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WHITE PAPER

**How to Prevent Recall Campaigns of Ready Meals**

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## 1 Introduction

It is a terrible scenario for any food-producing company: A customer finds a foreign object in his or her food and gets hurt from it, or it causes an allergic reaction in a person who may become seriously ill if an incorrect label is applied. Most of the approximately 3,000 food recalls occurring in the EU each year can be attributed to contamination of the product or questionable contents. Although adequate quality management certainly is a way to reduce such risks, ultimate safety can only be obtained by using processes and equipment capable of reliably detecting any foreign objects or incorrect labels. Several solutions protecting food producers from recall campaigns exist in today's market. This white paper describes some of the product safety challenges facing the ready meal industry. It illustrates the consequences of wrongly marked products and explains the technologies available for adequate protection.

## 2 Trends and Developments in the Food Industry

Food packaging becomes more and more important all over the world. For instance, the sharply growing trend towards meals individually produced for specific customers results in an increasing need for individual packaging. At the same time, the consumption of ready meals is becoming more widespread, and health and safety are of special importance for consumers. In addition to preserving and protecting food products before they are eaten, packages must provide useful and reliable information for risk-free consumption of the product.

Therefore, a control system forming a part of the manufacturer's food safety and risk analysis is more important than ever. Among other purposes, manufacturers are using these systems to prevent any bacterial or allergic risks which could occur if the product had an inappropriate package, if it was wrongly labeled or printed or if the package is sealed or closed inadequately. This is especially true for products marketed under a specific brand because any faults will have a detrimental effect on the brand's reputation.

Often, incidents in the food and beverage supply chain create an enormous media response. Consequently, consumers become increasingly cautious when it comes to processed products and the quality of their food. While they demand tasty products, they are not willing to make any tradeoffs regarding health and safety. Against this backdrop, the reluctance to return faulty products to the manufacturer is decreasing noticeably.

The number of recalls of ready meals has dramatically grown in recent years. In today's supermarkets, consumers come across packages with incorrect or wrongly placed labels, open closures or seals, leaking films or inappropriate packing material or they discover expired products. In the worst case, consumers will not notice these faults until they arrive at their homes.

Many consumers do not think about complaining to the retailer or manufacturer because they are uncertain about the procedure of the reclamation process or because they assume that it is too late to return the product. Nonetheless, their dissatisfaction with the incident will linger in the background without the manufacturer's knowledge. Nonetheless, these so-called 'unknown complaints' have far-reaching consequences. The consumers concerned tend to discuss their dissatisfaction within their own circles and even go as far as to warn third parties via the internet. There is no way for the manufacturer to react and restore the customer's faith in the products or brand.

Some food producers (especially manufacturers of branded goods) therefore overreact if they face a complaint. To compensate for the damage, they generously give away products, vouchers or other high-valued items in order to make the customer happy again. After all, for each returned product there will be a number of unknown complaints resulting in an incalculable damage to the company's reputation.

Unfortunately, fraudsters having recognized this relationship are trying to take advantage of this. Hoping to get massive compensation, they tamper with products and generate faults. This is one of the reasons why the number of returned and rejected products is growing. Food producers who do not protect themselves with adequate technology have no opportunities to find out if the claim is valid. They must run through the entire process for handling any faulty or contaminated products and will need to invest a lot of time and effort in identifying the fraud.

Due to the increasing level of distrust, it is necessary to use protective measures based on state-of-the-art technology. After all, food manufacturers have the full burden of proof. Instead of just protecting brands from any long-term damage to their reputation, it is also necessary to prevent detrimental effects on the product lifecycle due to damaged packages. In other words, wasted production time and a loss of consumables and energy must be avoided. Producers are therefore challenged to ensure their productivity and profitability while maintaining their high level of quality and food safety.

At the same time, laws and regulations define what is and what is not permissible. Many standards including the International Food Standard (IFS) can be regarded as de-facto laws in the food industry due to their prevalence. Due to the fact that the transition period of the EU Food Information Regulation ended in December, 2014, manufacturers are now obliged to print all ingredients and allergens on the package labels. From the end of 2016, it will also be mandatory to indicate nutritional information on every product.<sup>1</sup> Today, any company willing to sell products to the retail trade must have an appropriate certification and generally comply with EU regulations.

### **3 Recall Scenarios (Types and Causes)**

#### **3.1 Scenario 1: Foreign Objects**

Foreign objects in products including ready-made lasagne represent a high risk for food producers. If, for example, plastic, glass or metal is found in a product, the affected batch must be immediately withdrawn from the market. Consumers will be notified to return the product in a public recall campaign. Such a recall will launch extensive investigations of the production line. In order to find the fault, machines will be disassembled and an intensive inspection of the control processes will begin. All archived production records must be evaluated. Furthermore, specific data, totals databases as well as information on detected metal objects and audits of metal detectors must be analyzed if possible.

