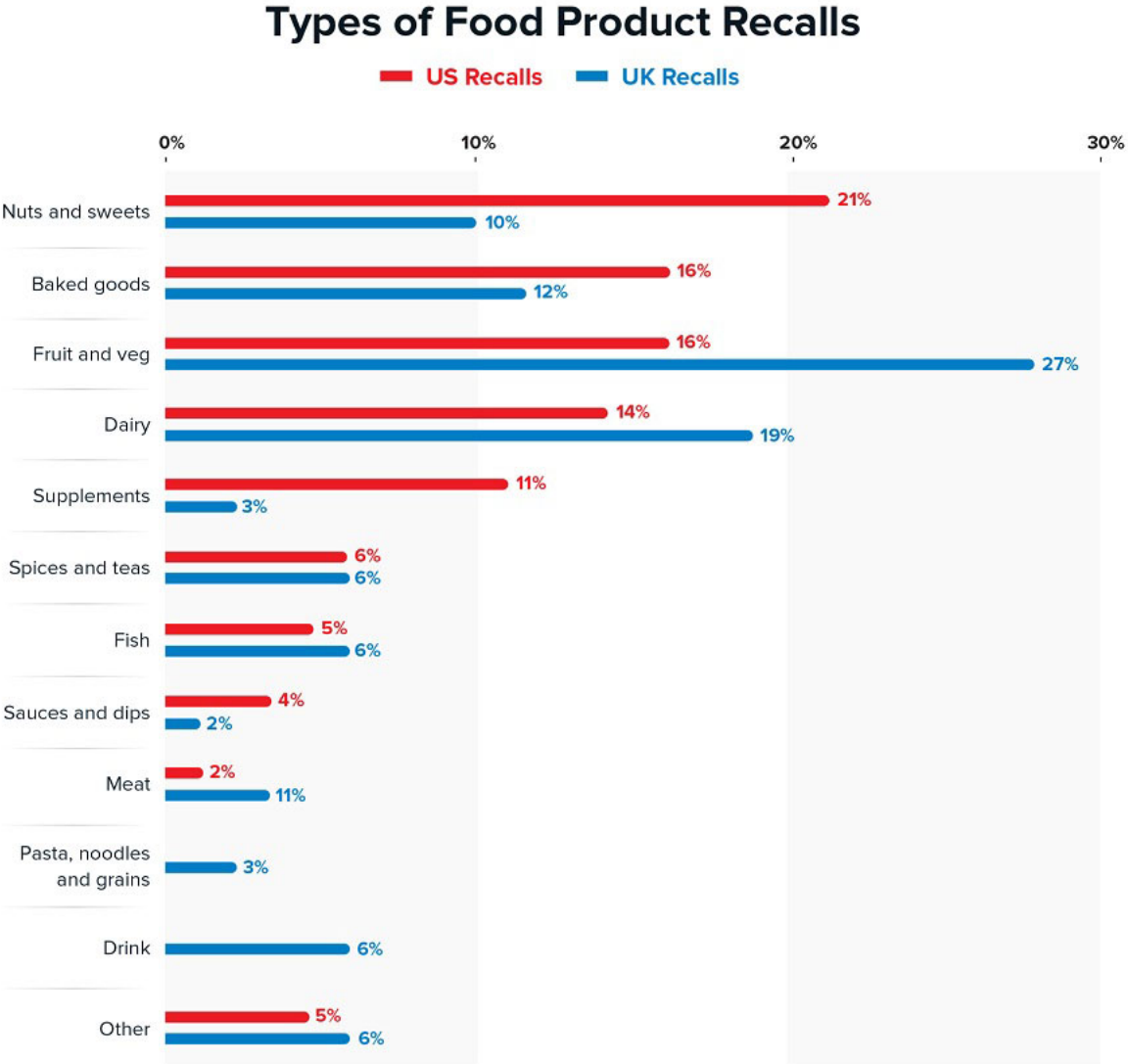
UK Recalls

84 food products were recalled in 2016, up 29% from 65 in 2015.



Contamination by Bacteria type in the US





Estimating the Minimum Direct Costs of a Recall

The minimum direct costs facing a business during a recall event can be estimated by the below model, designed by Moisés Resende-Filho and Brian Buhr:



Real World Examples in 2016

In 2016, a brand recalled 10 million pounds of flour – sold at roughly \$0.50 per pound – after it was linked to an outbreak of E. Coli.

Estimated min. direct cost of recall:



Below are real world examples using the aforementioned formula (brand names have been excluded).

50% of consumers would switch brands

20% would avoid the full product range

**15% would never buy
from the supplier again**

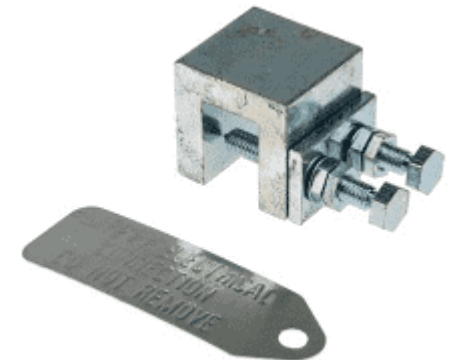
Preventative actions

- Prevention starts at the door to the factory
- Staff and visitors to wear the right PPE and garments
- Hairnets, Snoods, Coveralls – Disposable or washable
- No Jewellery – Plain ring band maybe acceptable
- No open wounds – cover with metal dectable blue plasters
- No moving part pens – metal dectable
- Changing areas with zoning
- Wash stations for hands and shoes
- Cover the above in induction videos
- Providing protection on building high flow areas



Industry Changing Parts to avoid Plastics

- Many clients are now looking where they can improve on minimizing plastic in process equipment
- Key areas
 - Logos and Stickers be omitted.
 - Plastic caps for glands and covers
 - Conduit clamps – No plastic gaskets
 - Earth straps. Select crimps without the plastic cover to the crimp end
 - Handles – Metal
 - All Gaskets and to be blue metal detectable
 - Cable ties to be blue metal detectable



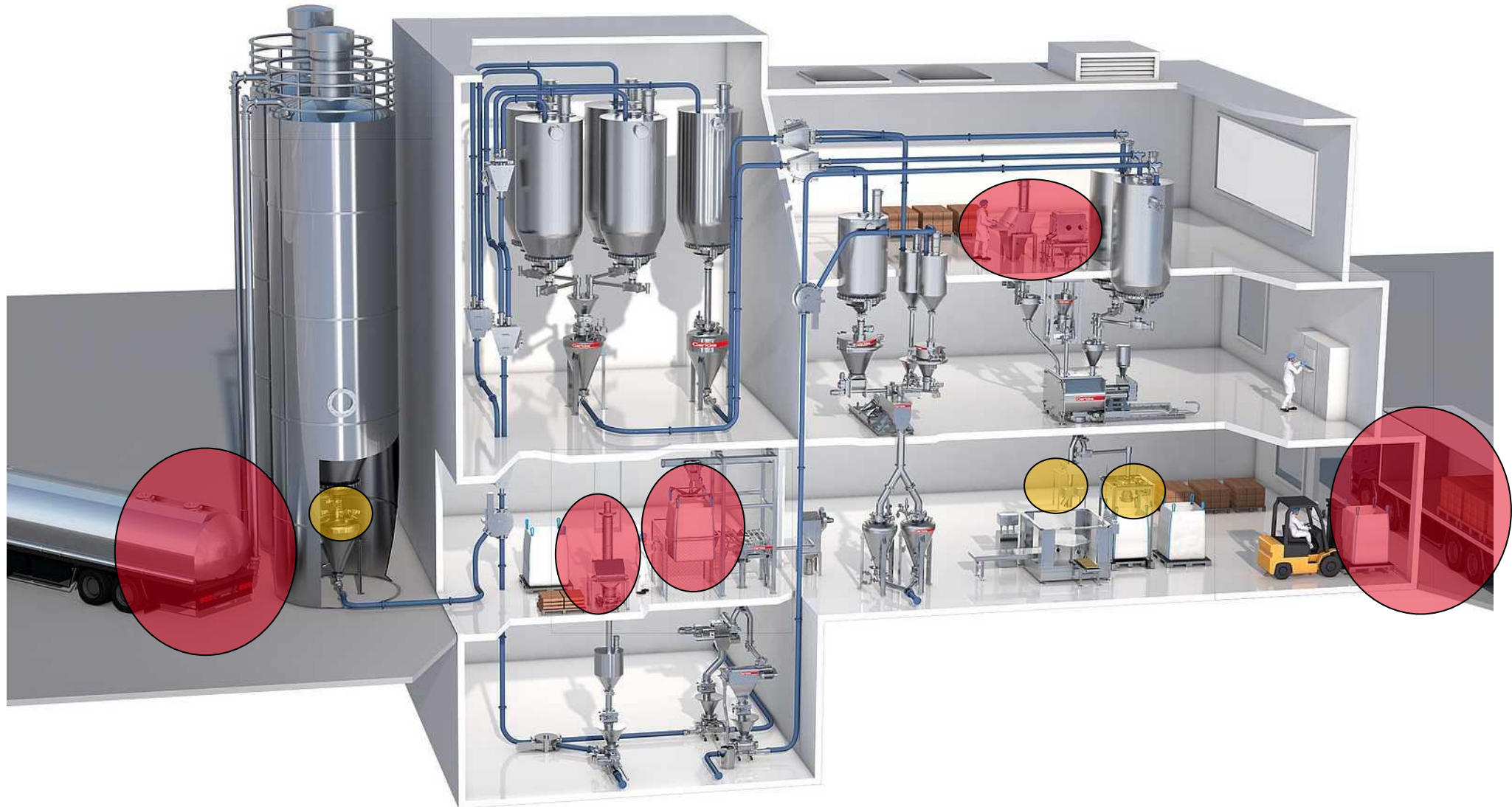
First Line of Defense: - Vendors delivering raw or packaging materials that are free from foreign bodies. - Properly equipping our vendors and Nestlé tipping lines to prevent, separate and/or detect any residual risks.

