



Focused Automation/Core Technology Solutions

Vacuum Seal Inspection

ZX



Industry:

Food and Beverage



Applications:

Food jar and bottle filling processes



Problem:

Vacuum sealed jar lids and bottle caps must be properly placed to ensure the integrity of the vacuum seal created during the jarring/bottling process. If lids/caps are not properly placed, or are missing, the vacuum loss will result in product spillage and spoilage. Accurate, consistent, on-the-fly, inspection of all vacuum sealed jars and bottles is essential to prevent imperfectly sealed products from getting into the supply chain.



Omron "FACTS" Advantage

- ZX Sensor amplifier with laser sensing head (Measurement)
- E3X-DA11S sensor amplifier (trigger)
- E32-DC200 Fiber optic cable (trigger)

Omron's ZX measurement sensor with laser sensing head provides a complete inspection solution with high-precision measurement capabilities and built-in control outputs for fast application on high-speed production lines. A wide selection of laser heads is available to meet virtually all applications. Available sensor monitoring software simplifies data logging and trending.



Application Diagrams

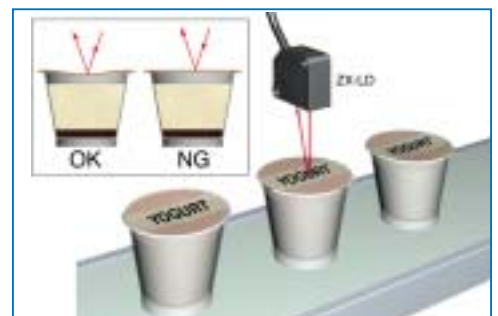


Good seal



Bad seal

Good seal and bad seal on vacuum-sealed lid



Detecting pinholes in foil-sealed dairy containers. Good seal is concave; pinhole in lid is flat.

FACTS **Focused Automation/Core Technology Solutions**

Vacuum Seal Inspection Application Details

Issue

The competitive nature of food production demands consistently high quality product to reach end customers' shelves so that producers can create and maintain their quality brand image. Vacuum leakage from improperly sealed jars and bottles leads to product spillage and spoilage that can result in "lot" based recalls if detected by retailers or much larger production recalls due to on-shelf product spoilage detected by consumers. The resulting product returns and potential liability can be very costly both financially and from a brand reputation point of view. For this reason, it is imperative that all possible actions be taken to avoid allowing any imperfectly sealed product from getting in to the supply chain.

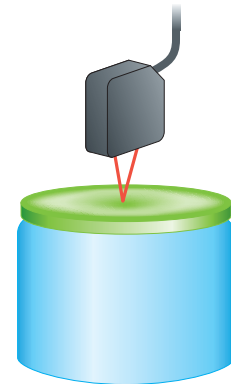
Cause

Listed below are a few of the more common ways that jar lids or bottle caps can be mis-applied in the capping process:

- Mis-feed (no cap present)
- Mis-feed (cap upside down)
- Misalignment (cross-threading)
- Insufficient torque
- Wrong lid/cap
- Damage to lid/cap or jar/bottle threads
- Out of tolerance lids/caps or jars/bottles
- Seal missing from lid/cap

While some of the above problems that lead to defective vacuum sealing can be easily spotted visually (missing cap), most are difficult to assess because the caps appear to be properly positioned.

The key is in detecting the concave deflection in the lid or cap caused from a properly sealed vacuum under the lid or cap.



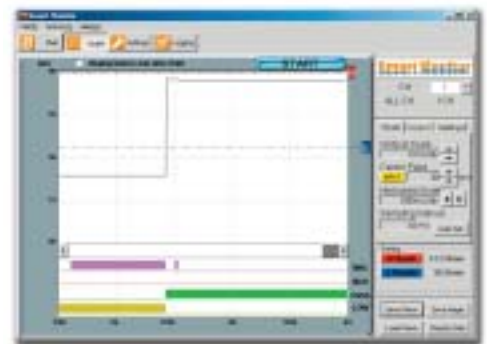
Omron's Unique Solution

Following capping and cooling processes, jarred and bottled foods naturally create a vacuum under the lid or cap. If the lids or caps are properly seated, the integrity of the vacuum seal is maintained and the jar lids or caps will be pulled down by the vacuum underneath and form a concave shape.

Omron's ZX sensor amplifier and laser displacement measurement head enables food production engineers to accurately detect this deflection and consistently identify properly sealed products from defective ones. Because the difference between properly and improperly sealed lids is only a matter of a millimeter or two, the sensor must be highly precise.

Oriented in a top-down view, the ZX sensor is fitted with a companion "trigger" sensor (Omron E3X fiber optic sensor) that starts and stops the inspection. Depending on the lid or cap style, the trigger sensor may be set to start the measurement process across the entire lid, or just the center of the lid where the "pressure button" is located.

The ZX sensor's "peak hold" function maintains the maximum distance value within the inspection range and compares it with a preset threshold. In this example, a threshold of 38.24 mm is set as low limit. Any container with a maximum lid deflection of less than this value is considered defective. Built-in High/Low/Pass outputs allow users to directly control gates to remove defective products from the line without the need for a PLC or other controller. Omron's ZX monitoring software may be used to graphically display the measurements from each inspected jar or bottle and log the data for immediate or later trending review.



Seal intact screens

Results

With the ZX measurement sensor, food production engineers can perform 100% inspection for properly vacuum-sealed lids and caps in-line and on the fly to virtually eliminate spoilage and spillage caused from improperly sealed jars and bottles. Because the sensor has built-in outputs, it can keep up with high-speed production processes. The available monitoring software further simplifies quality monitoring and data logging.

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