



Machine Vision Consulting
Inspiring Vision Across Industry

CodeSure[®] White Paper



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CodeSure®

What is CodeSure® ?

CodeSure® is a fully integrated hardware and software turnkey solution suite that provides a two part inspection system for moving or rolling cans. Machine Vision Consulting's (MVC) unique system design supports machine code verification on can lids using optical character verification (OCV) as well as inspects label correctness by verifying the barcode or the 2D Data Matrix on the labels.

The can lid inspection module “CodeSure CanLid” and the label verification module “CodeSure CanLabel” can be purchased separately or together. Each module can operate as a stand-alone system.

CodeSure CanLid is used to verify the code information that is printed by an ink-jet printer on the end of a can or on top of a jar lid. This code information may include a product code, a date code, a lot code, or other factory production code.

CodeSure CanLabel is used to verify that the correct label has been applied to a can when a roll-through labeler is used to apply the label. The can’s label contains an identifying code, whether it is a UPC barcode, a 2D Data Matrix code, or other barcode standard. As the can rolls out of the labeler, CodeSure reads the barcode and verifies that the expected code has been imaged, indicating that the expected label has been applied.

This white paper is divided into 2 sections to answer Frequently Asked Questions, the first section to review **CodeSure CanLid** and the second section to review **CodeSure CanLabel**.

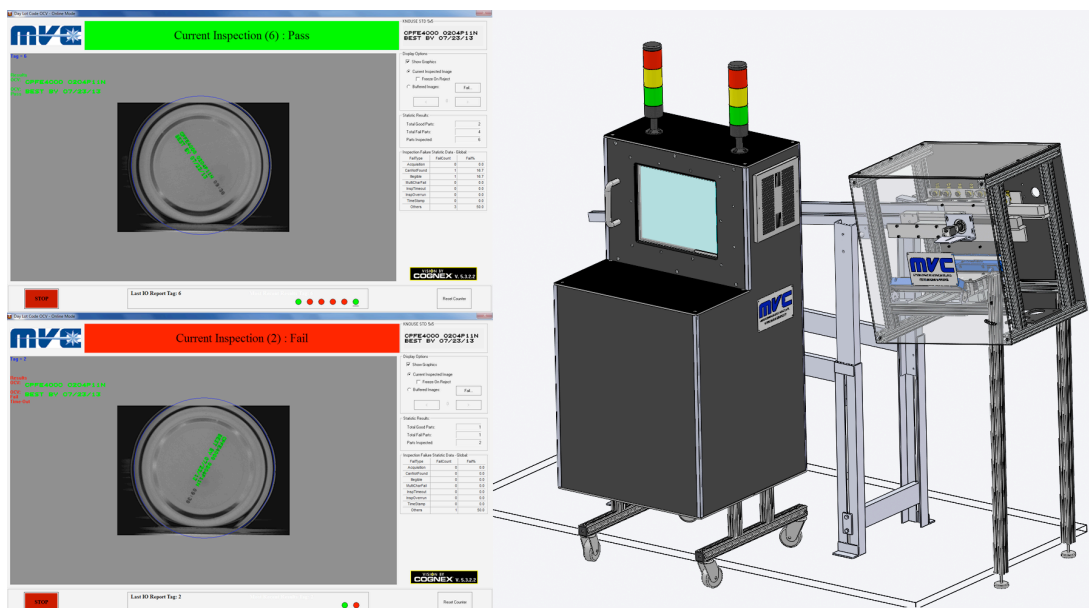


Figure 1. CodeSure CanLid Screens (left); CodeSure CanLid & CanLabel System (right)



CodeSure CanLid – Verifying the Can’s Printed Lid Code

What type of lid code verifications are supported by CodeSure CanLid ?

CodeSure CanLid will:

- Verify that the expected printed code is present.
- Verify the quality and legibility of each character in the printed code.

How does a lid code fail verification?

A code on a can lid may fail verification when:

- The printed lid code does not match the string that is expected, indicating that an unexpected can has entered the production stream.
- The printed code or a character in the code is illegible.
 - A quality score is provided for each character in the lid code to maintain control of legibility.

Cans with incorrect or illegible lid codes will be rejected.

What problems are prevented by CodeSure CanLid?

CodeSure CanLid prevents:

- a can with unexpected contents from being processed by verifying that the printed lid code is the expected one.
- the incorrect label from being applied to a can by verifying the expected printed code is presented on the can lid.

CodeSure CanLid monitors the number of rejects detected within a specified number of cans to detect sequential problems with the printer or the can feeding process before a large quantity of faulty codes or incorrect cans are processed.