Second Line of Defense: - Processing equipment. - Practices during manufacture up to packaging. - Measures for prevention, detection and removal during processing.

Third Line of Defense: - Environment in processing areas. - Downstream steps such as warehousing and distribution.

Typical Powder Process

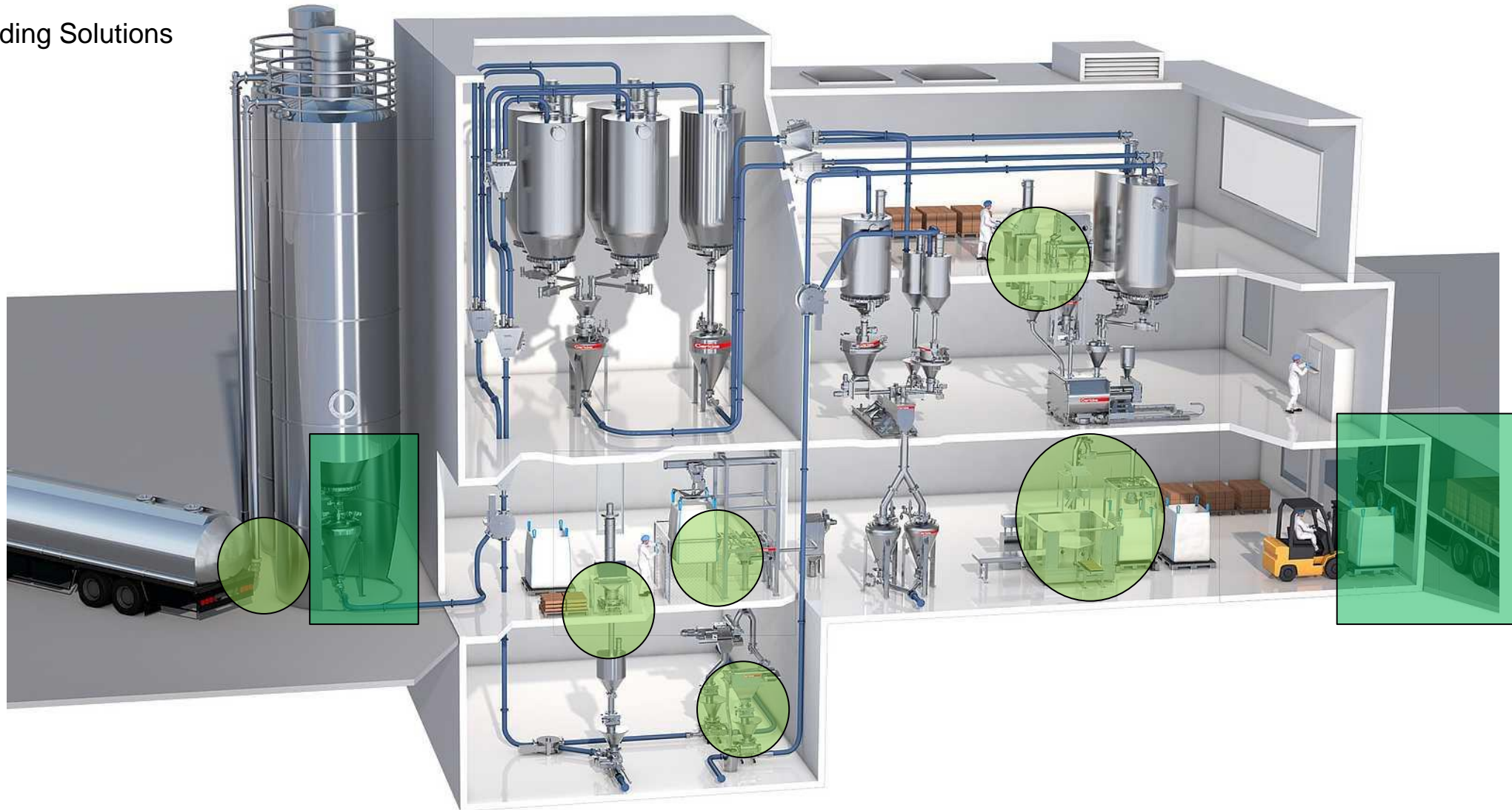




Preventative measures

● Equipment Solutions

■ Building Solutions



What are foreign bodies

- Items that should not be in the process that will cause potential harm to consumers or affecting the quality of the product



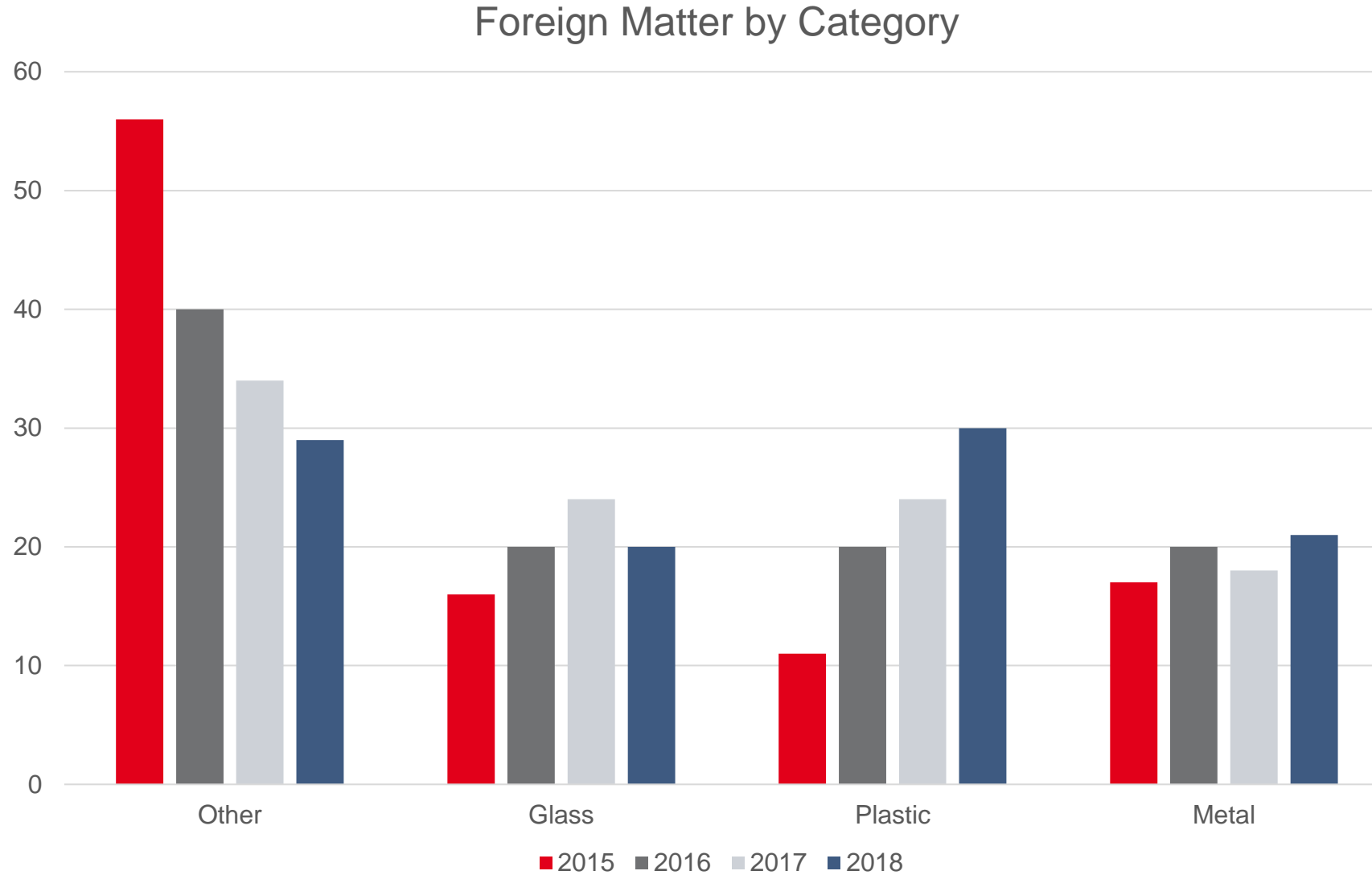
Common processes that generate foreign bodies