Wayne Farms, a large poultry manufacturer based in Mississippi (USA), had to close down their chicken processing facility in March due to a foreign object found in a production line. At an annual production of more than 2.6 billion pounds of poultry products, the economical consequences of such an action are enormous.<sup>2</sup>

Contaminations sometimes occur if product batches are manually transported to a different production line due to an interruption in the process chain. Furthermore, the commissioning of a new production line can be the cause. Construction work during the installation of a new line results in an increased risk of contamination. For instance, a drilled metal thread breaking during the packaging process can spill out metal objects over the product.

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<sup>1</sup> European Commission, Food Labeling Legislation, 30 March 2016, URL: [http://ec.europa.eu/food/safety/labelling\\_nutrition/labelling\\_legislation/index\\_en.htm](http://ec.europa.eu/food/safety/labelling_nutrition/labelling_legislation/index_en.htm)

<sup>2</sup> Food Safety News, USDA Inspector General investigates possible poultry sabotage, 11 March 2016, URL: <http://www.foodsafetynews.com/2016/03/ig-investigating-how-foreign-materials-got-into-poultry-plant/#.VwUNEmdf1aQ>

### **3.2 Scenario 2: Labeling-related Recalls**

The number of labeling-related recalls has increased in the two-digit percentage range over the last three years. This includes missing or faulty information regarding the content of the packaging and the quantity as well as faulty best-before dates or prices.

If a faulty use-before date is printed on the label, production will be stopped and all products concerned will be withdrawn from the market. Customers will be notified within a public recall campaign and authorities will start their investigations.

As a specific example, Alnatura, a German chain of organic food supermarkets, had to recall smoked tofu at the end of 2015 because some packages contained almond-nut tofu by mistake. As this was not indicated on the label, the product was declared inappropriately labeled. The company therefore preventively recalled the batch concerned in order to avoid any further risks to potentially allergic people.<sup>3</sup>

False declarations can have many causes. Often, an inappropriate setup of the line leads to faults. Intransparent data management, inefficient interfaces or misleading recipe management on behalf of the manufacturer can also lead to deficiencies. In some cases, there are also uncertainties and sometimes even total ignorance of official regulations.

### **3.3 Scenario 3: Packaging or Sealing Faults**

In addition to foreign objects and false labeling, faults can also occur during the packaging or sealing process. For instance, product residues will interfere with the sealing if the machine failed to correctly place the product into the package so that residues will remain in the sealed seam. The package may not be sold due to the visual impact of this. In addition, product residues in the sealed seam can cause leaks leading to premature spoiling of the product. Furthermore, the tools of the machine can be the reason for bad, improper or imprecise sealing which can result in a tiny inclusion in the seam of the package.

Package defects also include deformed packages or trays with missing or wrong products. Manufacturers will withdraw such products from the market, investigations will be made, and the resulting recall campaigns will have a massive financial impact and can damage the brand's reputation.

Faults in the packaging machine are the most frequent cause of leaky packages. In addition, production lines featuring a high start/stop frequency, incorrectly set machine and tool parameters and the lack of automated processes during the start-up phase of a line can be responsible for bad products. Clearly defined procedures following service events are also important for eliminating causes of errors.

## **4 The Impact of Recall Campaigns**

Irrespective of the cause, any recall campaigns will severely damage the reputation of a brand. It is a highly complex and daunting task to deal with the public outcry and to handle the logistic affairs. In addition to the loss of sales at the production side, retailers also have to cope with missed sales opportunities. Apart from production downtime, there will be additional unexpected costs, including expenditures for lawyers, recall-related transportation costs, compensation costs and maybe costs for the disposal of the products. Furthermore, investments into marketing campaigns and the restoration of the brand reputation and the confidence of the customers will always be required. Trouble and disputes with angry consumers are only the tip of the iceberg in this context.