Why is preventing these problems important?

Since cans are blind items:

- It is impossible to know what is inside the can except by reading and verifying the printed code on the can lid. The cans are processed in-line or are bulk-loaded into a labeler.
- Unless the lid code is verified as being the expected one for every can, the packager risks running the wrong can through the labeler and ending up with a mismatch between the label and the can’s contents.

Verifying the lid code can identify a mismatch between the lid code and the can’s contents. This can potentially avoid a consumer issue (e.g., allergic reaction) due to a can being mislabeled.



The printed lid code must not only be correct so that the proper label is applied; it must be legible.

- The printed code may have missing or damaged characters or the can may be presented upside-down so that no code is presented and the can cannot be verified.
- In the event of a product recall, the lid code provides important information that determines whether the can in question is included in a recall or containment event.

Under what circumstances do printing and labeling errors occur?

Printing and labeling errors may occur when:

- The print head is clogged.
- There are liquid droplets on the can or lid surface when the code is printed.
- An unexpected can has been placed into the can stream by an operator.
- A routing error has sent the wrong cans through the labeling system.
- The can is presented upside-down, with the printed side on the conveyor surface.

How is CodeSure CanLid different from Typical OCV Systems?

CodeSure CanLid is unique in that it operates by training character shapes synthetically.

- It uses the same font file used by the printer to train the expected shape and appearance of each printed character.
- Image-based font training is not required, therefore maintaining better system validation.

CodeSure CanLid compensates quickly and automatically for any normal print variations such as size, stretching, compression, and slanting in the printed lid code.

Must the Cans and Lid Codes be Oriented to be Verified?

No, the cans and the lid codes can be randomly oriented with the lid code facing the camera.

Must the Cans be Upright or Does CodeSure CanLid Support Roll-Through Labelers?

CodeSure CanLid supports verification of both:

- upright cans presented in a single-file line on a conveyor, and
- cans being processed in roll-through labelers.

Where Should CodeSure CanLid Be Positioned On The Line?

Different line configurations can be optimized with CodeSure CanLid. If the printing and labeling process is continuous, CodeSure CanLid can be positioned after the lid code printing process and prior to labeling to verify that the lid code is correct and legible.

In bright-stacking operations, CodeSure CanLid can be positioned to (1) provide inspection and verification for can lids after the printing process before warehousing and (2) verify incoming cans from



the warehouse prior to the labeler to confirm that the can's contents are the expected contents based on the printed lid code before the label is applied.

Is IO Communication Provided for Tracking a Failed Can to the Rejecter?

Yes. CodeSure CanLid includes a PLC and provides built-in can tracking. CodeSure CanLid can also interface directly with a rejecter or line controller that may already be in place.

Is a Can Rejecter Provided as Standard?

No. Since many manufacturing lines already have a rejecter in place, the rejecter is available as a system option.

Can different types of cans and lids be inspected by CodeSure CanLid?

Yes. CodeSure can verify the printed codes on can ends and lids that are flat in the printed region (typically food cans) or concave (typically aerosol cans).

What Printer Fonts are Supported by CodeSure CanLid?

CodeSure CanLid supports 5 X 7 dot fonts printed by popular ink-jet printers.

CodeSure CanLid uses these font files to automatically train the expected shape of each character so that image-based font training is never required. CodeSure CanLid automatically compensates for slight size changes, stretching, compressing, and slanting seen in the printed characters of a code. If required, MVC can train a non-standard font.

Are there any restrictions that should be observed to reliably verify the codes?

To reliably verify codes:

- The printer font used must be the same for all cans processed on the line.
- The codes should be printed in a clear flat center section of the can's end. That is, the print should be away from ridges and other geometric features that can add distortion to the printed code characters.
- Water droplets must not be present on the cans or they can create features that can be mistaken for print.
- No other geometry, such as embossing or double-printing, should be present in the area of the code.
- The code should be repeatably positioned near the center of the can's end.
- Care should be taken when replacing a serviced print head to minimize print slanting.

Consistent print quality leads to enhanced verification process quality.



How is the Expected Lid Code Entered?

The printed code information can be entered manually or automatically over the factory network.

What Security Levels are Provided to Protect the Integrity of CodeSure CanLid?

CodeSure CanLid provides password-protected access to prevent unauthorized changes to the expected code or other system parameters. Passwords can be changed as required.

Is event logging available to support system validation?

Yes.

What Inspection Speeds are Supported by CodeSure CanLid?

Every application is unique which makes it very difficult to calculate a standard inspection speed. A typical CodeSure CanLid system can verify the printed code at speeds over 600 containers per minute.