- Product Storage – Lava can grow overtime in the right conditions

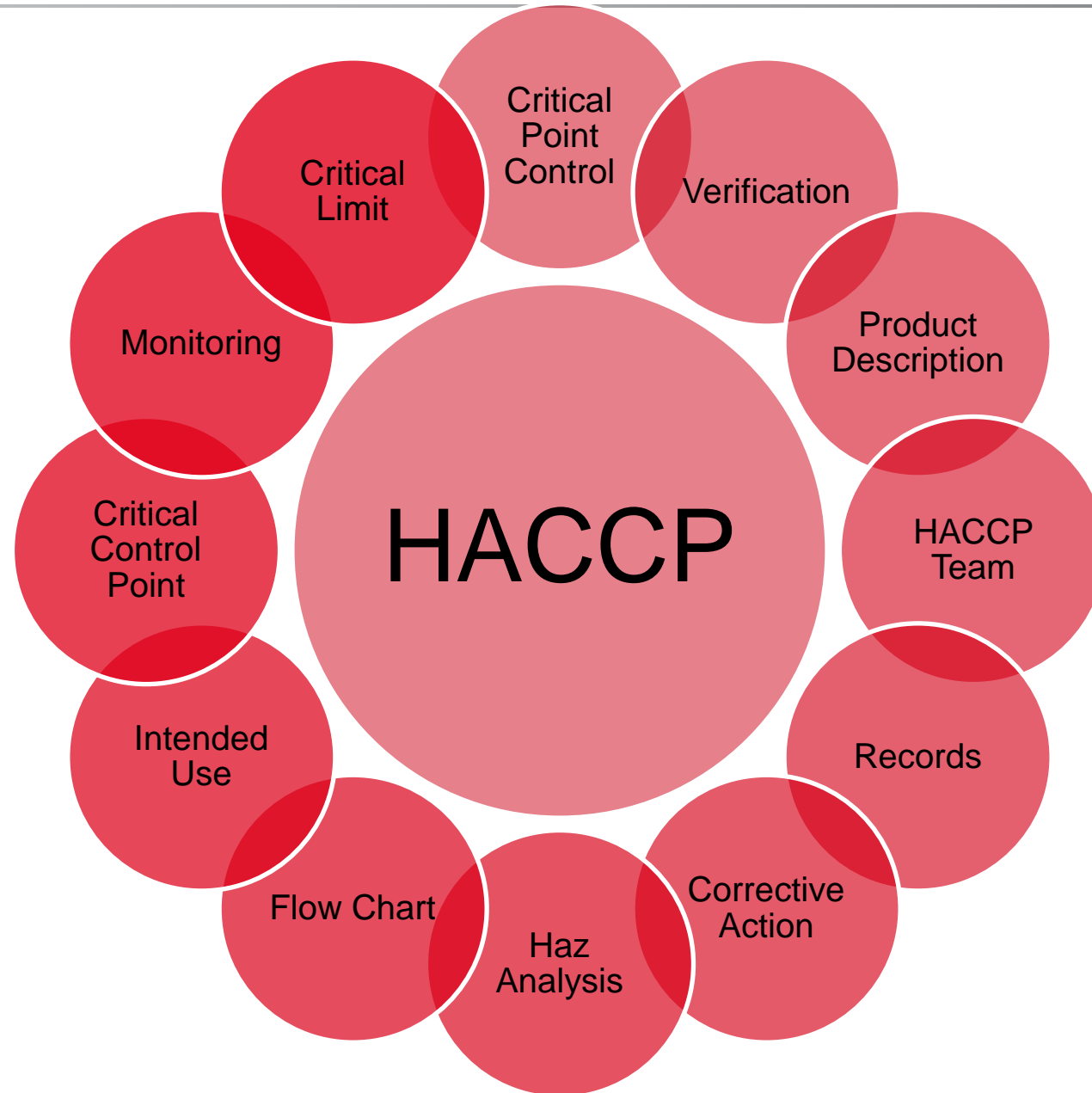


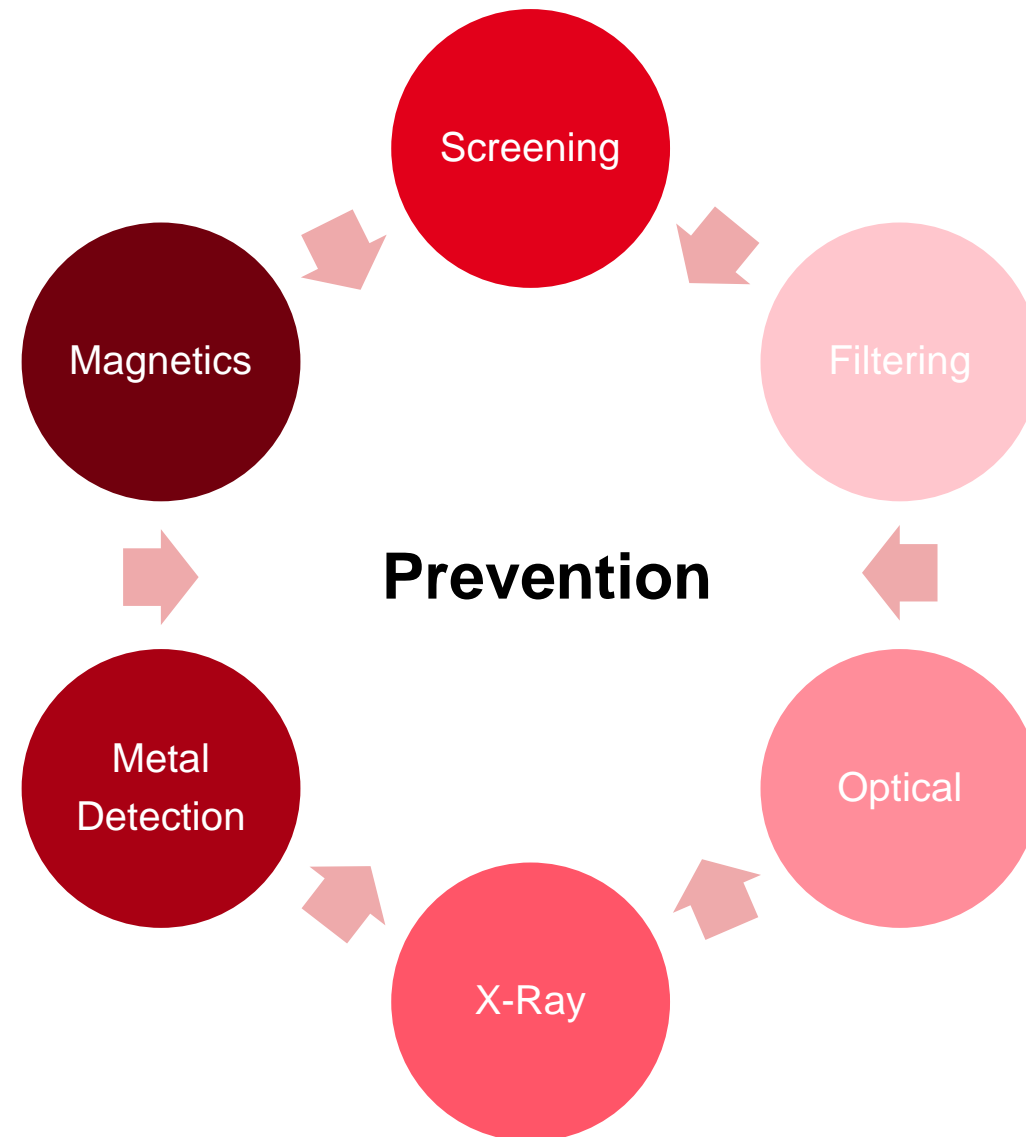
- Opening of Sacks and FIBC can lead to shreading of paper, plastic, string etc..

