



TapTone

APPLICATION NOTES

News and information from Teledyne TapTone, a leader in the package inspection industry.

IDENTIFYING SEAL DEFECTS AND COCKED CROWNS IN BEER BOTTLES

Tested: 640 Milliliter Glass Beer Bottles with Metal Crowns

Inspection Desired: TapTone's T500-A Acoustic Sensor is well-established in the brewing industry as the inspection system of choice in testing the seal integrity of glass beer bottles at production line speeds. The cocked crown option is a supplement to the T500-A to improve rejection of bullnose, dented, dimpled, wrinkled, crushed and cocked crowns. A small percentage of cocked crowns have the same acoustic response as a good crown making them difficult to detect. With the cocked crown option, the T500-A is ideal for insuring that no beer bottles reach the consumer without the highest quality.

Tested with: TapTone 500-AC Acoustic Sensor with Cocked Crown Option



▲ A beer bottle passes under the inspection station of the T500-AC. The inset shows a crown defect.

TECHNOLOGY CORNER *HOW IT WORKS*

The T500-A uses acoustic technology to measure pressure in beer bottles that do not have a measurable lid deflection. The acoustic sensor works by applying a "tap" to the top of each container. The "tap" is produced by a large electromagnetic pulse, which excites the container lid. The lid vibrates at a natural resonant frequency "tone" based on internal pressure. The resultant "tone" signal is sensed by a microphone, digitally sampled and stored in memory for processing. The Digital Signal Processor (DSP) produces a real-time signal spectrum and calculates the resultant frequency of the "tone" for that container lid. This frequency value is then compared to user set limits where containers with a frequency response outside these limits are rejected.

The cocked crown detector is an optional sensor for the T500-A to increase the detection and rejection of damaged crowns. It works by measuring the crown curvature with an analog proximity sensor and comparing it to the curvature of a good crown. If the detector determines that the measured crown is outside of a predefined set of criteria, a reject signal is sent to the T500 controller to remove the bottle from the production line.



▲ TapTone 500-A Acoustic Sensor

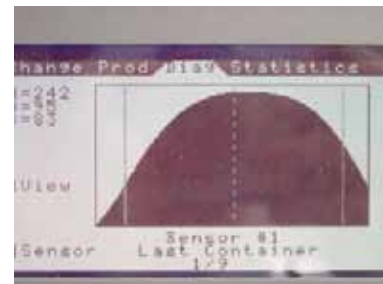
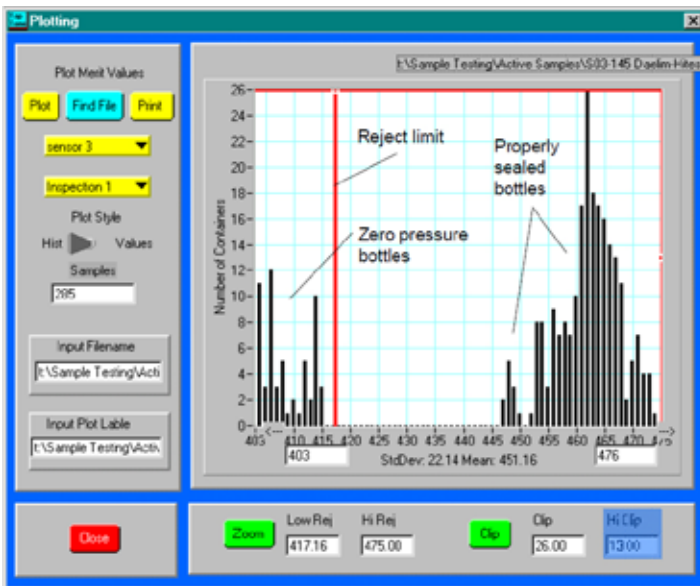


TEST SUMMARY

For this application review, five glass beer bottles with metal crowns were repeatedly tested on a loop conveyor running at high speed. One bottle was made to read zero pressure. The T500's acoustic head and photo triggers were adjusted per the application requirements. The data plot below shows that the T500-AC can easily distinguish between the sample bottles tested. A difference of 47 merit values between

low pressure and properly sealed bottles will allow the operator to set up parameters for rejection of defects.

The test clearly shows that bottles with a loss of pressure or defective caps can be identified using the TapTone 500-AC.



NOTE: Merit value is a calculated number generated from the processing of an algorithm to compute a resultant from a set of data values.

- ▲ The top profile shows an undamaged crown. The bottom profile shows a dented crown. Crown defects can clearly be identified using the T500-AC.



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