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<sup>3</sup> News Directory, Food: Alnatura recalls incorrectly packaged almond nut tofu, 28 October 2015, URL: <http://news.newsdirectory2.com/food-alnatura-recalls-incorrectly-packaged-almond-nut-tofu/>

The financial impact of recalls is best illustrated by the case of Nestlé in India. A recall campaign concerning instant noodles resulted in costs of 127 million pounds for the company. The Indian food control administration had branded Maggi noodles as 'dangerous and unsafe' because of an excessive lead concentration and obliged Nestlé to recall the snacks. The company had to withdraw approximately 400 million portions from the market, amounting to more than 27,000 tons. Nestlé reported that this is the largest recall campaign the company ever had to master and that it may have been the largest operation of this kind in the entire food industry.<sup>4</sup>

The financial impact of the large-scale recall campaign initiated by sweets manufacturer Mars can only be guessed at present. In February 2016, the sweets giant recalled several millions of Mars, Snickers and Milky Way chocolate bars in 55 countries after a plastic object was found in a product. While there are some who say that this incident will positively impact the confidence in the brand and that it is an example for excellent crisis PR, the manufacturer is also criticized for its complicated reimbursement process, its overloaded web servers and the form of compensation. Furthermore, the disposal is subject of close observation. For instance, it is thought they are to unpack and shred the recalled bars in order to mix them into animal food.<sup>5</sup>

Although companies can insure themselves against the consequences of recall campaigns, they will have to dig deep into their pockets to do so. Food manufacturers will have to pay insurance premiums of approximately 50,000 euros for an insurance sum of 10 million euros—at a deductible of 100,000 euros. It is therefore more worthwhile to deploy reliable inspection systems that can be integrated into several stages of the production line.

## 5 How can Bizerba Prevent Recall Campaigns?

There are several reasons why manufacturers will decide to invest into an inspection system. They may want to:

- Detect faulty products in order to ensure maximum product quality
- Comply with applicable laws
- Avoid further recall campaigns
- Automate the secondary packaging process
- Fulfill the requirements of their internal foreign-object management process
- Ensure that flawless products will not be declared as insufficient at a later date

Based on many years of experience in the inspection sector, Bizerba is capable of detecting many different materials. There are numerous possibilities that can be adapted to the specific requirements of the ready-meal industry.

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<sup>4</sup> Food Navigator Asia, Nestlé results show Maggi incident still hurts, 19 February 2016, URL: [http://www.foodnavigator-asia.com/Business/Nestle-results-hit-by-China-and-aggi/?utm\\_source=newsletter\\_daily&utm\\_medium=email&utm\\_campaign=23-Feb-2016&c=IMQX2QfVKmcpIz4HM0%2FTnDgnxNZIo%2FQs&p2](http://www.foodnavigator-asia.com/Business/Nestle-results-hit-by-China-and-aggi/?utm_source=newsletter_daily&utm_medium=email&utm_campaign=23-Feb-2016&c=IMQX2QfVKmcpIz4HM0%2FTnDgnxNZIo%2FQs&p2)

<sup>5</sup> Food Production Daily, Mars issues mass chocolate recall due to plastic, 23 February 2016, URL: [http://www.foodproductiondaily.com/Safety-Regulation/Mars-recalls-chocolate-due-to-plastic-contamination/?utm\\_source=newsletter\\_daily&utm\\_medium=email&utm\\_campaign=24-Feb-2016&c=IMQX2QfVKmclobl%2BikORCJztUdMZfoxd&p2](http://www.foodproductiondaily.com/Safety-Regulation/Mars-recalls-chocolate-due-to-plastic-contamination/?utm_source=newsletter_daily&utm_medium=email&utm_campaign=24-Feb-2016&c=IMQX2QfVKmclobl%2BikORCJztUdMZfoxd&p2)



Image 1: Range of Bizerba inspection systems (Source: Bizerba)

## Metal Detectors: The Good Nose for Ferrous and Non-Ferrous Metals

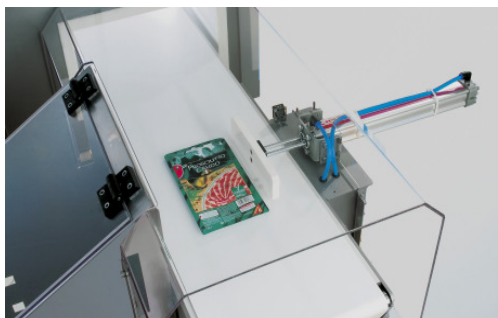


Image 2: Metal detector Varicon+ (Source: Bizerba)

Today, most companies routinely use metal detectors at the end of their process chain right after the packaging machinery. Bizerba's Varicon+ metal detection system generates an electric field within the range of its coil. Any product passing through the detector generates a specific pattern, and any deviation from this pattern is an indication of contaminants and will trigger an ejection process. In order to achieve adequate functionality, the system must be trained for each product.

This technology reaches its limits when the products to be inspected have a high 'product effect'. This includes products packed in tin foil. Due to its high conductivity, this material reduces the metal detector's precision. Consequently, reliable detection of small contaminants cannot be ensured. In the case of food products packed in containers like E2 boxes, metal objects must have a diameter of 7mm or more to make the system issue an alert.

