



# 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 small profile pharmaceutical, nutraceutical, and vitamin containers

**Tested:** Small profile multi-sided and round pharmaceutical plastic containers with roll labels and plastic form-fit Tamper Bands

**Inspection:** Cap, Tamper Band, Date & Lot Code, Label Presence, Label Positioning, Correct Label, 2D Barcode / 2D Data Matrix

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



Small profile pharmaceutical, nutraceutical, and vitamin container samples.

**Challenge:** Pharmaceuticals packaging and the management of electronically documented label and container content information is a growing concern for the safety of consumers. By July 1, 2016, all wholesalers and repackagers of pharmaceutical products must accept and forward products with the California e-pedigree requirements. By July 1, 2017, all pharmacy and pharmacy warehouses must accept and pass e-pedigrees. For a complete understanding of how California's E-Pedigree requirements and definitions may affect you or your customers, visit the Department of Consumer Affairs Board of Pharmacy at: [http://www.pharmacy.ca.gov/about/e\\_pedigree\\_laws.shtml](http://www.pharmacy.ca.gov/about/e_pedigree_laws.shtml).

### 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.

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'



TapTone TotalVu



## TECHNOLOGY CORNER *HOW IT WORKS* (Continued)

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 3a - 3d and 4a - 4d, (following pages) show the process of developing vision inspection solutions at TapTone. Front, back, side, and top view product images, solution overlays, and the final solutions for a 60-count multi-sided container of Cetirizine HCl / Antihistamine with a 38mm cap and a 100-count round container of Acetaminophen with a 43mm cap are shown below. 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 4 cameras simultaneously to capture images, process them to compare certain pre-set inspection criteria, and pass or reject them accordingly.

**Featured Products:** A multi-sided container of Cetirizine HCl/Antihistamine with a 38mm cap that travels with a uniform orientation (Fig. 1) and a round container of Acetaminophen with a 43mm cap that travels with random orientation (Fig. 2)



▲ **Fig. 1** Images of the featured multi-sided container of Cetirizine HCl/Antihistamine

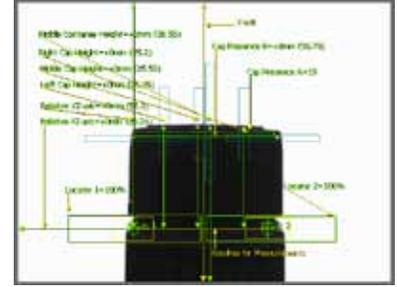
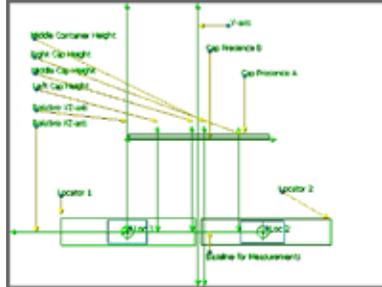


◀ **Fig. 2** Images of the featured round container of Acetaminophen



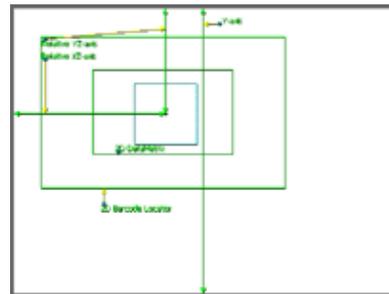
# Multi-sided Container of Cetirizine HCl/Antihistamine

## Developing a Solution for a Cap Inspection



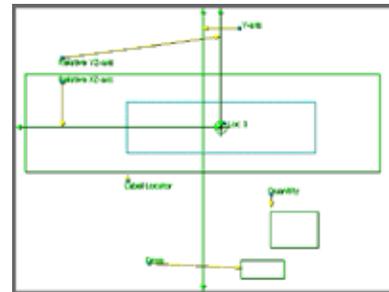
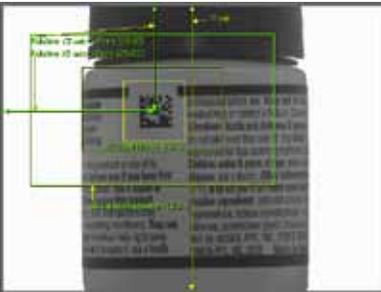
▲ Fig. 3a Camera 1 –Cap of a 60 tablets container of Cetirizine HCl/Antihistamine

