Market insights and solutions: packaged baked goods & snack products

Key Words

packaged snack products, packaged baked goods, product inspection, product effect

The Product Inspection Landscape

Evolving inspection/detection technology can help both baking and snack food companies get their products to market contamination-free and in the case of multiple-item packs, with all of the promised pieces in place.

Using inline checkweighers to weigh packaged products ensures that they contain the correct amount of expensive product ingredients and that dispensing equipment is operating correctly. This aids in problem identification and facilitates uptime on today's high-rate lines.

Product and package types can vary widely within these two product categories. For example, under the baked goods umbrella, there are breads, bagels, cakes, cupcakes, cookies, pies, donuts, etc. Common packaging materials include plastic bags and paperboard cartons or material combinations (plastic/paper carton, plastic/aluminum foil tray, etc.)

Snack foods types include chips, crackers, bars, pretzels, nuts and others. One of the more common package types for these items is a metalized material that gets automatically formed into a bag with heat seals on either end. Folding cartons, composite cans, flexible material laminations and other packaging alternatives are also found in this category.

Also, in more recent years some baked and snack food products have started using desiccant packets to reduce oxygen and help extend shelf life. The content and positioning of these packets within the package can impact detection parameters, sometimes forcing sensitivities to be lowered to minimize the chance of false rejects.

Because of the wide range of product and packaging types, specific attention needs to be paid to the individual product attributes, material selection and production environment in order to select the most appropriate inspection/detection equipment.

For some applications, metal detectors are excellent work horses, but for others, significant benefits will be gained by stepping up to the expanded inspection/detection capabilities offered by X-ray systems.

Checkweighers are a critical component to any baking or snack foods operation. Close tolerances need to be kept to avoid giving away costly ingredients—or on the opposite end of the spectrum—under filling, thereby not meeting legal requirements and negatively impacting customer trust.

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Physical Properties Challenges

Baked Goods: Bread

When we look at the use of metal detectors for baked items, one of the biggest challenges is "product effect." This occurs when a product has a conductive property which effects the magnetic field generated by the metal detector. This is typically found in high salt, high moisture product environments.

For example, warm bread coming out of the oven, coupled with its salt content, tends to have a high product effect. This negatively impacts the metal detector's ability to distinguish between actual non-ferrous metal contaminants and the false signal given by the combination of typical product attributes. This is further complicated by the varying densities, air bubbles and other physical characteristics of each loaf, since no two are exactly the same. (There also are variations between bread types.)

In these situations, X-ray equipment will produce significantly better results since product effect is not a factor. However, other issues need to be considered. For example, the ideal time to run the loaf of bread through the X-ray machine is prior to bagging. Bread is typically conveyed through the X-ray machine with its longest dimension leading. At the point of entry, there is a lead shielding curtain, which sometimes causes the loaf to roll on its side as it passes through. This is not problematic for the X-ray machine, however – incorrect orientation can negatively impact the bagging operation that immediately follows.

On specialty bread lines, where volumes and productions speeds are slower, loaves can be positioned so that the short dimension leads. Entering the machine that way minimizes the curtain's contact with the bread, thereby preventing loaf roll over.

Baked Goods: Bagels

Since bagel products are typically sold in multiples, the objective is both contamination detection and ability to verify count. Additionally, pieces can break off during the production process. X-ray inspection, which can detect missing pieces as well as contaminants, is ideal for this product type.

Baked Goods: Cakes and Pies

The recommended inspection machinery type for these products is dependent on the packaging materials used. Since most pies are in aluminum foil pans, metal detectors can be useful to examine ingredients and dough. However, after the pie has been placed into the pan and/or folding carton, X-ray inspection should be used.

Cakes also sometimes rely on aluminum foil pans, but also folding cartons and sometimes metalized film, so the inspection solution recommended is also X-ray.

Many cake and pie products are frozen immediately after production, so some bakers choose to inspect after the items are case packed using an X-ray unit that can accommodate the case size.

Baked Goods: Frozen

Metal detectors work extremely well with frozen baked goods which no longer have a product effect that "just out of the oven" versions do. The challenge is to make sure that the freezer is efficient and is holding the product at the correct temperature. If a product isn't completely frozen, its unfrozen center will have a tendency to "look" like a piece of metal to the detector.

Snack Foods: Metalized Film Packaging

Although most snack foods don't have the product effect issues found in baked items, spotting contaminants is challenged by the packaging material of choice. The majority of snack foods marketed today are packaged in metalized film which is formed into a bag via a form-fill-seal (f/f/s) machine or flow wrapper. This means that these packages are not good candidates for metal detectors.