## Checkweighers with Metal Detectors: Flawless and Balanced

According to the pre-packaging regulation, food producers must check the correctness and completeness of the content of any packed and equalized product that reaches the market. The production process is required to continuously document that the filling quantity is not be less than or greater than the nominal value.

Automatic checkweighers ensure compliance with the pre-packaging regulation. They can be used to check the filling quantity and for process control processes. A feedback function prevents excessive product quantities in the package which would result in unintentional product giveaways. This saves valuable raw materials and increases the manufacturer's earnings. Thanks to the metal-detection functionality of the combined checkweigher, costly recall campaigns will be avoided. Brand loyalty and customer satisfaction will improve as well.



Image 3: Checkweigher CWP Bakery (Source: Bizerba)

### X-Ray Technology: No Chance for Glass, Plastics etc.

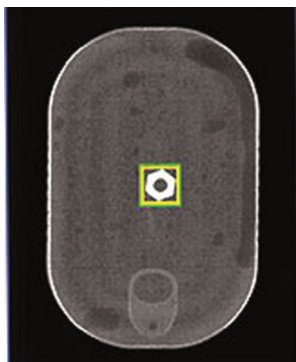


Image 4: X-ray image of a ready meal can (Source: Bizerba)

Featuring excellent detection accuracy, x-ray technology can detect even minor metal particles or stones. Inspection systems like the Bizerba XRE\_2 generate a gray image from the captured radiation. Any foreign objects in the food will appear as dark spots in the digital image due to their higher density. Modern x-ray detectors like the Bizerba XRE\_2 can process the image within milliseconds, enabling the conveyor to run through the system at a speed of 60 meters per second. This corresponds to approximately 200 packages per minute. As an additional advantage, a distance of only 10 millimeters is required between packages contrary to similar devices, enabling an extremely high throughput.

The system is also adaptable to individual requirements. For instance, manufacturers can selectively exclude intentionally used metal parts from the detection process, including aluminum

clips on poly-clip bags. In addition, the x-ray system will check glasses and tin cans with a wall thickness of up to 3 millimeters for any foreign objects as the x-rays will be only minimally influenced by glass or metal packages.

In addition, x-ray detectors are also able to check the completeness of the package content (e. g. if a chocolate box is completely filled). For this purpose, the device is provided with the average gray value of the object to be checked. The image processing stage will then analyze the result and watch out for foreign objects. After this, the system will hand over the control record to the statistics software enabling comprehensive analyses and a detailed documentation. Furthermore, the system can be combined with other equipment, including checkweighers. The x-ray system will switch to different inspection parameters if a transition to a different product is made.

Bizerba x-ray technology and checkweighers can also be used to prove that a package was flawless and without foreign objects when it left the company.

### Vision Systems: Bringing Together What Belongs Together

In addition to the checked content, packages and labels must also be correct. The Food Information Regulation clearly defines which product specifications must be indicated and depicted on the label. Food producers violating a rule, for instance by indicating ingredients with a smaller font size than required, will



be facing financial penalties. In this context, vision inspection systems like the Bizerba BVS-L can provide security by reliably detecting any faults on the package.

The camera-based control systems used for this purpose are using reference images to detect labeling faults. The so-called vision systems check the best-before date, the readability of the ingredient and allergen information, the position of the label and the functionality and correct position of the barcodes. In order to ensure that the product has an appealing effect, the system also checks if the packaging machine has used the correct film.

To this end, food producers use one or more reference images to train the system for the product to be



*Image 5: Vision system BVS-L (Source: Bizerba)*

inspected, with no limitations to the parameters to be checked. Producers can choose to just check the best-before date of the products or to simultaneously check the proper packaging material, correct allergen indications and the correct position and readability of the label.

The checking process only takes some milliseconds. Two fixed cameras are taking photos of the product with a read error rate in the per mill range. If the system detects a deviation from the

reference image, the faulty product is ejected. An operator will then determine and eliminate the source of error. It is also possible to define serial defects. The whole production process will be halted if the vision system ejects an excessive number of packages in a short time due to faulty machine behavior. Apart from saving time and cost, this also eliminates any annoying re-labeling. Food producers can individually set the tolerance threshold of the serial-fault detection scheme, thus benefiting from a system capable of controlling the whole process instead of just single packages.

The time-stamped product images also facilitate the traceability of product batches. If a wholesaler should complain about an entire food batch due to unreadable barcodes, the manufacturer can easily check if this was caused by a manufacturing problem. Alternatively, external influences may be responsible for the unreadable barcodes.

