



TapTone

APPLICATION NOTES

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

TOTALVU® SENSOR

Integrated Camera Solution for Total Package Inspection

Application: Vision inspection for container closure and labels on dairy product containers

Tested: Multi-sided Quart, Half Gallon, and Gallon plastic containers of dairy products

Inspection: Cap, Tamper Ring, Date and Lot Code, Label Presence, Label Positioning, Correct Label, Barcode

System: TotalVu Vision Inspection System with four camera setup and T4000-PC User Interface

Challenge: Post-pasteurization contamination remains the most common cause for contaminated dairy products. Inspection from both State and Local regulatory agencies ensure stringent sanitation requirements are met by Dairy Farms, In-Processing Plants, Dry Milk Plants, and Receiving and Transfer Stations (establishments where raw milk or cream is received for further transport). Milk and Milk product packagers and handlers under the 'Grade "A" Pasteurized Milk Ordinance and recommendations of the United States Public Health Service/ Food and Drug Administration (FDA) must also comply with 21 CFR Sections 1/10; 101; 108; 110; 113; 130; 131; 133 ; 173.310; and 178.1010. Nonetheless, critical quality inspections of finished products must be performed to ensure that all packaging and handling guidelines in the Dairy manufacturing industry are followed. TapTone's TotalVu complete vision inspection system can assist in detecting many post-pasteurization processing issues with dairy product containers in production plant environments.

TECHNOLOGY CORNER *HOW IT WORKS*

TapTone's TotalVu Vision Inspection System with its smart camera technology is capable of accurately inspecting and processing data for almost any defect or flaw visible to the human eye. Today's fast and demanding production lines may reach line speeds of up to 2000 containers per minute. Visual inspections for packaging defects on products with the naked eye at these production line speeds is impossible but with TotalVu, it can be achieved. Configurable with up to four cameras, each camera inside TotalVu's inspection bridge is capable of performing multiple vision inspections simultaneously and can present detailed inspection data for enhancing production line processes.



TapTone TotalVu



TECHNOLOGY CORNER *HOW IT WORKS* (Continued)

The TotalVu System will capture and process images of passing containers for each camera configured. Each camera is programmed with a product solution to inspect through a series of taught images and protocols to determine a 'Pass' or a 'Reject'. Utilizing DSP technology, the controller analyzes the measurements and assigns merit values to each measurement taken on a container. Any merit values outside of the user set tolerances result in a reject signal transfer to the processor which signals a remote reject system to properly separate good vs. bad containers. All of the processing is done in just fractions of a second - typically in milliseconds (ms).

Depending on the complexity and profile of the container, 1 to 4 cameras may be positioned to increase the resolution and focus required for optimal inspection accuracy. Too many inspections with one single camera may increase the inspection processing time drastically. This may minimize the resolution in the images resulting in image processing issues and false rejects. For best results, a complete understanding of an application is essential for configuring unparalleled production quality control with TotalVu.

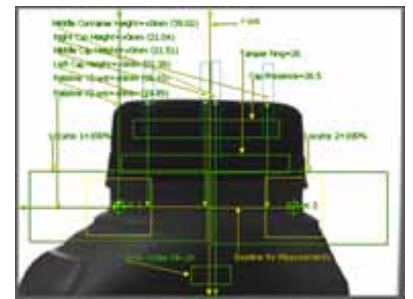
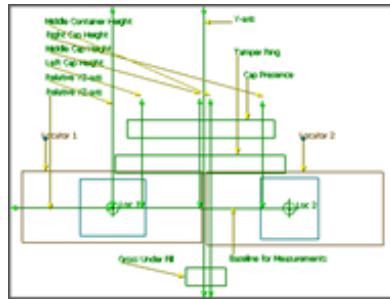
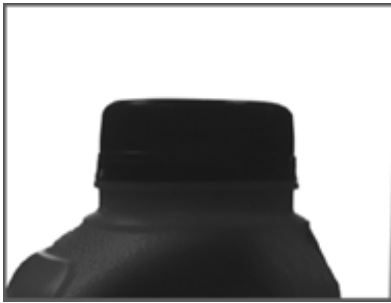
TapTone's TotalVu Vision Inspection System allows for easy management of operator responsibilities during product changeovers. Because production line products and their respective inspection requirements are understood prior to TotalVu configurations and installations, TapTone configures the TotalVu system so that only a few simple adjustments are required by an operator to perform a product changeover. Application dependent, a product changeover can be performed in just 3-5 minutes.