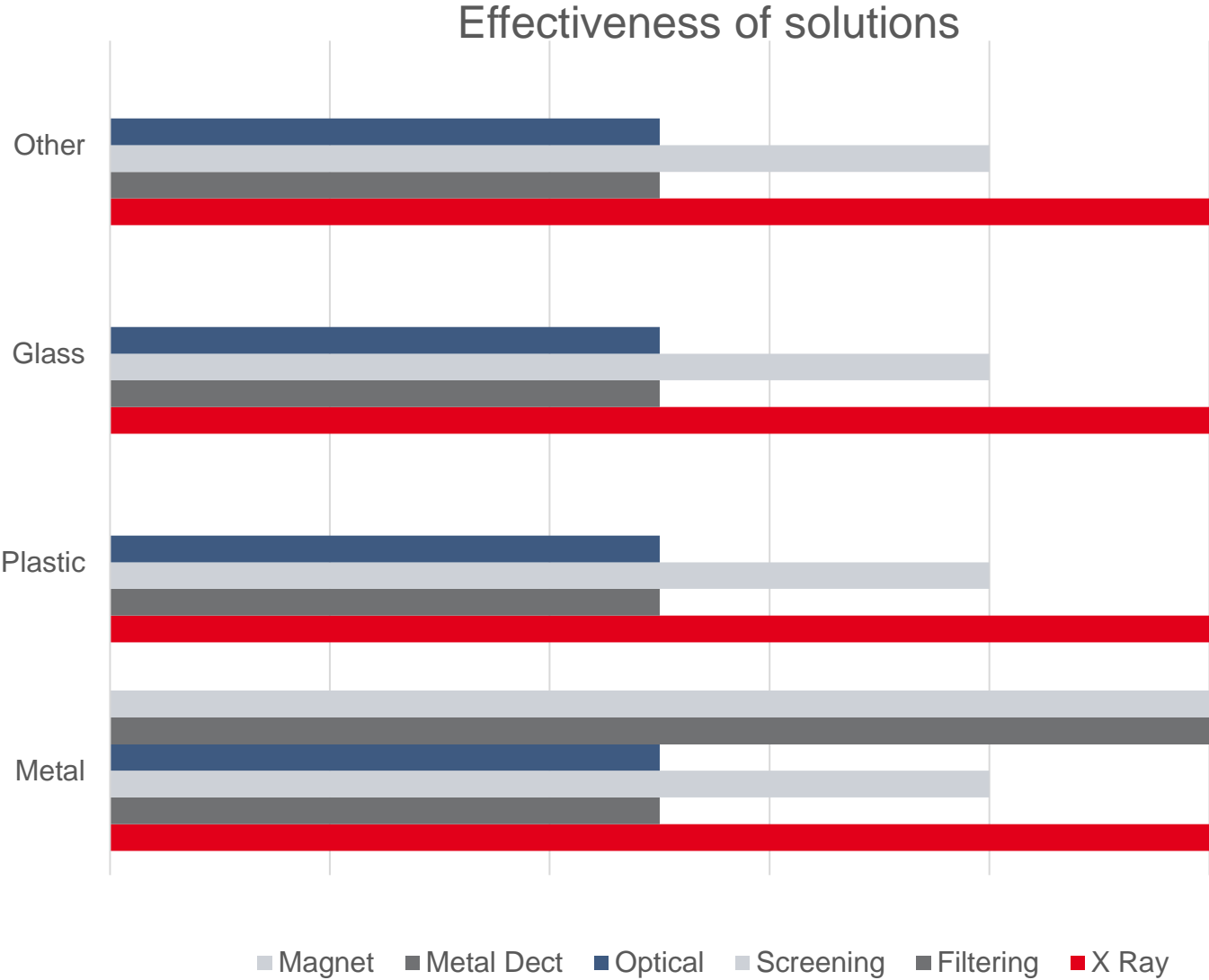


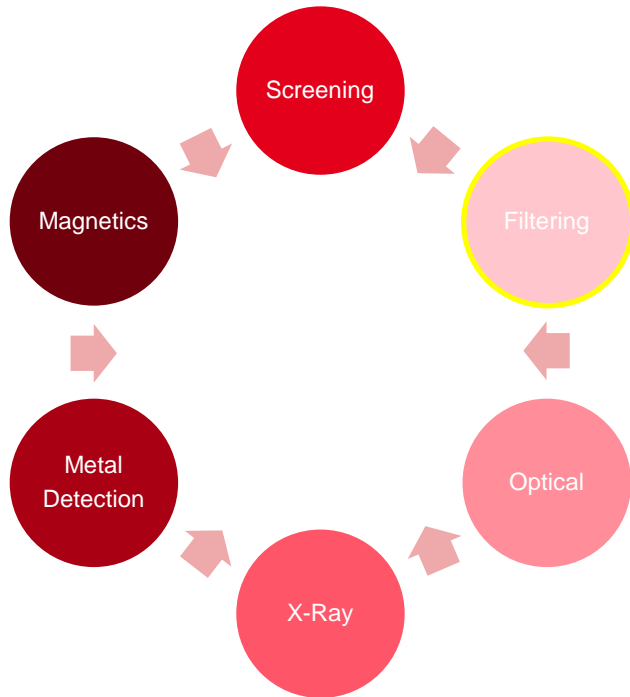


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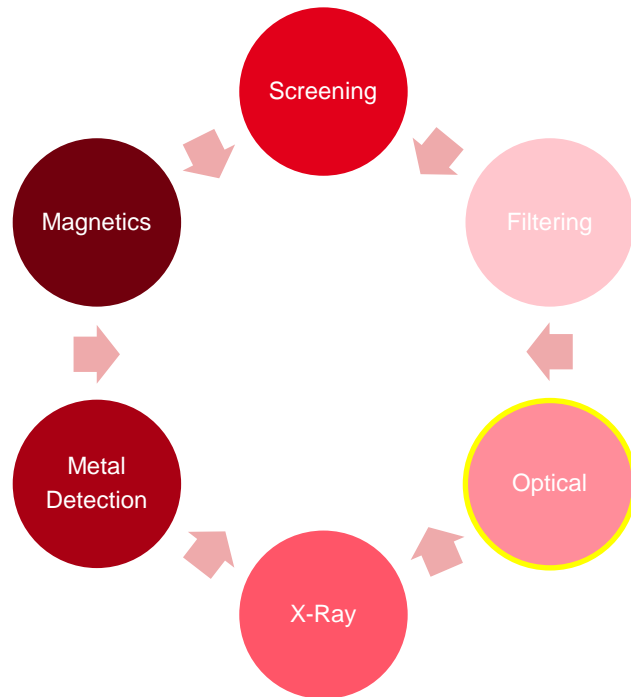






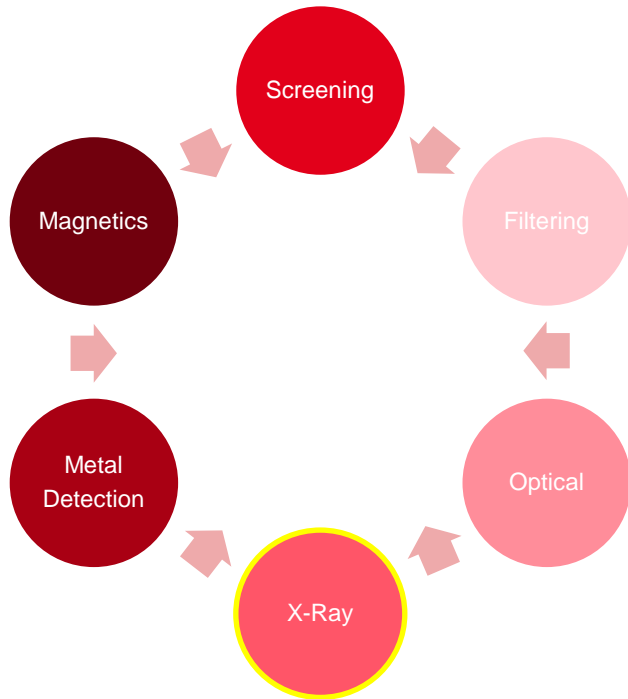
- **Filtering systems**
- Water baths
- Popular for items such as fruit & veg
- A turbulent bath encourages heavy particulates – earth / sand etc. to sink and the good product floats, causing separation
- Not effective for any absorbent products





- **Optical Inspection**
- Camera Systems
- Able to detect both flat and 3D objects and analyses for change
- Perfect for post manufacturing or simple variances for example colour or some particle variance
- Can only see what is visible so can not see underneath layers of product

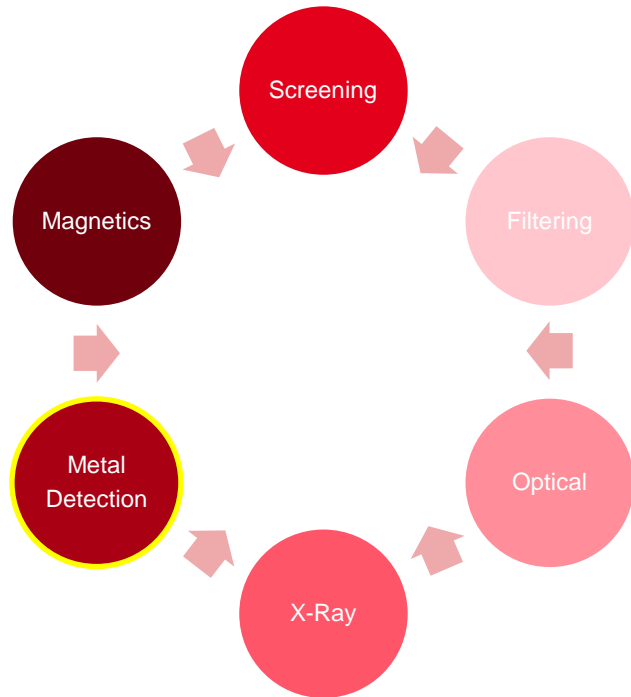




■ X-Ray Systems

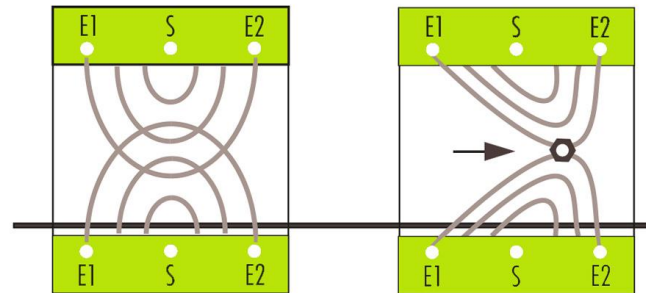
- Perfect for seeing what the human eye can not, using As the name (light waves the eye can't see) to locate contaminants.
- Commonly below 1mm and in certain cases even smaller
- Offering a alternative than metal detection because x-ray systems can detect non-metallic contaminants
- Work well in fast moving lines
- Pros – Metal, Non-ferrous metals in foil, including stainless steel, Glass
- Heavy Plastics, Ceramic
- Negatives - cant pick up Insects, Wood, Hair, Carboard & Paper



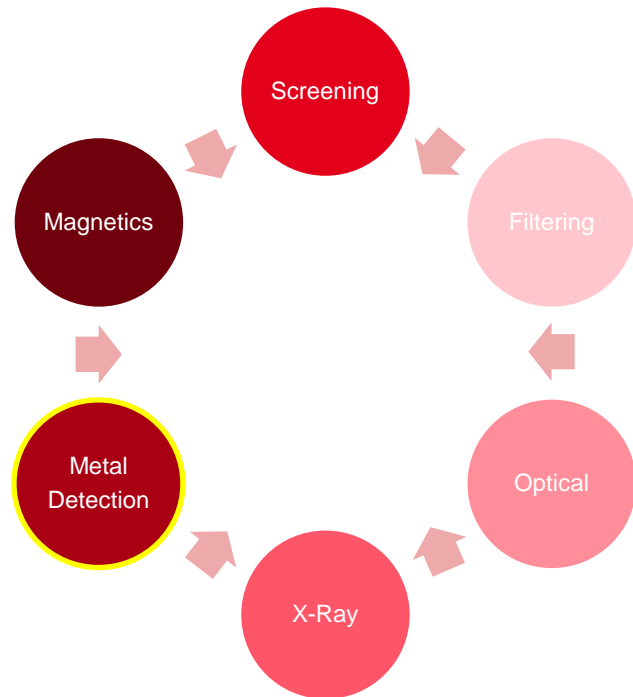


■ Metal Detection Systems

- Designed with Metal firmly in mind so not covering
- Paper, Plastic, Ceramic, Hair, Wood etc.
- Ferrous and Non Ferrous
- Working on a principle of electromagnetic field disturbance
- When a metal particle disturbs the field the system can alert and reject the particles in some cases