Even with drop-through metal detecting technology, there typically is not enough room in the f/f/s machine to mount a reject mechanism. Therefore, there is no easy way to reject a single product. (A possible work around is to give a signal to the bagger to make a double bag when a contaminant is found. The double bag, coupled with an audio alarm, signals the person packing the case that there has been a metal hit.)

With these process and material obstacles in place, X-ray equipment is the ideal solution to address snack food inspection challenges. Additionally, in the case of bars and other similar snack products, X-ray inspection can be used for spotting missing or broken pieces.

Checkweighers

Checkweighers are a critical component of most packaging lines. Making the weight specified on the label is an important issue with regulatory and brand equity implications. However, it is also critical that expensive ingredients are not being given away in the form of overfills. Additionally, with products that have tight packaging tolerances, such as bars that need to fit in a wrapper with specific dimensions, products that exceed size tolerances can very quickly shut down a production line.

Checkweighers can signal production on the fly to make a fast adjustment to make sure that the specifications are being met.

Inspection Needs from Sourcing to End User

There are several points in the baked goods/snack foods production process that benefit from inspection (metal detectors, X-ray equipment) and checkweighing technology. Here are some examples.

1. **Incoming ingredients.** Most of the larger bakers demand that their vendors meet specific HACCP objectives. They may require that metal detectors be used, provide proof of inspection, etc. Even with those methodologies in place, some will also inspect incoming ingredients. Typical incoming inspection consists of drop through and bulk flow metal detectors.

2. **Dough stage.** Before the product is baked or otherwise processed, this is an ideal location to conduct upstream inspection. Metal detectors are the equipment of choice because metal-based packaging is not part of the process at this stage. Bar products are another example. They can be examined right after sheeting, or after the individual bars are cut, or before the product goes into the wrapper. Alternatively, they can also be inspected after packaging.

3. **After baking/before packaging.** The inspection equipment type will depend on the product type and whether or not its formulation creates a "product effect." Warm, moist, high salt content products such as breads are more suited toward X-ray equipment, while metal detectors perform well with typically-inert snack foods. Checkweighers can also be located at this stage to make sure that the product weight falls within the min/max specifications and will not create problems (such as line stoppages due to oversize) at the packaging stage. Checkweighers can also be used to confirm that all of the late-stage filling components, such as icing and other toppings, have been properly dispensed.

4. **After packaging.** The recommended inspection equipment type is dependent on the packaging material or combination of materials that have been selected for this product. Metal components such as aluminum foil trays or metalized firm structures are much more suited to X-ray inspection. Flexible materials without a metal component, paperboard folding cartons and/or a combination of the two, work very well with metal detectors. Checkweighers are frequently located at this stage of the operation.

5. **After case packing.** Some bakers or processors prefer to inspect after the final packaging stage—case packing. This is typically done via X-ray inspection, provided that the unit is large enough to accompany a case. In addition to inspection, the X-ray system's ability to detect missing pieces will help ensure that the specified count has been loaded into the case. In certain situations, especially when X-ray inspection is not included at the end of the line, checkweighers are placed here to ensure that the proper number of packages are contained inside the case.

Meeting Applications Challenges

The Thermo Scientific™ APEX range of metal detectors is ideally suited for both baking and snack food applications. The APEX 500 and APEX 100 units are conveyor models and the APEX 300 is a drop-through system. All three feature a solid-state, touch operation control panel with icon-driven interface and multilingual "help" and "auto-calibrate" functions. A dent- and shock-resistant ABS plastic control panel with straight-lined, stainless-steel 304 case is also standard.

The APEX 500 metal detector features:

- Reduced production downtime
- Enhanced search head capability with advanced digital signal processing (DSP) technology, new algorithms, improved noise filters, product phase tracking approaches and balance/recovery schemes
- Performance validation through AuditCheck (optional)
- Breakthrough signal process with Intellitrack XR for improved performance in difficult applications
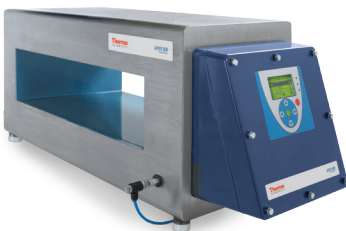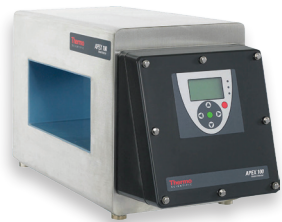
APEX 500 metal detector

- Remote monitoring and control using Modbus™ protocol
- Unmatched sensitivity: Up to 20% greater than current industry standards
- Dozens of apertures sizes available to custom fit your production line
- Sanitary, blue, hermetic epoxy aperture lining to improve ease of use