Can CodeSure CanLid be Deployed on an Existing Packaging Line? Or Only on a New Packaging Line?

CodeSure CanLid has been successfully deployed on both existing packaging lines as well as new packaging lines.

CodeSure CanLid requires approximately 3' of line space and never touches the canned product. The imaging module easily fits over the conveyance system on an existing packaging line.

Image Enclosure which includes:

What is CodeSure CanLid's Standard Hardware Configuration?

The components that comprise the standard CodeSure CanLid solution are:

- Image Enclosure which includes:
 - 1 Monochrome Digital Camera
 - Optics
 - Custom Lighting Solution

- Operator Workstation/Electronics Enclosure which includes:
 - PC
 - 17" Touch-screen Monitor
 - CodeSure CanLid Software
 - Fan or Vortex Electronics Cooling
 - Opto-isolated I/O via Allen Bradley PLC
 - IQ/OQ/PQ Documentation Package
 - User's Manual
 - System Schematics



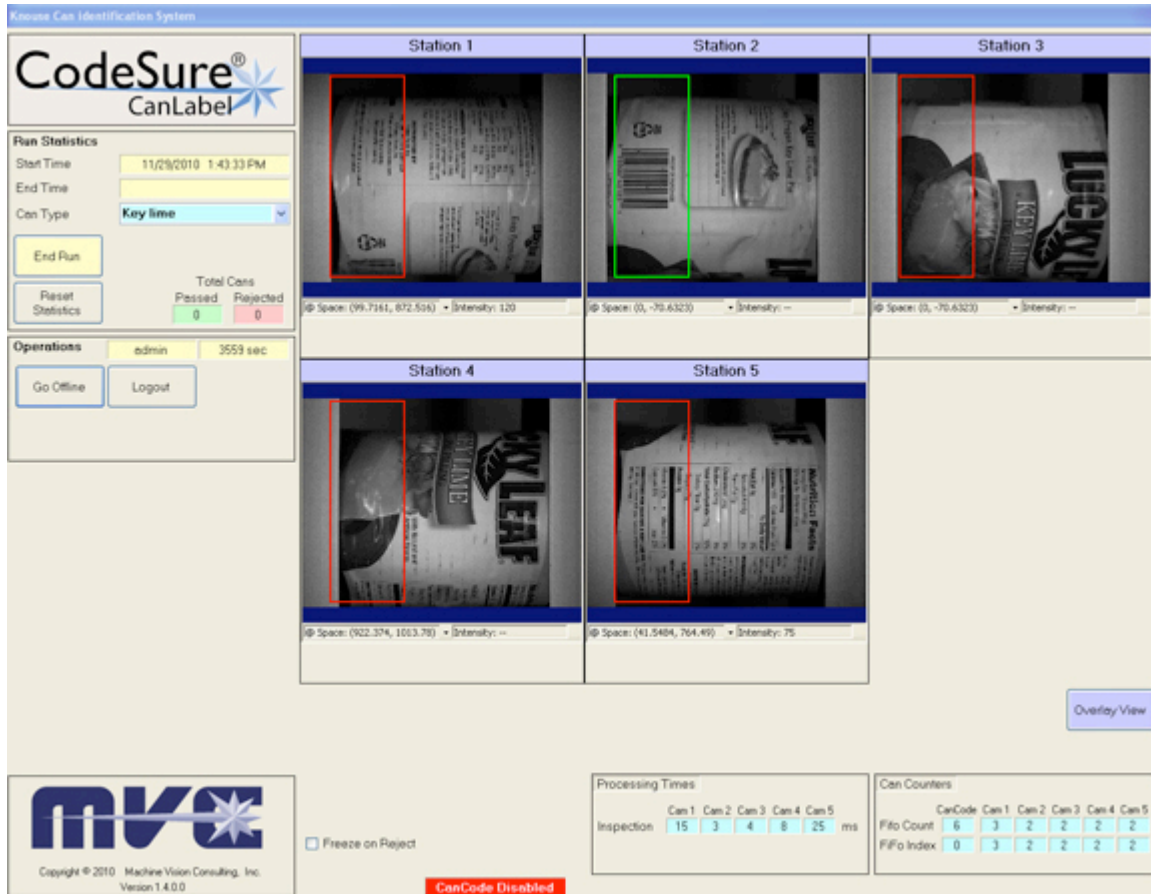
What Options are Available for the CodeSure CanLid?