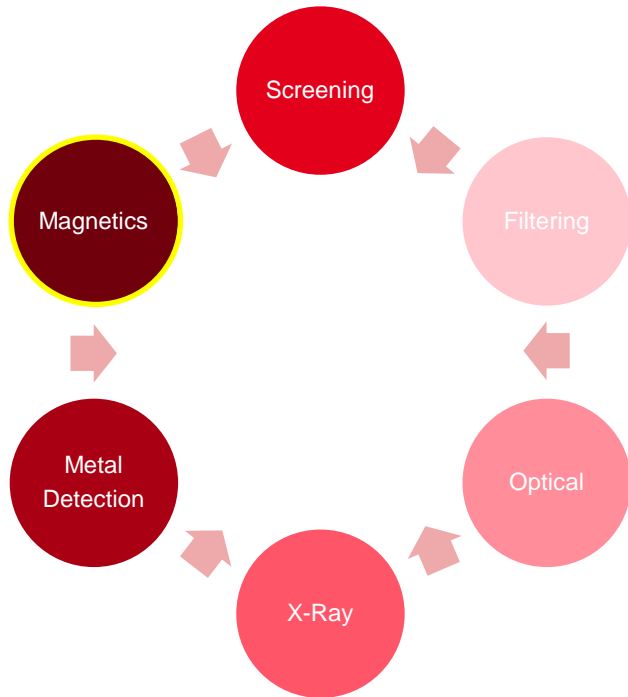
- Pick up very small metal particles alerting manufacturers to hidden dangers



■ Metal Detection Systems

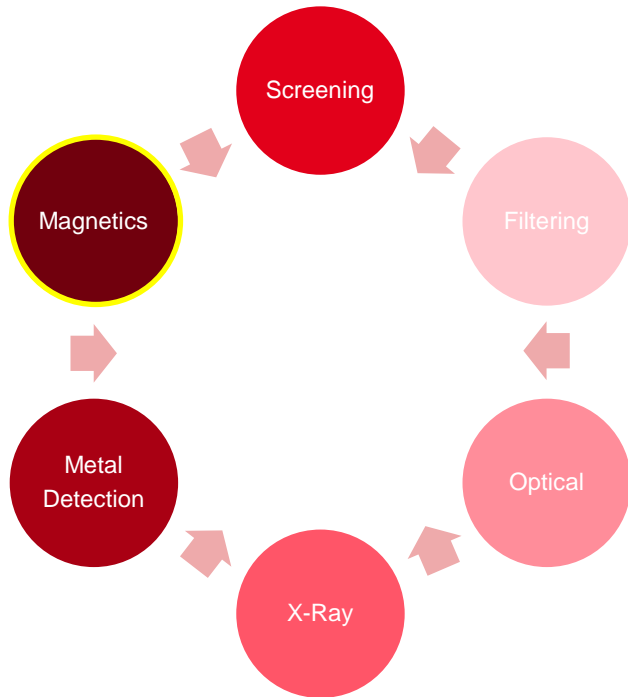
- Idea for use in final product packaging for sacks and FIBCs as a part of a suite of products
- And in the case of sacks or small packages whole media can pass through a metal detection tunnel





- **Magnetic Solutions**
- Designed with Metal firmly in mind
- Using high powered Magnets 10-12000 Gauss
- **Gauss** is a measure of **magnetic** induction and a value of density. Simply put, **Gauss** represents the number of **magnetic** field lines per square centimeter, emitted by a **magnet**. The higher the value, the more lines of **magnetism** emitted by the **magnet**

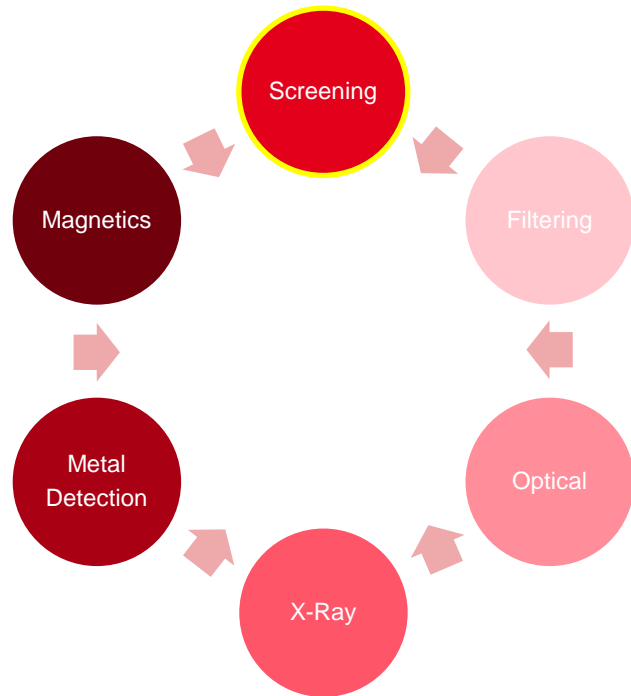




- **Magnetic Solutions**
- Work both in Gravity situations but also within pneumatic conveying and fast moving product flow 25-30m/s
- Ideal for first point of entry into a plant from a road tanker



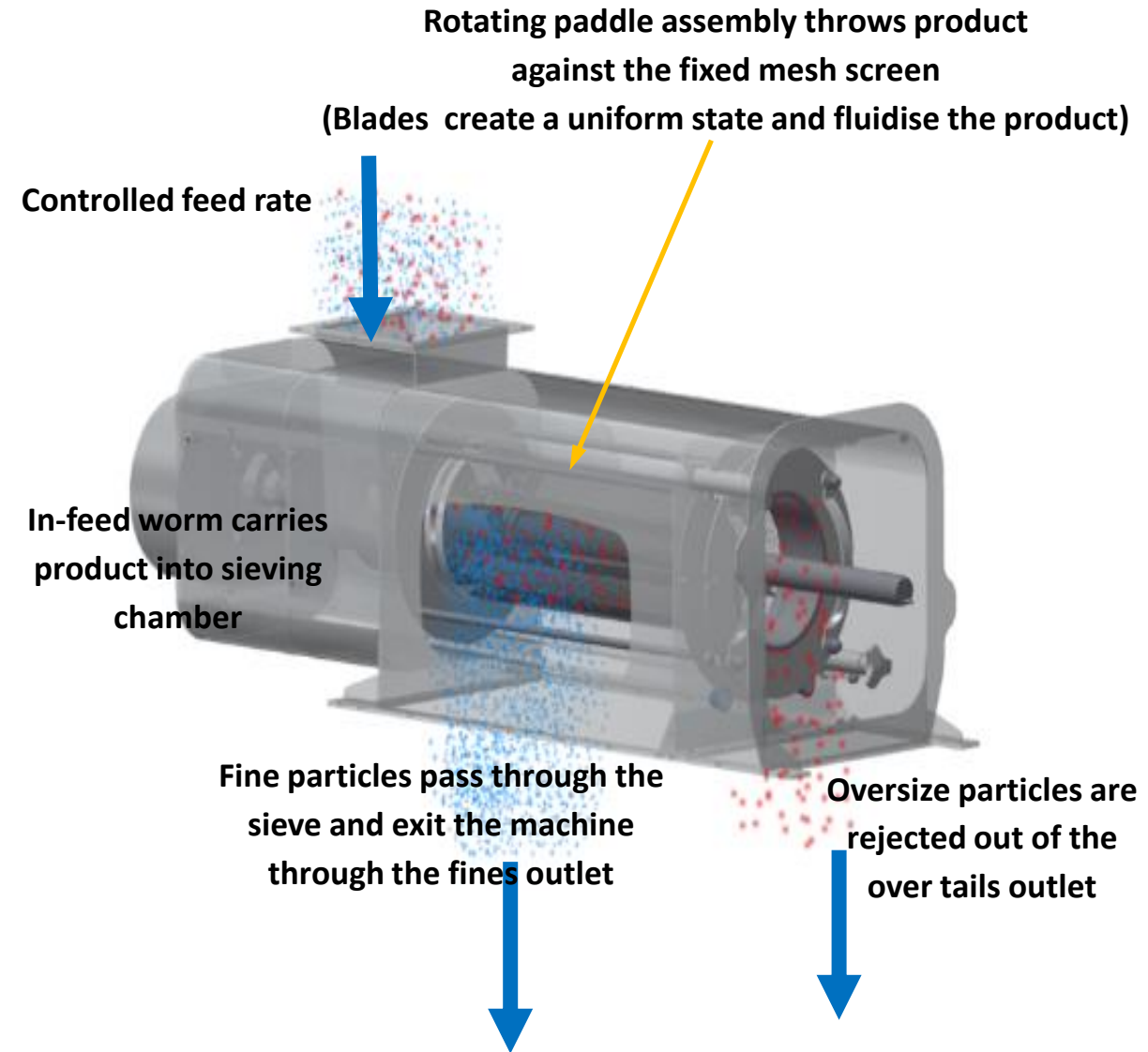
- **Screening Systems**
- A variety of solutions available



