

TAPTONE

APPLICATION NOTE

Volume 2, No. 8

COOKER PROTECTION: SEAL INTEGRITY, VACUUM LOSS, AND FILL LEVEL INSPECTION IN STEEL CANS

Tested: Steel Food Cans for Seal Integrity and Fill Level

Tested with: TapTone X-ray and Proximity Sensors (T1000/T500)

The purpose of this test was to prove the effectiveness of TapTone systems in determining seal integrity, proper vacuum and fill level in food cans prior to the cooker or retort. Canners have long sought a remedy for the costly equipment failure and downtime that results when defective containers jam the continuous cooker on a canning line. By combining a proximity sensor to measure lid curvature and an X-ray sensor to measure fill level, the TapTone proximity/X-ray system detects and automatically rejects cans with deflective lids, flat lids, missing lids, cocked lids, seam defects, knockdown flanges, dents, underfill and overfill, and low vacuum. With a TapTone system installed before the cooker, these defects are virtually eliminated, protecting the cooker from jam-ups.



TECHNOLOGY CORNER

How it Works

Proximity Technology -

Measures pressure or vacuum in food cans, beverage cans, glass jars, and bottles with pop-up lids by measuring the lid deflection.

The proximity sensor produces a continuous magnetic field that monitors the distance to the metal lid and produces a proportional analog voltage. The continuous proximity signal is digitally sampled to produce a merit value of the lid profile. The profile value is then compared to user-set limits. Containers with lid deflection outside these limits are rejected.



X-ray Technology -

Measures the product fill level in steel, aluminum, glass, plastic and paper containers. An X-ray tube is used to produce a low-energy X-ray beam. The X-ray beam penetrates the side of the

container in the area of the fill level. An X-ray detector is positioned on the opposite side of the container to measure the intensity of the beam after it goes through the container. The intensity of the beam is then compared to acceptable energy levels to determine the relative fill level of each container. The X-ray sensor is used to measure both overfilled and underfilled products in all types of containers.



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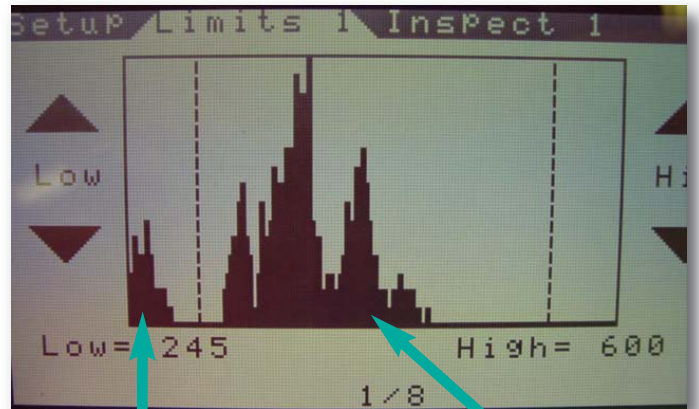


TELEDYNE TAPTONE
Package Inspection Systems
A Teledyne Technologies Company

SEAL INTEGRITY TEST

Vacuum, if present in the can prior to reaching the cooker, is detected using proximity inspection. The proximity sensor measures the deflection of the can end caused by the vacuum in the can. The average merit value for the good, non-leaking cans was 350. Leaking cans had an average merit value of 175.

The proximity sensor is capable of detecting a lid deflection of .003" - .014" (.076mm - .355mm) under production line conditions. The system inspects 100% of the cans on the line and will reject all cans that have lid deflections outside limits established by the user.



Low Vacuum Cans

Good Cans with Vacuum

BUCKLED CAN / DAMAGED CAN END TEST

Proximity inspection is used to identify missing or damaged can ends and buckled cans in applications where no vacuum or very limited vacuum has been created prior to the cooker. The proximity sensor will take up to 256 readings across the top of each can creating a profile of the can end. A buckled can or a can with a damaged or missing end will have a significantly different profile from that of a good sealed can. Cans with profiles outside of user set acceptable limits can be removed from the production line before they ever reach the cooker.



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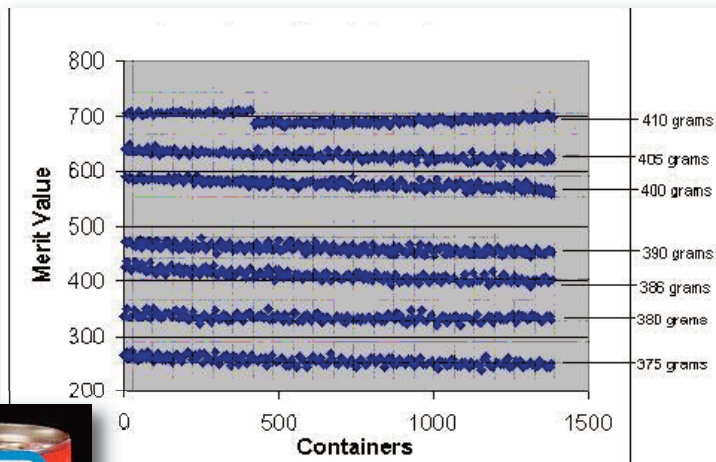
X-RAY UNDERFILL/OVERFILL TEST

Cans with varying fill levels were tested using the TapTone X-ray sensor. The target fill level was determined by the gross weight of the can. Samples were tested multiple times to develop an average merit value for the specific fill level. In this test, the target weight of 400 grams was determined to be a properly filled can.

Overfills - Cans with a weight of 410 grams or higher were determined to be over filled. These cans would not cook evenly in the cooker due to the lack of head space.

Underfills - Cans with a target weight of 390 or less were considered underfilled. The excess head space in these cans could expand when heated in the cooker.

This would cause excessive internal pressure and could cause the can end to burst inside the cooker. The graph shows the TapTone X-ray system is capable of detecting cans that are overfilled as well as cans that are underfilled.



SUMMARY

The TapTone proximity sensor can detect leaking cans, dented/buckled cans, missing and damaged can ends. The X-ray sensor will detect underfilled and overfilled cans. These defects are the most common causes of cooker jams. When placed after the seamer and prior to the cooker, the TapTone Proximity/X-ray system will detect these defective cans and remove them from production, eliminating the potential of a cooker jam.



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Package Inspection Systems
A Teledyne Technologies Company

www.TapTone.com

49 Edgerton Drive • North Falmouth, MA 02556 USA

P: 508.563.1000

F: 508.564.9945

E-Mail: taptone@teledyne.com

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