See more at: www.thermoscientific.com/apex

The APEX 300 metal detector features:

- Improve signal levels: Unique multi-coil design makes magnetic flux more consistent in the aperture
- Improved performance: New filtering algorithms for gravity-fed and pipeline applications
- Intellitrack XR: Breakthrough signal processing for improved performance in difficult applications
- Modbus protocol: Allows for complete remote monitoring and control
- Dual frequency: Provides application flexibility
- User-friendly interface: Solid-state, touch operation control panel
- Customizable: Styles for horizontal and vertical product flows
- Software enhancements: Optional AuditCheck performance validation system and AnyBus communications modules

See more at: http://thermoscientific.com/apex

APEX 300 metal detectors

The APEX 100 metal detector features:

- Sensitivity levels equal to the Thermo Scientific™ DSP3 and Thermo Scientific™ Metal Eliminator detectors
- Remote monitoring and control using Modbus™ protocol
- Dual frequency for improved application flexibility
- Compact and robust mechanical design for easy installation
- Sanitary, blue, hermetic epoxy aperture lining to improve ease of use

See more at: www.thermoscientific.com/apex

For those companies interested in stepping up to X-ray inspection/detection, the Thermo Scientific™ NextGuard™ system is ideally suited to handle the challenges of both baked goods and snack foods production.

APEX 100 metal detector

The Thermo Scientific™ NextGuard X-ray detection system features:

- Compact size for easy installation and use
- Unique non-linear detector to eliminate inspection blind spots
- Removable conveyor for simple directional change and maintenance
- Intuitive Thermo Scientific™ VersaWeigh™ user interface and software
- Modular design for high reliability and quick diagnosis and repair
- Source and detector lifetime indicators to minimize expensive downtime
- Built-in remote monitoring for quick problem determination

See more at: www.thermoscientific.com/nextguard

NextGuard™ X-ray detector

The VersaWeigh checkweigher features:

The VersaWeigh food checkweigher is an easy-to-use, easy-to-maintain, sanitary and scalable system. Built on 50 years' experience, it offers accuracy equal to or better than market requirement standards. The VersaWeigh food checkweigher is a reliable solution for your checkweighing needs.

- Flat surfaces avoided to reduce risk of product buildup
- Quick routine sanitation
- Rapid release conveyors and belts
- DIN-rail mounted networked modular electronic architecture
- Full stainless-steel frame, electronics enclosure and conveyor beds

VersaWeigh checkweigher

- High-torque sealed brushless DC motors
- Microsoft Windows XP™ operating system
- Large color touch-screen operation
- Configurable security access levels
- Applications for lightweight to 10 kg packages
- Modular weigh-engine approach enables integration into larger packaging systems
- 100 standard product memories
- OIML MID approved

See more at: www.thermoscientific.com/versaweigh

For boxes or cartons, either the Thermo Scientific™ Versa Fr44 or Versa 8120 offer solutions to the bakery and snack food industry.

Consumer Satisfaction

Reaching a high level of consumer satisfaction is an important goal for all food companies. What used to be a phone callor letter to the manufacturer complaining about finding a contaminant, chipping a tooth or other quality issues, now results in a photograph and negative discussion on a social mediasite. Complaints are no longer a private matter between the consumerand the manufacturer. Instead, they are voiced publicly and loudly, encouraging others to chime in with their negative experiences.

Consumers have learned that their concerns are more likely to be addressed quickly if they are made public. So now, many companies are having to employ costly human resources to monitor and address complaints on social media about their product safety and integrity. By incorporating the appropriate number of inspection options into the production landscape, many of these issues can be prevented from occurring in the first place.

Key Takeaways

Baked snack food product safety and quality can benefit from the use of inspection/detection and checkweighing equipment. There are multiple places on the processing and packaging line where installing these systems can positively impact the quality, accuracy and safety of the food item being marketed.

The specific inspection solution is dependent on the product characteristics, placement in the line (before or after packaging) and inspection/detection objectives. To review:

1. "Product effect" needs to be taken into consideration when trying select the appropriate detection technology. Moist, high salt content breads, for example, can trigger a metal detector false positive.X-ray equipment is not subjected to "product effect" issues.

2. Metal detectors work well with thoroughly frozen baked goods.

3. X-ray equipment is ideal for products whose packaging include metal components (aluminum foil trays, metalized film, etc.)

4. Checkweighers are a critical component of any baked goods or snack foods line. They help ensure that the weight listed on the label is met and that product in the form of overfills is not given away.

5. X-ray inspection can be deployed to spot broken pieces (bagels, pretzels, etc.) or missing components (multipack counts)

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