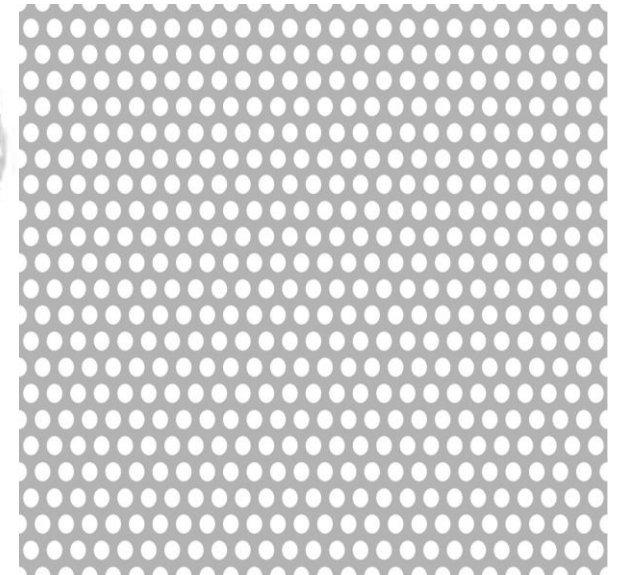
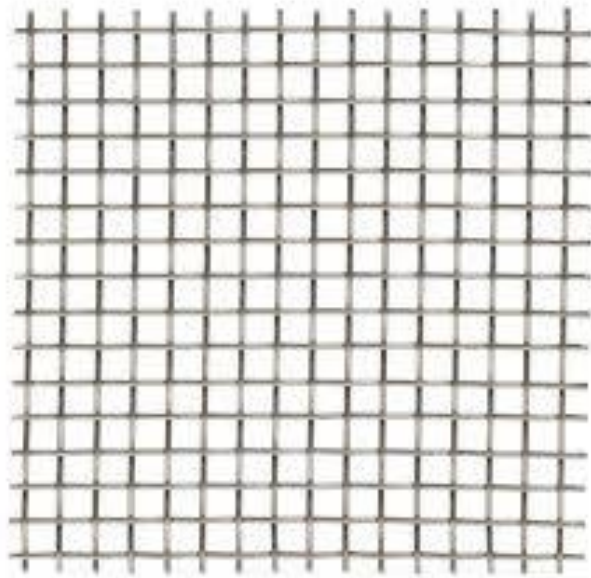
Foreign particle elimination using centrifugal sieves

Sifter

- Material fed in via a scroll to give a consistent feed
- Paddles on a shaft which spins from 1000rpm to 300rpm machine size dependent – creating a centrifugal force
- A basket fitted with various optional mesh types and size sits around the paddles
- Particles pushed outwards against the media
- Fine particles pass through the media
- Large particles – Oversize – travels down the basket and out through the oversize end of the sifter which is collected separately to keep foreign bodies away from the process.



- Nylon, Woven Wire, Wedge Wire & Perforated Plate



- To remove a product from another product you need to let the smaller particles through a hole and the large particles to be trapped. As discussed previously there are a variety of screen materials available. Below is a statement from the FDA and a link to the document

From 1972 through 1997, the FDA Health Hazard Evaluation Board evaluated approximately 190 cases of hard or sharp foreign objects in food. These include cases of both injury and non-injury reported to FDA. The Board found that foreign objects that are less than 7 mm, maximum dimension, rarely cause trauma or serious injury except in special risk groups such as infants, surgery patients, and the elderly. The scientific and clinical literature supports this conclusion.

[CPG Sec. 555.425 Foods, Adulteration Involving hard or Sharp Foreign Objects \(fda.gov\)](#)

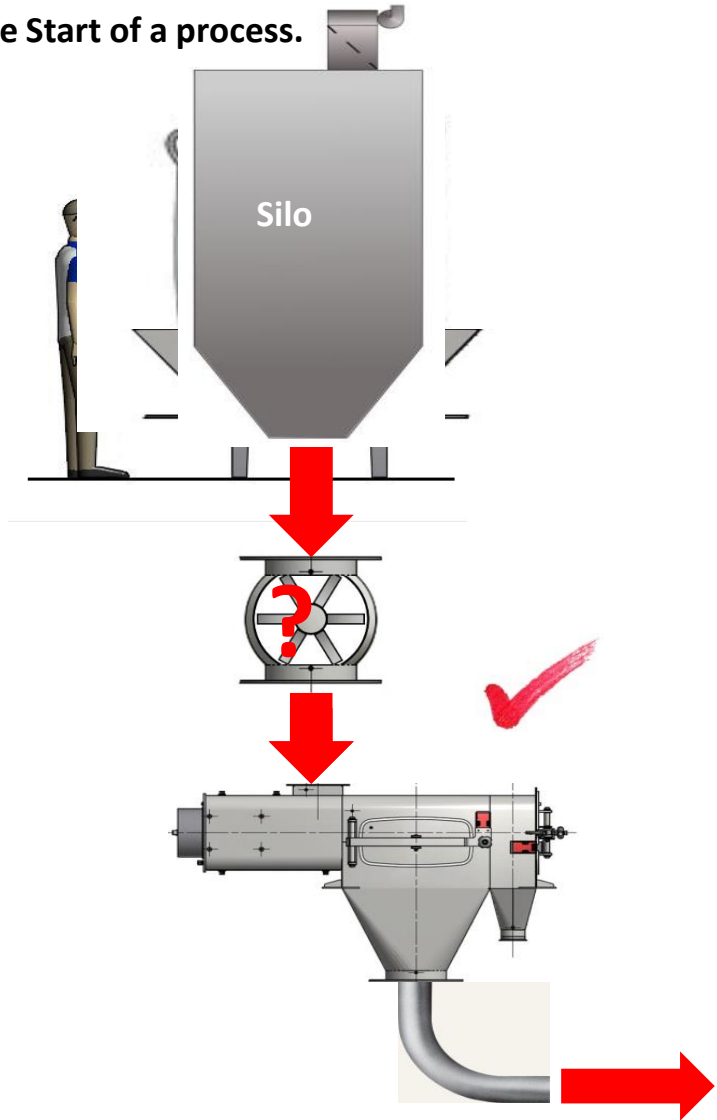
- So why do we then sieve at lower aperture sizes than 7mm if it is deemed safe. Well that is for the industry to answer but the assumption is being safe and producing a quality product is good for sales and reputation. For process large particles can also effect the final product quality in terms of outcome success of manufacturing. 2mm in any direction is often now the specification sieve manufacturers are asked to achieve.

	Nylon	WovenWire	Wedgewire	Perforated plate
Efficiency	High	High	High	Medium
Robustness (Impact)	Low	Medium	Medium	High
Open area %	High	Medium	High	Low
Cleaning	Low	Low	Medium	High
Longevity	Low	Medium	Medium/High	High

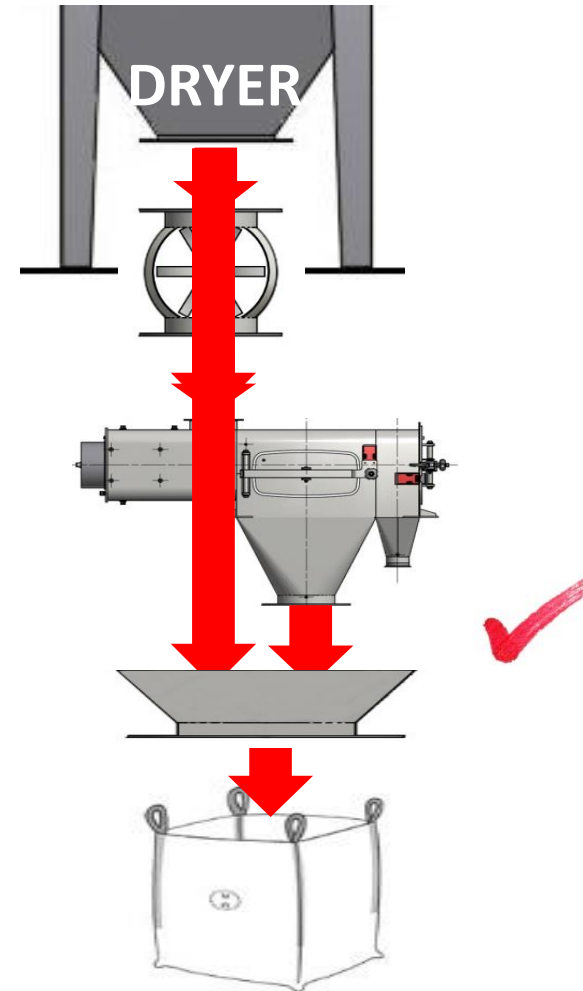
Where would you use a screening device

Sifter Location: Where to install in to a process.

At the Start of a process.

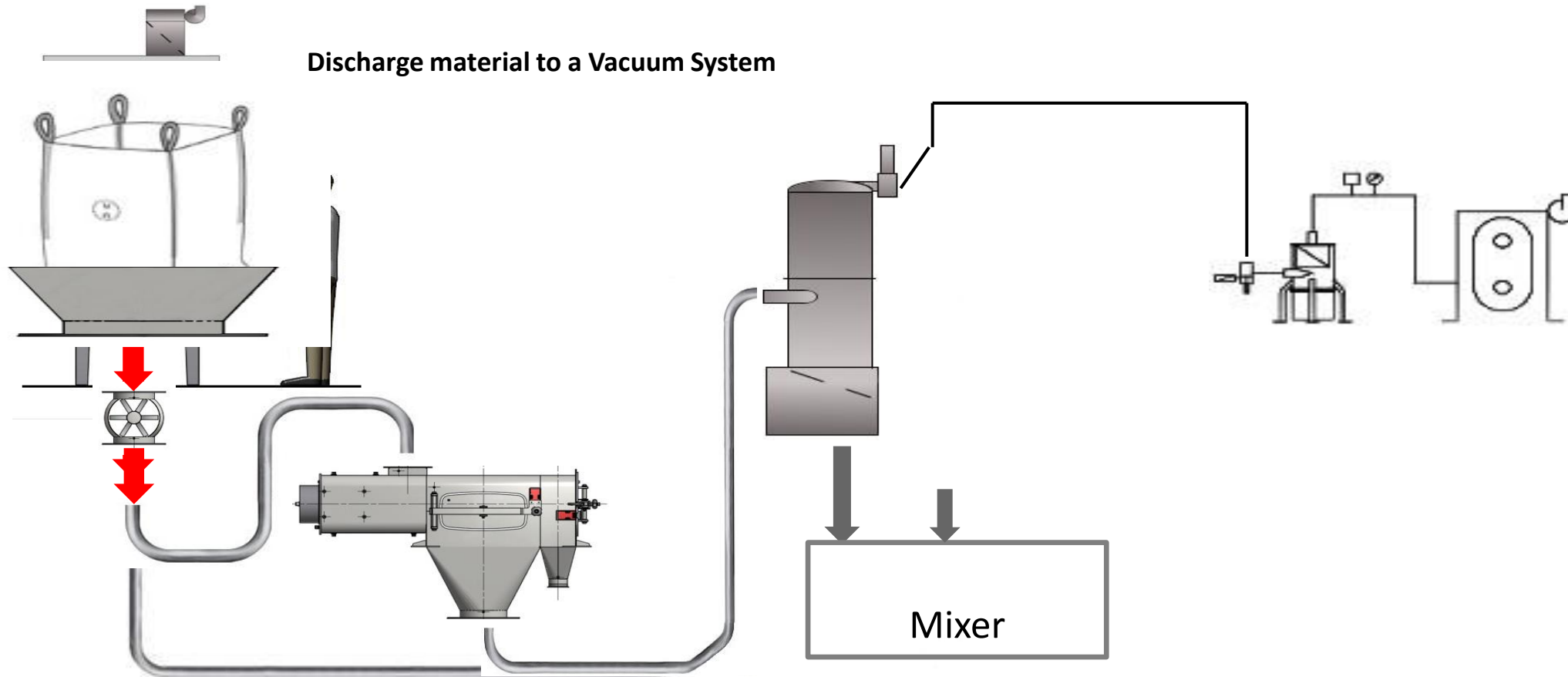


At the End of a process.