Figures 2a - 2d, on page 3, show the process of developing vision inspection solutions for front (0°) and back (180°) TotalVu camera images, solution overlays, and the final solutions for a one quart milk container. When solutions have been developed and applied to each product's areas of interest, containers passing through TotalVu's inspection bridge will trigger up to four cameras simultaneously to capture images, process them to compare certain pre-set inspection criteria, and pass or reject them accordingly. The images on pages 4-5 demonstrate common application inspections which are capable with TotalVu.

Fig. 1 Featured product: 32 fluid oz. (one quart) container of milk with a 38mm cap.

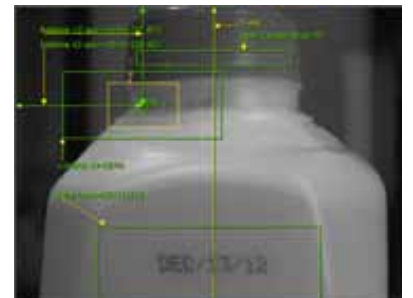
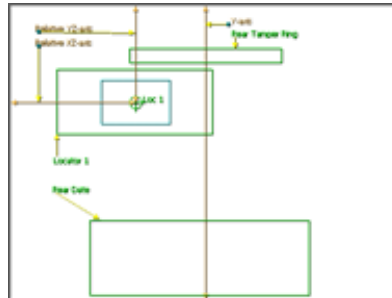


Developing a Solution for a Front Cap and Fill Level Inspection



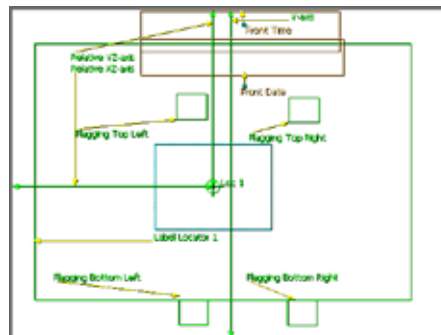
▲ **Fig. 2a** Camera 1 –Front cap and fill level of a one quart milk container

Developing a Solution for a Rear Cap and Date Code Inspection



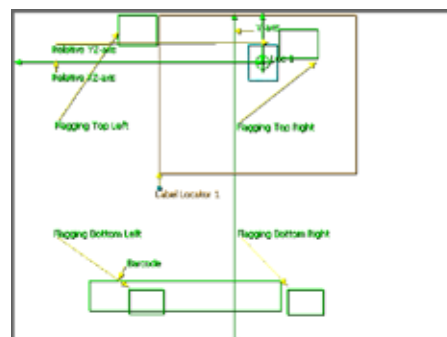
▲ **Fig. 2b** Camera 2 –Rear cap and date code of a one quart milk container

Developing a Solution for a Front Date & Lot Code and Label Inspection



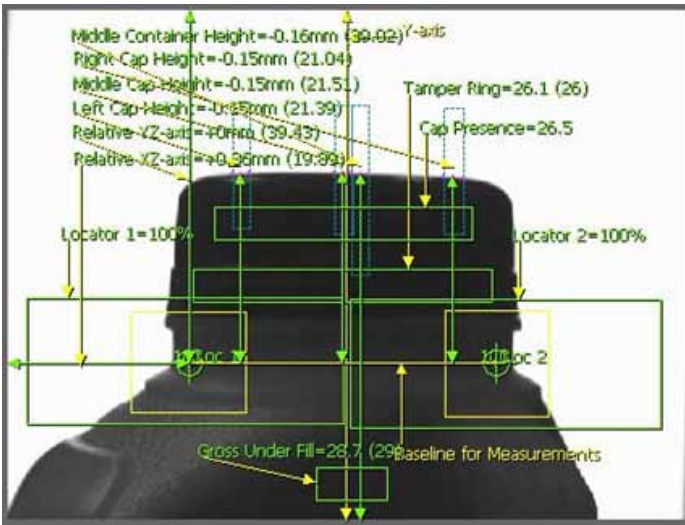
▲ **Fig. 2c** Camera 3 –Front date & lot code and label of a one quart milk container