## Developing a Solution for a Front Label Inspection



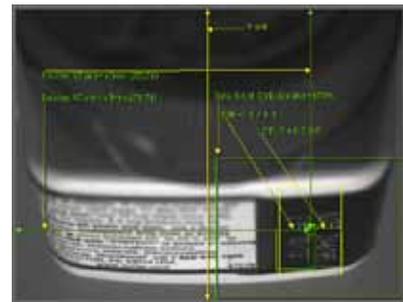
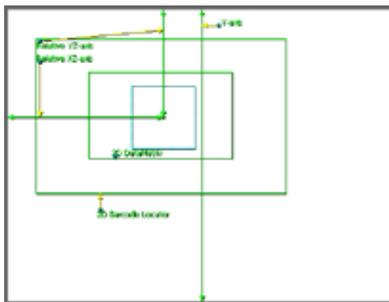
▲ Fig. 3b Camera 2 – Front label of a 60 tablets container of Cetirizine HCl/Antihistamine

## Developing a Solution for a 2D Barcode / 2D Data Matrix Back Label Inspection



▲ Fig. 3c Camera 3 –Back 2D barcode/2D data Matrix of a 60 tablets container of Cetirizine HCl/Antihistamine

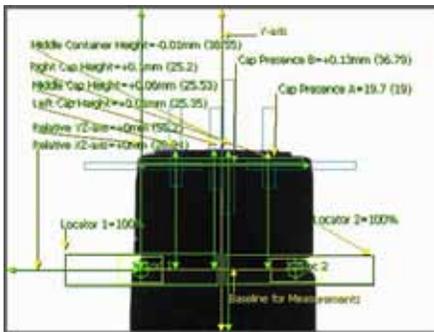
## Developing a Solution for a Top-Down Date & Lot Code Inspection



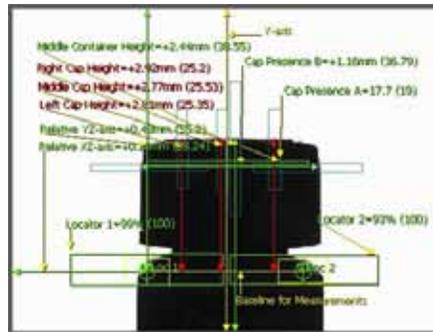
▲ Fig. 3d Camera 4 –Left side (270°) date & lot code of a 60 tablets container of Cetirizine HCl/Antihistamine



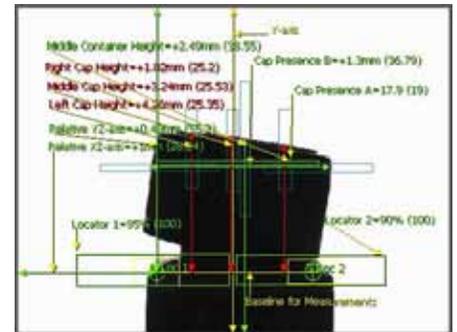
# TotalVu is Ready to Inspect the Multi-sided Container