Where would you use a screening device

Sifter Location: In-line – Vacuum distribution system.



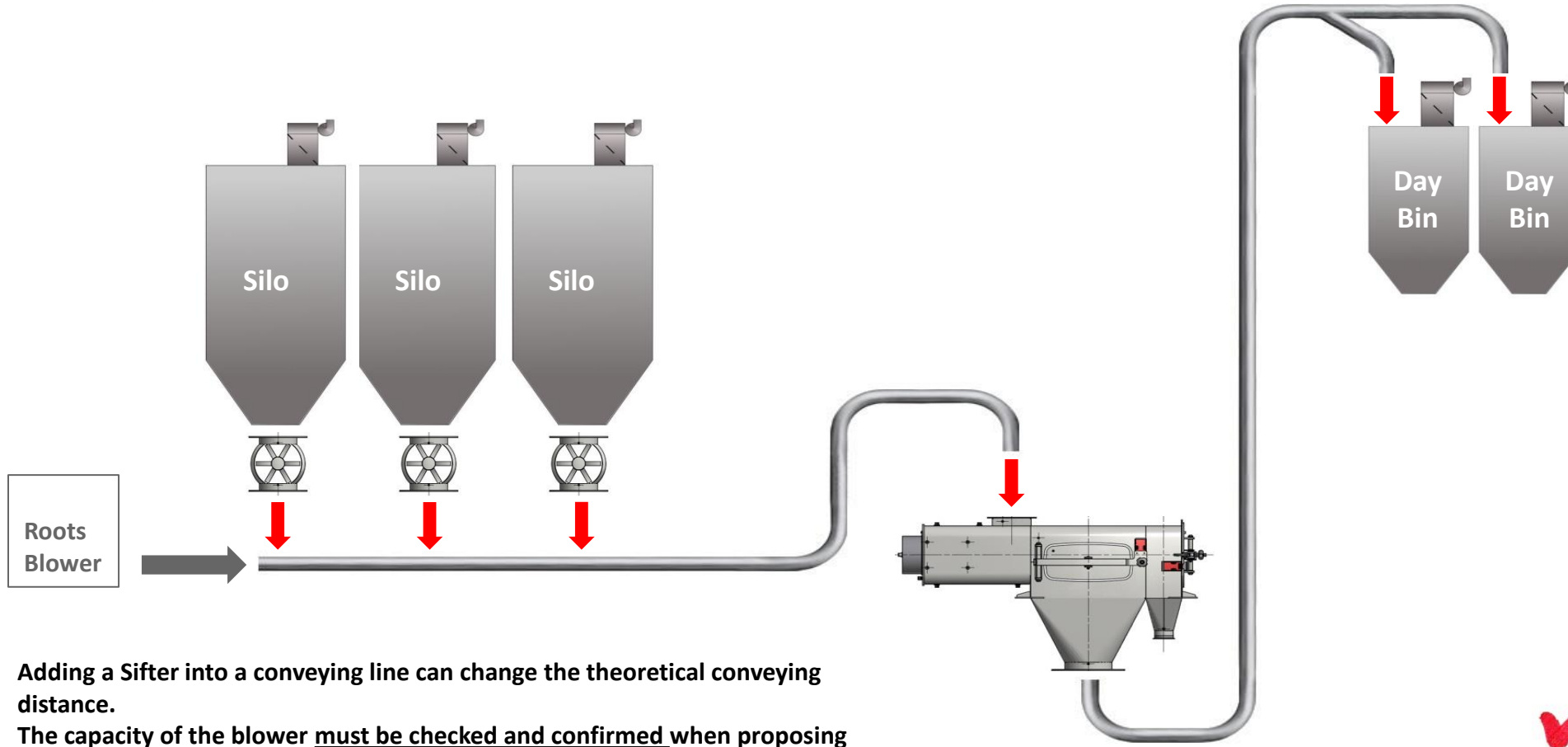
Adding a Sifter into a conveying line can change the theoretical conveying distance.
The capacity of the blower must be checked and confirmed when proposing an in-line sifter.