High-quality vision systems are capable of ejecting only those packages that are really faulty. Additional cost and uncertainties would result if flawless packages would also be ejected from the production process.

## Is Everything Still Sealed?

During the packaging process, the package seams are heat-sealed by so-called thermoforming machines. Vision systems can also be used to verify if a package was closed correctly and to check the correct content and position of the label. For instance, the ThermoSecure solution by Bizerba Luceo can be integrated at the end of the line following the weighing and metal detection stages in order to identify, inspect and control the products. Products that have an imperfect sealed seam or that do not meet the visual requirements can thus be ejected from the production process.

This functionality is also available as an integrated solution for packaging machines. To this end, a camera solution is built into the thermoforming machine in order to directly check the sealed seams using sensors.



*Image 6: Vision System ThermoSecure (Source: Bizerba)*

Any faults are more clearly visible as long as the filled, sealed and unseparated packages are lying in the packaging machine with tight and clean surfaces. Visual inspection is more difficult after cutting the packages because the sealed seam is often undulated and warped especially for flexible products.

For best results, the type of camera and lighting must be adapted to the individual package shape. Being essential for emphasizing specific features, this is done by using different illumination methods. Image sensors without different types of illumination would not be capable of detailed fault analyses under these circumstances. Furthermore, the image sensors are installed at a specific angle in order to deliver an optimum image.

### Bizerba ThermoSecure checks

- The tightness of the sealed seams
- The existence, position and orientation of the label
- The correctness of the indicated information
- The existence of product information mandated by law, including
  - Best-before date
  - Barcode
  - Weight, price, etc.
- The conformity of the labels on the top, bottom and side surfaces of the package.

The system also eliminates the risk of mixing up packages when the production of a new batch begins. For this purpose, the product is cross-checked with the information on the label.

## Software for Continuous Documentation

The fully integrated BRAIN2 software family additionally enables manufacturers to store all vision and x-ray images and metal-detector files for the entire shelf life of a product. It is therefore possible to prove that the package was flawless at the time of delivery, preventing any opportunity for consumers to abuse or tamper with the products.

## Labels: Adhesion at Any Temperature

Labels play a pivotal role for quality assurance. In particular, it is necessary that the labels not peel off of the product or the package irrespective of the environmental conditions and temperatures they are subjected to. After all, missing labels can also result in recall campaigns that are very expensive for the manufacturer.

For more than 30 years, Bizerba is exclusively manufacturing its own laminate with an in-house combination of surface material (film), glue and carrier paper. The glue is of key importance in this context in order to prevent labels from peeling off during the packaging process or in the store. The applied quantity must always match the individual application because otherwise the label might fail to stick. A deep-frozen product puts different requirements on the glue than a product stored at room temperature.



*Image 7: Non-thermal paper label (Source: Bizerba)*

In order to ensure completely safe products, it is not enough to focus on the product, its origin and its production. Instead, the production of the package and the label are more and more important elements in the struggle for quality and safety.

## **6 Summary**

Comprehensive food inspection solutions can effectively reduce the number of product recalls. In particular, manufacturers can use metal detectors and x-ray systems to produce products without foreign objects and with standardized weight. Offering additional safety, visual inspection systems ensure uniform product packaging, resulting in a pleasant, consistent appearance to the end customer. This can influence the buying decision because consumers will prefer perfectly packaged products over products with slanting labels or unreadable ingredients. On the other hand, vision systems will perform a 100% check of each package and store the result including an image, which will significantly ease the documentation for customers and the legislator.

In addition to state-of-the-art hardware solutions, adequate software is a prerequisite for the deployment of a functional manufacturing and control system. Statistics software and goods management systems make it easier for manufacturers to detect any errors in order to optimize their foreign object management processes.

Use Bizerba inspection systems to ensure your product quality, to protect yourself from false accusations, to reduce your costs, to avoid recall campaigns and to preserve your good reputation.

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## **About Bizerba**

Bizerba offers its customers in industry, trade, and logistics a globally unique solutions portfolio of hardware and software around the central value "weight". This portfolio includes products and solutions related to slicing, processing, weighing, cashing, checking, commissioning and labeling. A wide range of services from consulting and service, labels and consumables to leasing complete the portfolio.

Since 1866 Bizerba has made a significant contribution to the developments in the area of weighing technology and today is represented in 120 countries. The customer base includes globally operating companies in trade and industry as well as retailers, bakeries and butcheries. With around 3.700 employees worldwide and with its headquarters in Balingen, Baden Wuerttemberg, Bizerba has been in the same family for five generations. Additional production facilities are located in Germany, Austria, Switzerland, Italy, France, Spain, China and USA. Bizerba also has a global network of sales and service locations.