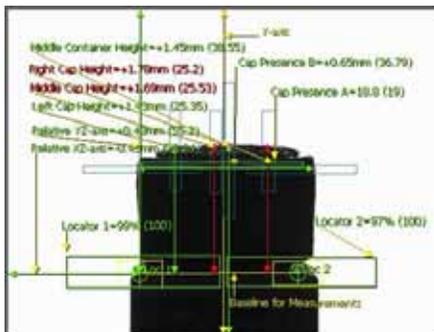
Good Cap Inspection



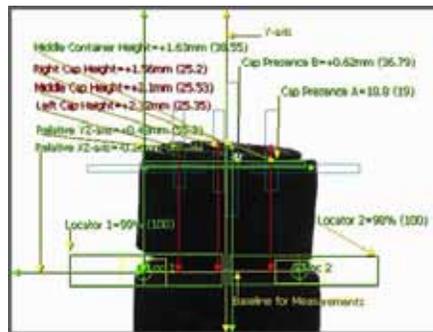
High Cap Detection



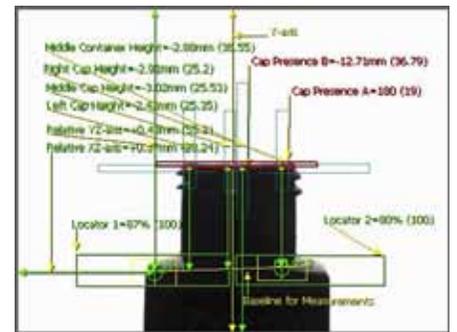
Cap Cocked Left Detection



Cap Cocked Right Detection



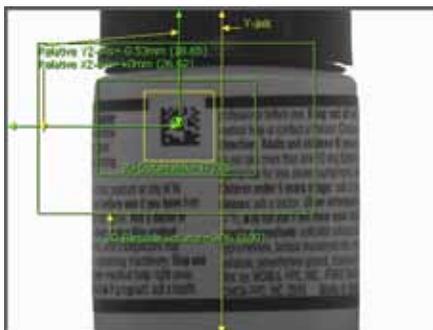
Cap Cocked Back Detection



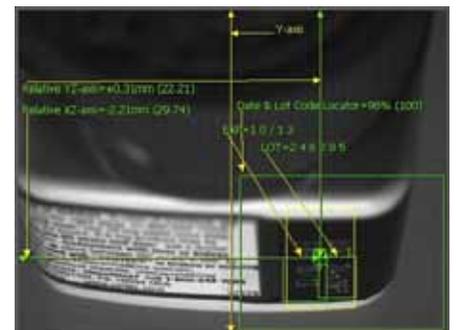
Missing Cap Detection



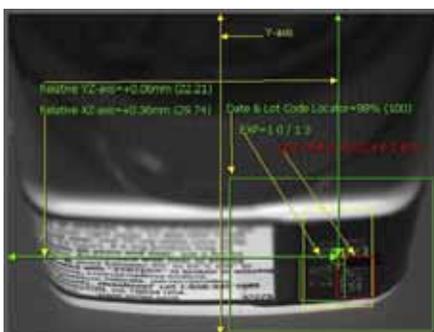
Good Front Label Inspection



Good 2D Barcode/2D Data Matrix Inspection



Good Date & Lot Code Inspection

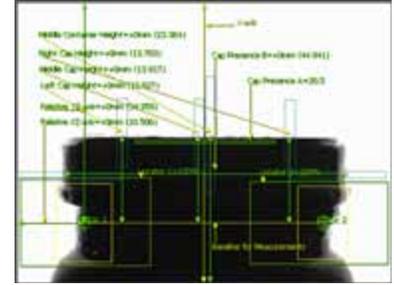
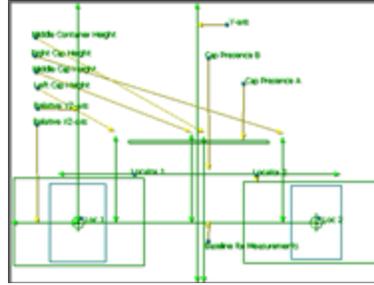


Missing Character Date & Lot Code Detection



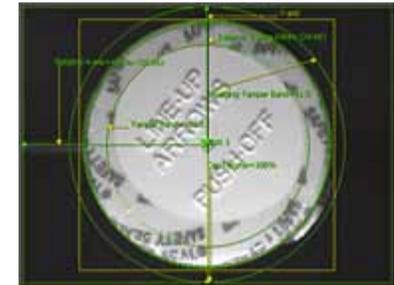
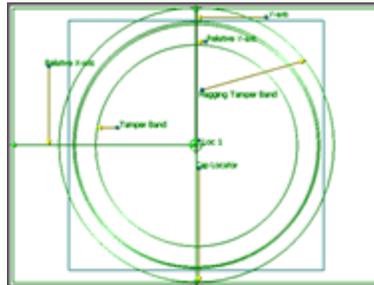
# Round Container of Acetaminophen

## Developing a Solution for a Cap Inspection



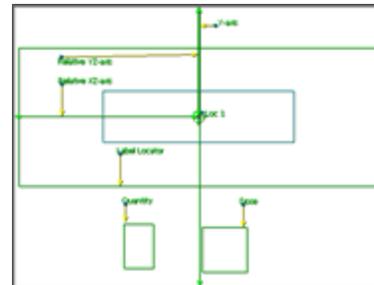
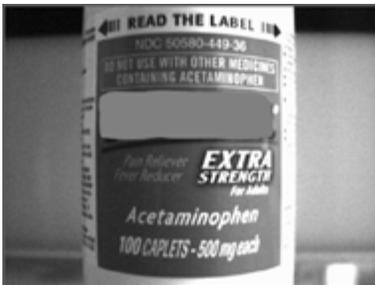
▲ Fig. 4a Camera 1 –Cap of a 100 caplets container of Acetaminophen