Options available are:

- Rejecter (air required)
- Lockable Rejecter Box
- NEMA 4/4X: Wash-Down and Stainless-Steel Food Grade Construction

CodeSure CanLabel – Verifying the Label’s Printed Barcode

CodeSure CanLabel is a system that leverages multiple cameras to capture the barcode on a moving can. The following image provides a snapshot of the application’s main screen showing five camera images. Barcode acquisition is indicated on the image with the green border, Station 2.



CodeSure CanLabel Main Screen showing 5 camera images and barcode acquisition on Station 2.

What type of barcode verification is provided by CodeSure CanLabel?

CodeSure CanLabel will:

- Read the label’s barcode to verify that the expected label has been applied to the can.
- Verify the readability of the barcode on the label.

Labels with incorrect or unreadable barcodes will be rejected.



What problems are prevented by the CodeSure CanLabel system?

CodeSure CanLabel prevents an incorrectly labeled can from being shipped by verifying that the label's printed barcode is the expected one.

Verifying the label's barcode can identify a mismatch between the label and the can's contents. This can potentially avoid a consumer issue (e.g., allergic reaction) due to a mislabeled can.

CodeSure CanLabel checks to see that the label's barcode is correct, and it also checks that it is readable by a scanner. Therefore, CodeSure prevents cans from going through where

- The label may be missing, or
- The barcode is not readable by a scanner due to damage or tearing.

In addition to detecting single labeling errors, CodeSure CanLabel monitors the number of rejects detected within a specified number of cans to detect sequential problems with the labeling process before a large quantity of faulty labels are processed.

Under What Circumstances do Labeling Errors Occur?

Most companies have processes and procedures in place to avoid labeling errors. However, even with the best procedures and the best employees, human error can and does occur. Examples of possible errors:

- In most cases, labels come in from an outside vendor, so the wrong labels can be mixed in with the correct labels, unbeknown to the packager.
- An operator picks up the wrong stack of labels and puts the incorrect stack into the labeling machine without noticing the mistake.
- The labeling line has not been completely cleared from the previous run.
- Unauthorized changes have been made to an existing inspection system, with no record of who made the changes, when the changes were made, or what changes were made.

Does CodeSure CanLabel Support Roll-Through Labelers?

Yes. CodeSure CanLabel only supports cans processed in roll-through labelers.

Is IO Communication Provided for Tracking a Failed Can to the Rejecter?

Yes. CodeSure CanLabel includes a PLC and provides built-in can tracking. CodeSure CanLabel can also interface directly with a rejecter or line controller that may already be in place.

Is a Can Rejecter Provided as Standard?

No. Since many manufacturing lines already have a rejecter in place, the rejecter is available as a system option.



Can different can Sizes be inspected by CodeSure CanLabel?

Yes. CodeSure CanLabel can verify that the expected label has been applied on all standard can sizes.

Which Barcode Types are Supported by CodeSure CanLabel?

CodeSure CanLabel can read:

- UPC
- EAN
- Pharmacode
- 2D Data Matrix

How is the Expected Barcode Entered?

The expected barcode information can be entered by rolling a single can through the CodeSure CanLabel imaging system while in the “Train Barcode” mode.

What Security Levels are Provided to Protect the Integrity of the CodeSure System?

CodeSure CanLabel provides password-protected access to prevent unauthorized changes to the expected barcode or other system parameters. Passwords can be changed as required.

Is event logging available to support system validation?

Yes.

What Inspection Speeds are Supported by the CodeSure CanLabel?

Every application is unique which makes it very difficult to calculate a standard speed. A typical CodeSure CanLabel system can verify the barcodes at speeds over 600 cans per minute.

Can CodeSure CanLabel be Deployed on an Existing Labeling Line? or Only on a New Labeling Line?

CodeSure CanLabel has been successfully deployed on both existing roll-through labeling lines as well as new labeling lines. CodeSure CanLabel requires approximately 2 feet of line space (for the largest cans) and never touches the customer product. The imaging module fits over or under the roll-through conveyance system.

What is CodeSure CanLabel’s Standard Hardware Configuration?

The components that comprise the standard CodeSure CanLabel system are:

- Image Enclosure, which includes:
 - 4-5 Monochrome Digital Cameras (depending on minimum and maximum can size that will be run on the line)



- Optics
 - Custom Lighting Solution
- Operator Workstation/Electronics Enclosure that includes:
 - PC
 - 17" Touch-screen Monitor
 - CodeSure CanLabel Software
 - Fan or Vortex Electronics Cooling
 - Opto-isolated I/O via Allen Bradley PLC
 - IQ/OQ/PQ Documentation Package
 - User's Manual
 - System Schematics

What Options are Available for CodeSure CanLabel?

Options available for CodeSure CanLabel are:

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