Where would you use a screening device

Sifter Location: In-line – Dilute phase blowing system

Bulk storage to process through In-Line Sifter

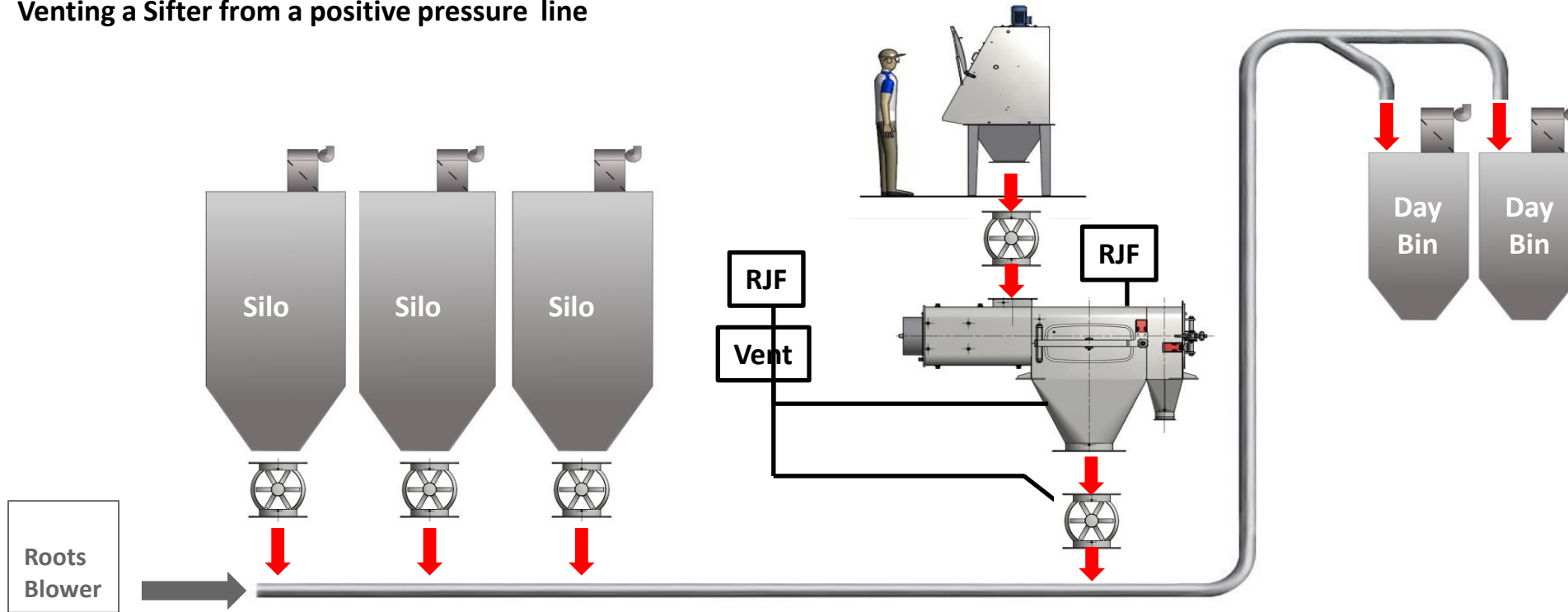


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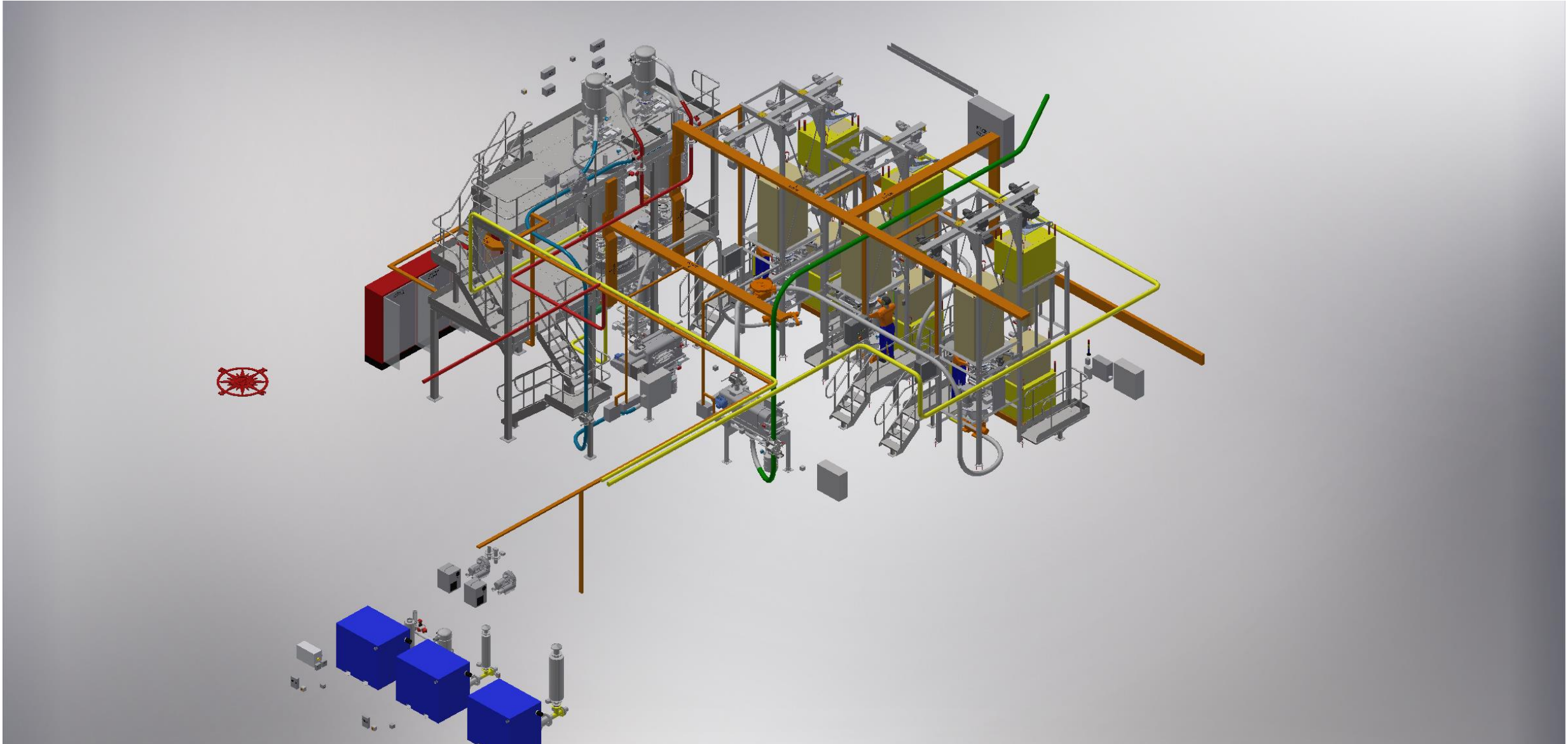
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Sifter Location: Positive pressure conveying line

Venting a Sifter from a positive pressure line



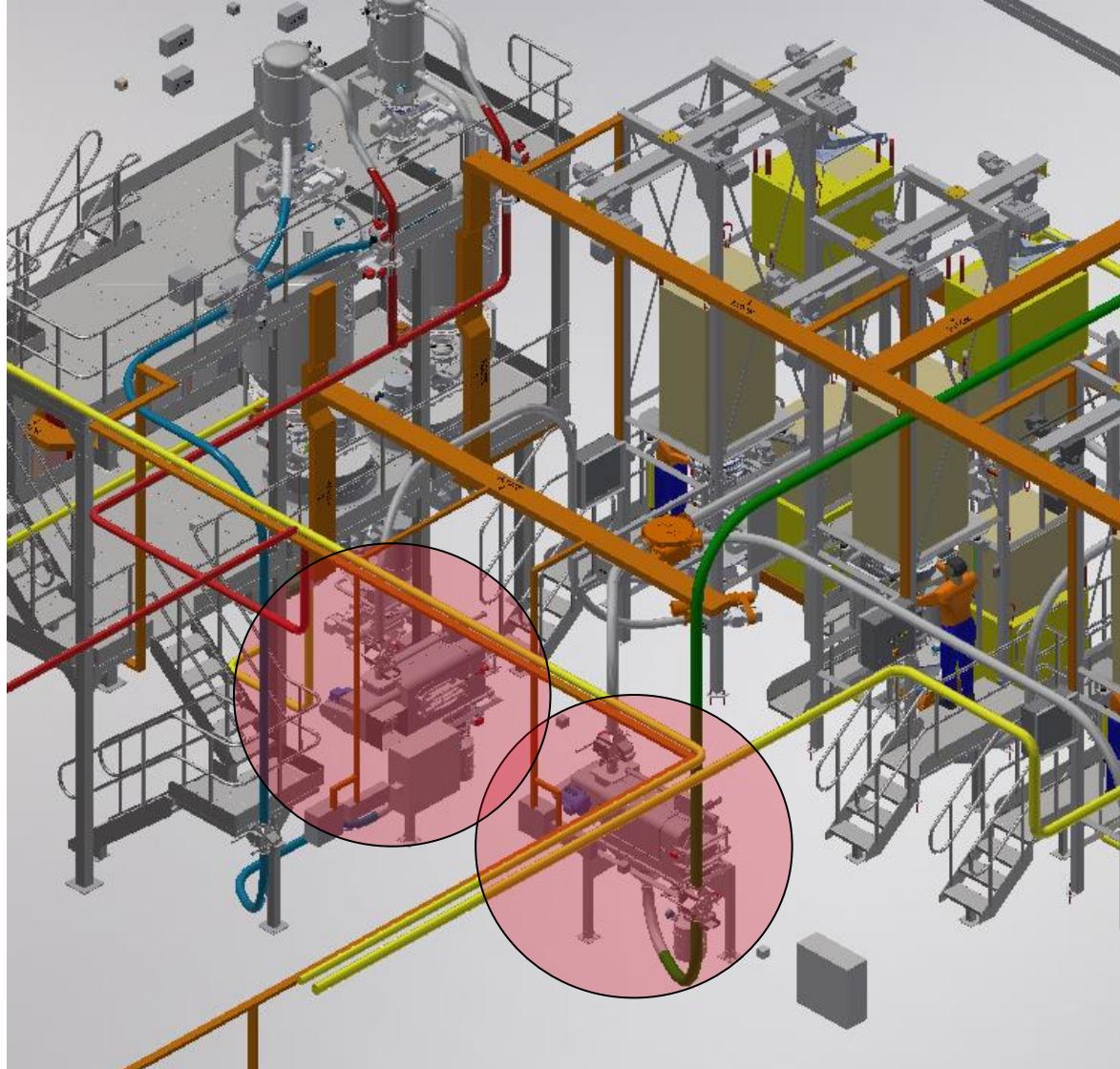
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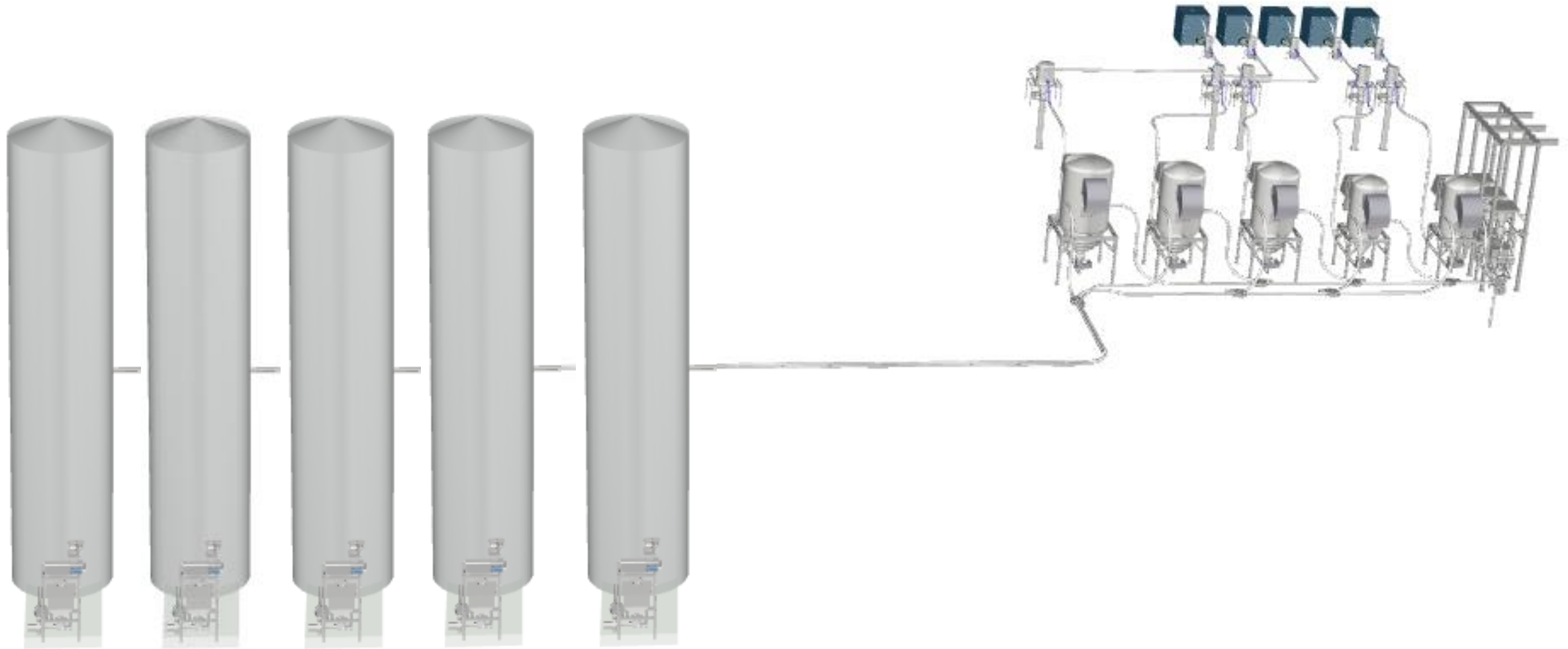
Where would you use a screening device

Location

- Typically after a raw ingredient handling process, FIBC, Tanker, silo, or sack tip emptying process



Where would you use a screening device



Where would you use a screening device