Developing a Solution for a Back Label Inspection

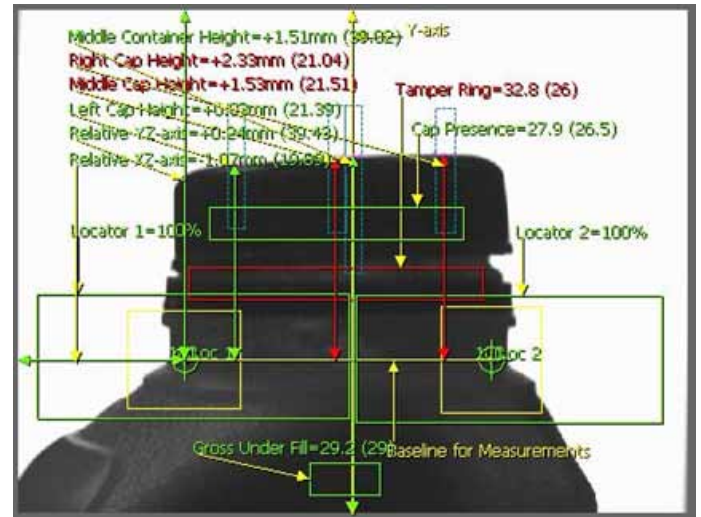


▲ **Fig. 2d** Camera 4 –Back label with barcode of a one quart milk container

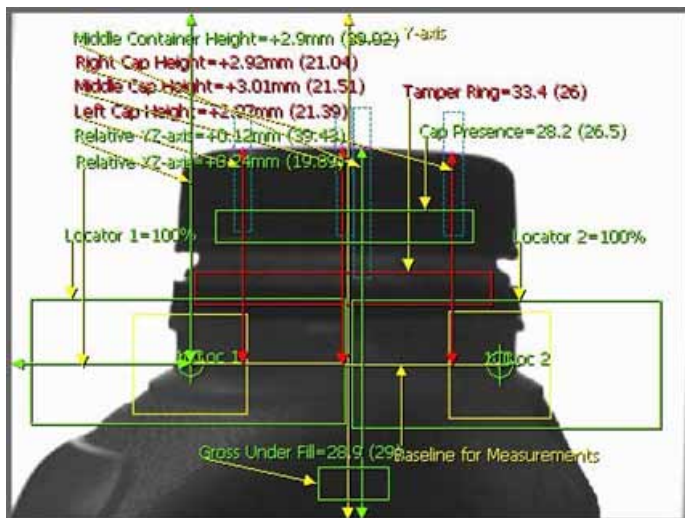




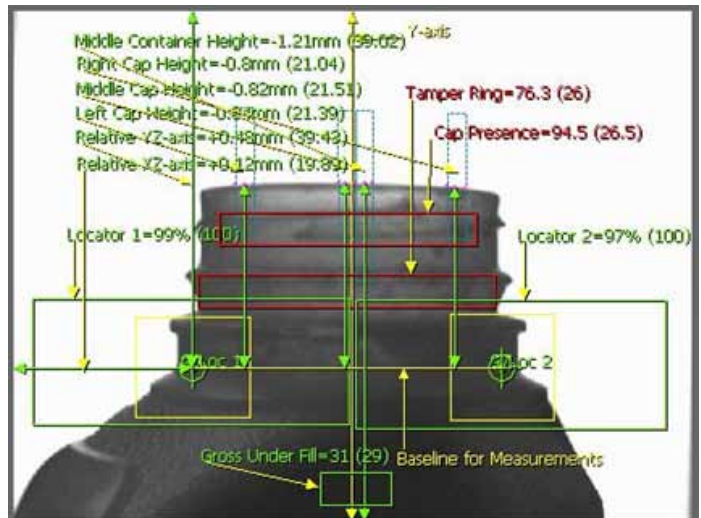
Good Front Cap and Fill Level Inspection



