Technology White Paper

Ensuring Labeling Accuracy in the Packaging Process

Using Barcode Systems and Machine Vision

MICROSCAN®

Ensuring Labeling Accuracy in the Packaging Process with Barcode and Machine Vision Systems

This white paper focuses on barcode and machine vision systems that can be used in packaging lines to ensure label accuracy and to comply with safety regulations as well as mandates or codes of practice imposed by retailers. Barcode and machine vision solutions help manufacturers adhere to these regulations and avoid product recalls, whilst ensuring quality and improving efficiency. Three specific applications are discussed in this paper:

- *End of Line barcode system that detects incorrect labels in a food packaging facility*
- *Machine vision OCR (optical character recognition) system that verifies contents in a high-speed canning line*
- *Machine vision OCV (optical character verification) system that ensures print legibility and label presence in bottle labeling*

Microscan Systems, Inc.

100% Label Accuracy with End of Line Inspection Systems

Accurate labeling is essential to today's food and beverage manufacturers, who need to cut costs, improve quality, and ensure accuracy in their packaging process in order to meet increased customer expectations, address a more competitive marketplace, and minimize the potential for product recalls. Mislabeled products pose a safety risk for consumers with allergies, and represent an enormous liability to the company in the form of costly recalls and associated lawsuits.

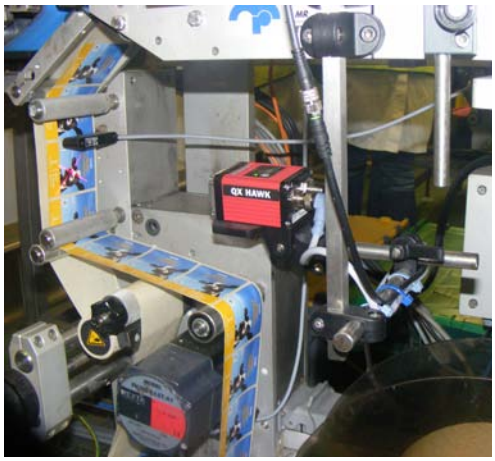
Products may receive an incorrect label during the packaging process for a number of reasons. Mislabeling can occur as the result of an equipment fault, such as a clogged printer nozzle that fails to produce readable text or barcodes. Simple human error can also be a factor, particularly in operations where manual inspection cannot keep up with line speeds and labeling errors are likely to be missed.

Automated data acquisition solutions including machine vision and barcode systems help to prevent mislabeled products by ensuring print accuracy and verifying product contents during the packaging process. 100% inspection delivers the peace of mind that products are properly labeled before they make it to the grocery store shelf.

More and more facilities are adopting these technologies as they realize the benefits that automated inspection brings to their process. While every operation brings a unique set of requirements and challenges, three sample applications that utilize barcode and machine vision technology to ensure labeling accuracy are outlined in this paper.

An End of Line barcode system can be used to ensure that a correct lid or cover is placed on the correct product. In this photo a 2D Data Matrix code is decoded on the lid, and then matched to the EAN barcode on the bottom of the product.

End of Line Barcode System Detects Incorrect Labels in Food Packaging Facility



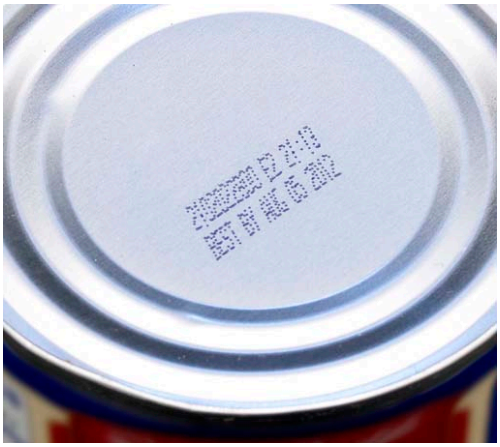
A barcode system can be used to validate labels prior to final packaging.

Many food packaging facilities currently rely on paperwork checks and human intervention to detect inaccurate product labels. Labels are attached to paperwork and manually signed off. Often errors can be missed, especially if label designs are similar, and this can result in costly food mislabels. This also applies to "spliced" reels in which multiple reels of labels are attached together. Packaging suppliers can easily splice the wrong labels together, resulting in an operator placing the correct label reel on a food packaging assembly machine, but inadvertently switching to an incorrect label design midway through the process. Operators packing the product may not notice the change due to high line speeds.