## Developing a Solution for a Tamper Band Inspection



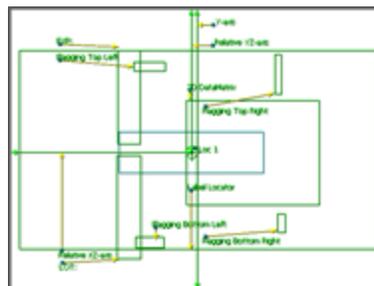
▲ Fig. 4b Camera 2 –Tamper band of a 100 caplets container of Acetaminophen

## Developing a Solution for a Front Label Inspection Inside a Labeler



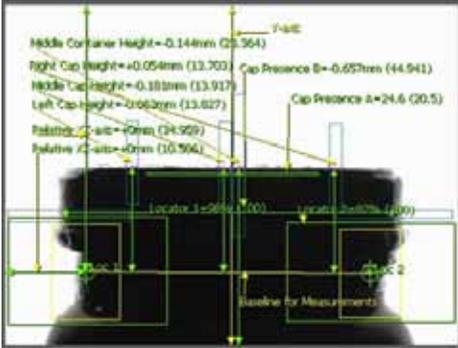
▲ Fig. 4c Camera 3 –Front label of a 100 caplets container of Acetaminophen

## Developing a Solution for a Back Label Inspection Inside a Labeler

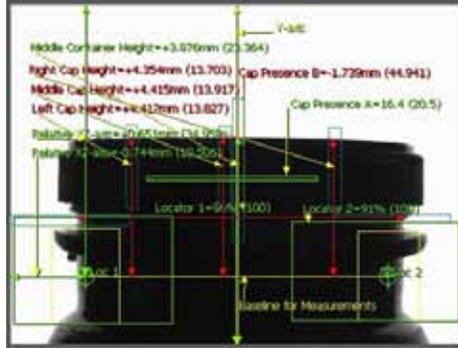


▲ Fig. 4d Camera 4 –Date and lot code, and 2D barcode / 2D data matrix of a 100 caplets container of Acetaminophen

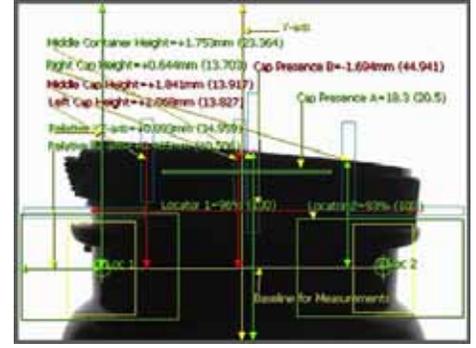
# TotalVu is Ready to Inspect the Round Container