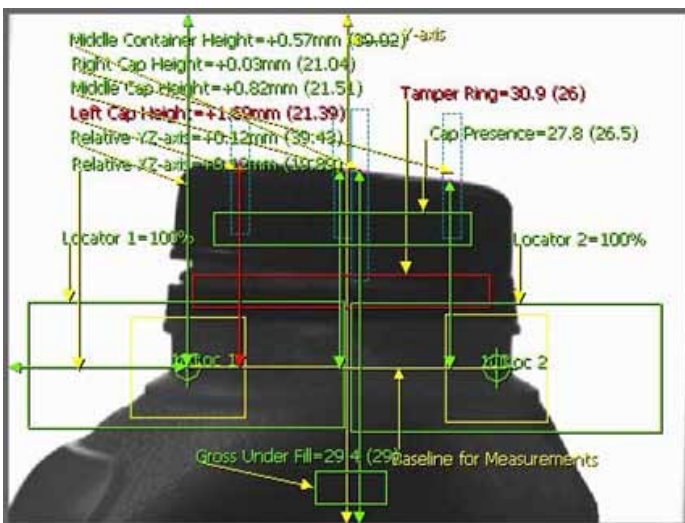
Cap Coked Right Detection



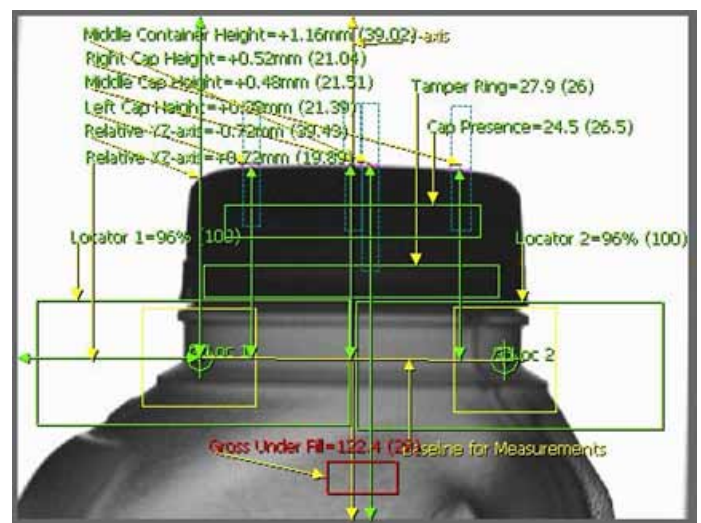
High Cap Detection



Missing Cap Detection

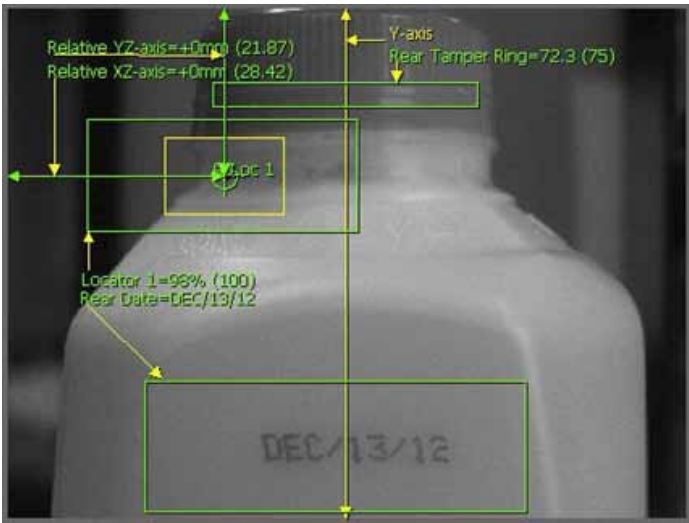


Cap Coked Left Detection

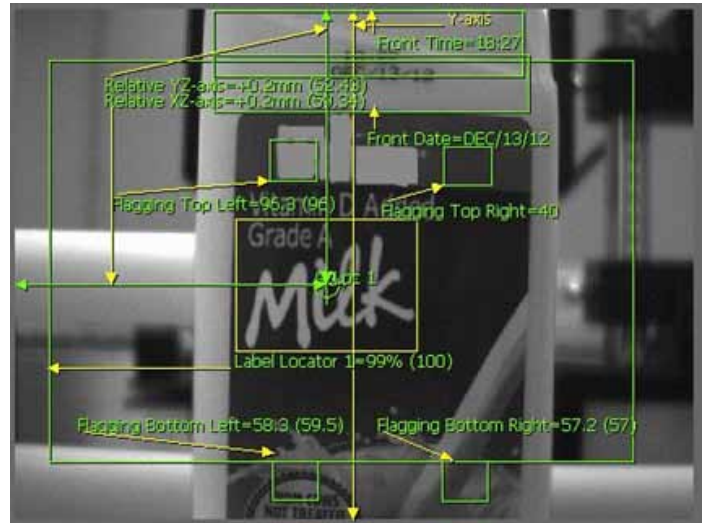


Under Fill Detection

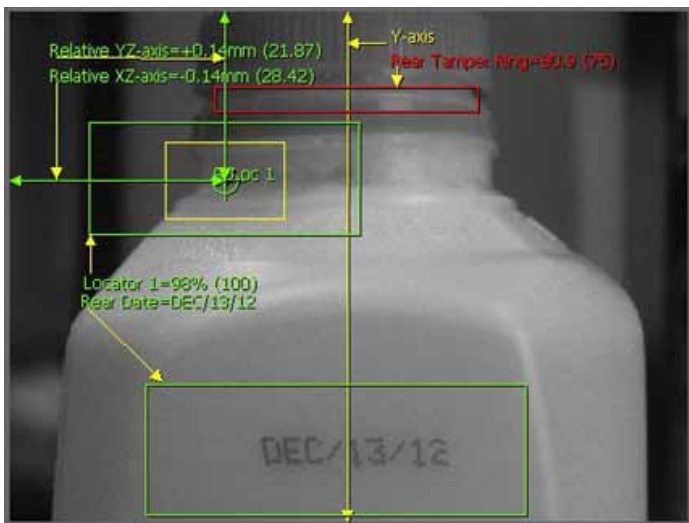




Good Rear Cap and Date Inspection



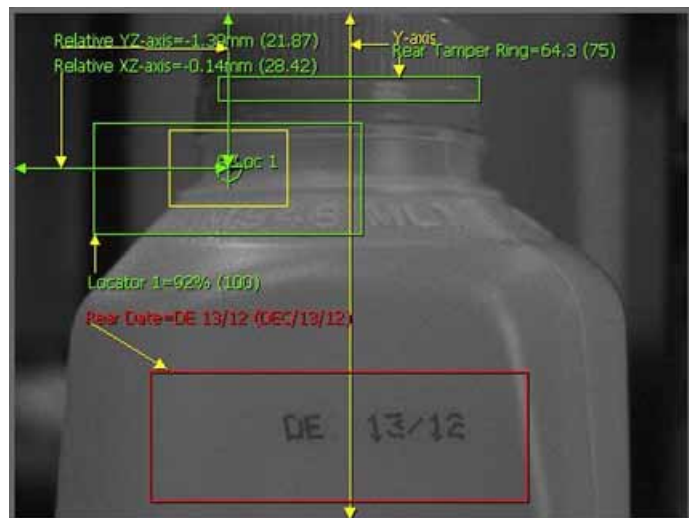
Good Front Date, Lot Code and Label Inspection



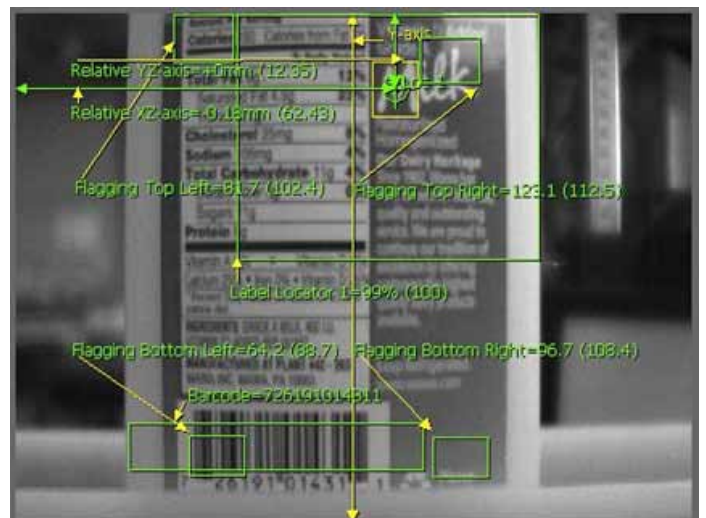
Tamper Ring Defect Facing Rear Detection



Missing Digits in Front Time Stamp and Flagging Label Detection



Missing Characters on Rear Date Detection



Good Back Label Inspection



APPLICATION SUMMARY

Uniform orientation of containers with Coding and Label Information is critical in achieving inspection results for Date & Lot Code and Label Information shown above. Presentation of Coding and Label Information must be perpendicular to the TotalVu cameras' line sight of view presenting itself in the same manner the information was taught. If information is presented skewed or rotated from the Calibration Image ('taught image'), visual inspection of the information via TotalVu cameras may result in a 'Failed' status even though the information is still in camera's view. Generally, Date & Lot Code and Label Information inspections on round containers are done immediately after the Coding process or inside the Labeler due to inability to predict orientation of information on these containers during travel.

The illustrations on the previous pages represent actual inspection images from a sample test performed on 32 fluid oz. (one quart) whole milk containers with a TotalVu Vision System (four camera configuration). Tolerances were defined and preset into the inspection solution of each configured camera for criteria comparison. Containers that met inspection criteria resulted in a **Passed** status and containers that didn't resulted in a **Failed** status.

The green and red status indicators of inspection tools used in each solution above clearly outline good versus problem areas for process enhancement consideration. Inspection data/statistics can be viewed in real-time or logged to a file. Last rejects can also be reviewed by selecting a 'View Rej.' tab from the default operator screen for verification of defects in reject stations.



◀ Multi-sided Quart, Half Gallon, Gallon, and Single Serve plastic containers of dairy products



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