End of Line verification solutions use barcode readers to detect incorrect labels. This enables operators to take immediate action, such as rejecting a mislabeled product from the line, or stopping the assembly line altogether so that the problem can be corrected immediately.

An example of this type of solution is located in a U.K. cheese packaging facility, where barcode readers are positioned on conveyors throughout the plant floor to scan barcodes printed on the film or labels that will be applied to the packs. This application required a reader that could decode both 1D (linear) and 2D Data Matrix codes while meeting the high speed requirements and varying code locations. A 2D barcode reader relies on imaging technology to scan the encoded data, typically a six digit number which identifies the packaging. The data is then checked against a database to ensure there is a match. If a match is not detected, a signal is sent to stop the line and to prevent the wrong labels from going out on the products.

Machine Vision Utilizes OCR to Verify Contents in High Speed Canning Line



OCR characters printed on the top of cans are used to make sure that the correct label is put on the can.

In the canned food industry, like many others, contents are frequently put into cans and stored, unlabeled, as "brite" stock until needed. The only indication of what is inside the can may be a text string that identifies its contents. Machine vision can be used to ensure that otherwise unmarked products receive the correct label when it comes time to put the label on the can, bottle, or container.

In the canning operation of a leading U.S. producer of canned fruits and vegetables, a machine vision system uses Gigabit Ethernet (GigE) cameras positioned on multiple points of the packaging line to read three-letter text codes printed on the top of each can. The first camera is positioned at the beginning of the process, on a seamer line, after the vegetables are placed in cans. Using OCR the camera reads the three-letter code printed on the top of the can, which identifies its contents, to confirm its legibility. If a specified number of cans are deemed unreadable, the line is shut down, allowing the printer to be checked and fixed.

Multiple seamers merge into a single line, where the second camera reads the text code to verify the contents of the can. If the system reads an incorrect code, the can is kicked off the line. From here, most of the cans will be sent to a distribution site, where they are stored as "brite" stock and labeled as needed. The rest are labeled immediately. The robust PC-based system was implemented in order to meet processing speeds of approximately 1200 cans per minute in addition to its ability to overcome challenges such as inconsistent print size, character spacing, and ink color.

Machine Vision System Ensures Print Legibility and Label Presence in Bottle Labeling Operation

More and more, date/lot codes and barcodes are incorporated into product label designs. The accuracy and legibility of these codes is key to ensuring that products are traceable throughout the supply chain. Missing or unreadable codes may result in rejected shipments or product recalls that balloon in scope.

One U.S. bottle labeling operation uses a dual smart camera system to ensure that printed codes are legible and to detect any bottles that are missing a label. The first camera verifies that the date/lot code and barcode on each label are correct as the labels are fed through a labeller that runs parallel to the bottle conveyor. Each label is indexed and verified by the system using OCV to match the date/lot code to an expected string. A label that does not meet the required specifications will be tracked to the bottle on which it has been applied, and expelled in a reject station further down the line.

Note: While they are commonly confused, OCR and OCV are two distinct tools in a machine vision toolset. In OCR applications, a vision system reads the characters, whereas OCV verifies that these characters match an expected string. In production lines where data is expected to be consistent throughout a run, OCV is commonly used.

After the label application process, a second smart camera checks each bottle to detect any missing labels. The camera detects print and/or graphics on the label to ensure that each bottle has a label on it using an Edge Detection tool in the vision software program.

Summary

Automated data collection technologies including machine vision and barcode systems help manufacturers ensure 100% accuracy in their labeling process - critical for complying with industry labeling regulations, ensuring consumer safety, and ultimately, remaining competitive in today's marketplace.

Package Inspection Solutions from Microscan

Microscan has thirty years of experience providing barcode and machine vision solutions to a broad range of industries. A global technology leader with extensive solutions for ID tracking, traceability and inspection, Microscan's line of 1D and 2D barcode readers, machine vision systems, and machine vision lighting is backed by one of the world's most robust patent portfolios and years of proven performance in the field.

Microscan offers a number of products for package inspection, including smart cameras, machine vision software, and 2D imagers with OCR decoding capability.

Supported by a highly skilled global integrator network, Microscan products are known and trusted by customers worldwide for their high precision and reliability in industrial automation and control applications, with solutions ranging from basic barcode reading to complex machine vision inspection, identification, and measurement.

More information on Microscan is available at www.microscan.com.

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