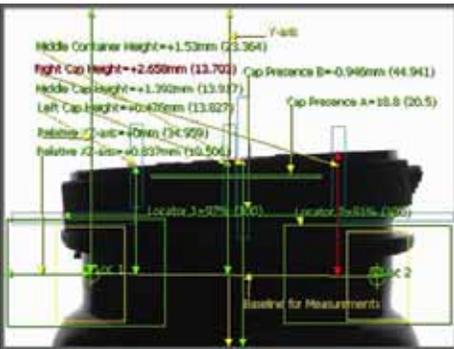
Good Cap Inspection



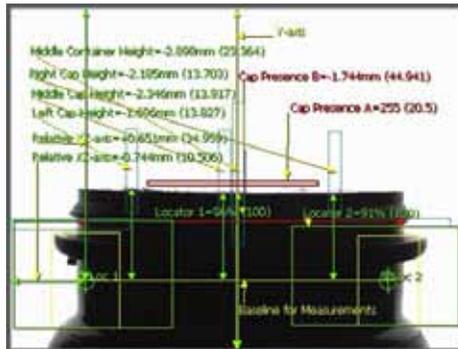
High Cap Detection



Cap Cocked Left Detection



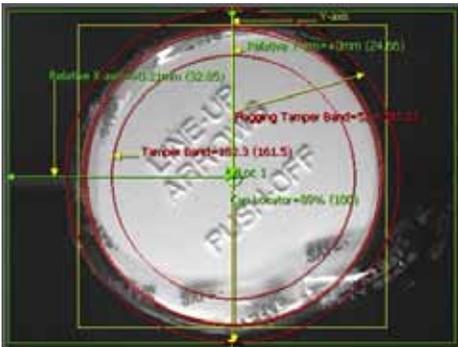
Cap Cocked Right Detection



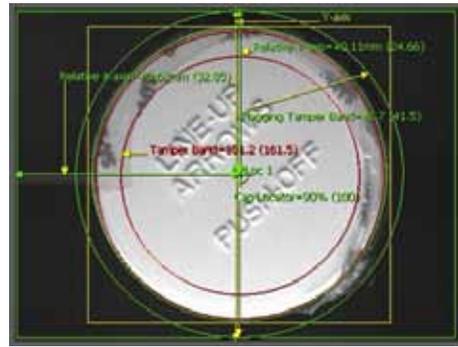
Missing Cap Detection



Good Tamper Band Inspection



Flagging Tamper Band Detection



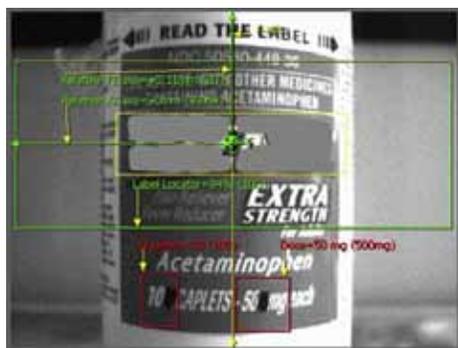
Partially Missing Tamper Band



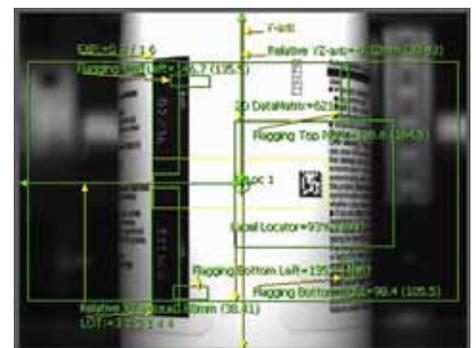
Missing Tamper Band Detection



Partially Missing Tamper Band



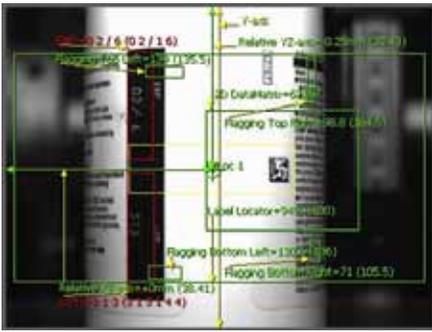
Incorrect Label Detection



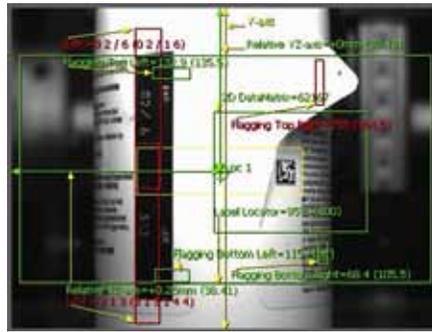
Good Date & Lot Code and 2D Barcode / 2D Data Matrix Inspection



# TotalVu is Ready to Inspect the Round Container



Missing Characters in Date & Lot Code Detection



Flagging Label Detection

## 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 figures and illustrations above represent actual inspection images from a sample test performed on a multi-sided 60 Tablets - 10mg each container of Cetirizine HCl / Antihistamine and a round 100 Caplets - 500mg each container of Acetaminophen with a T4000-PC TotalVu Vision Inspection System. 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.

TotalVu is TapTone's complete vision container inspection system which offers a fully integrated vision solution for demanding visual closure, fill level, coding, and label inspection applications. Integrated with the TapTone T4000-PC User Interface, TotalVu can be configured with up to 4 cameras for quick and accurate non-contact visual inspections or paired with other TapTone inspection systems such as Acoustic, Force, and X-ray sensors for an unparalleled level of confidence when it comes to delivering quality in overall packaging and processes for your products. A single controller can support multiple inspection applications such as leak detection, fill level and vision inspections.

TotalVu allows for 16 preprogrammed product changeovers with up to 1024 inspection solutions/sub-solutions to choose from in each camera configured. Cameras in the TotalVu may be positioned independently to visually inspect almost any container as it passes through the system's inspection bridge.



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