



Label Mix-up Prevention

Using Vision to Improve the Labeling Process

METTLER TOLEDO

1 Introduction

In the United States, food producers and processors provide food and beverage products consumed by 250 million people each day. Each of those consumers relies upon the correctness of the labels to inform them and keep them safe. According to an American Institute of Baking (AIB) report, the number one reason for food product recalls is mislabeling. Mislabeling violates US Food and Drug Administration (FDA) regulations and renders the packaged product the object of a mandatory recall. Research done by The Food Safety and Inspection Service (FSIS) found that 43% of food recalls were from mislabeled products.

As a result of mislabeling recalls, most companies have established automated inspection regiments. These systems are able to detect defects; thus nearly eliminating the possibility of defective products and incorrect packaging reaching the customer.

In a high speed manufacturing or packaging environment, the capability of today's machine vision system to perform tirelessly, to communicate instantly with production line controls and adapt to changeovers in inspection targets makes it an extremely effective tool that is able to pay for itself quickly by reducing labeling errors, wasted products and product recalls.



2 What is Label Mix-up?

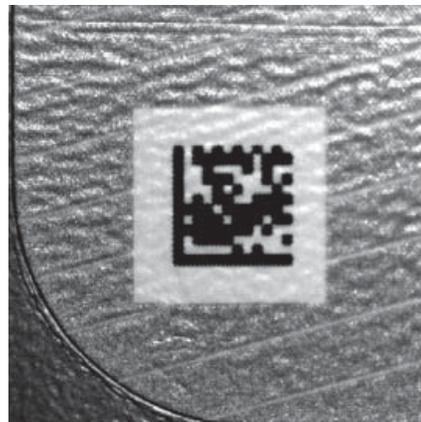
Label mix-up errors can include placing the wrong label on a product, mismatched front and rear labels, and incorrect product information on the label. When label mix-ups occur on a production line they compromise product integrity, brand reputation, company profits, and pose a risk to the consumer. The opportunity for label mix-ups on the factory floor are numerous and encompass many different factors.



A data matrix code on lid for an ice cream scround (left) is compared to data matrix code on the side of the scround container (right) to ensure that the lid is being paired with the proper container.



An example of a numeric Label Control Number (LCN) code on a pressure sensitive label.



An example of a data matrix Label Control Number (LCN) code on a molded in label.

3 What Creates the Opportunity for Mix-Up?

There are four main factors that contribute to label mix-up: operator error, manual inspectors, equipment malfunction, and system override.

Operator Error

Operator error is a mistake made by a human that is not an intentional act of harm or system sabotage. A simple example of operator error could be retrieving the wrong label off a pallet that contains many different label designs.

Another cause of label mix-up is product changeover on the line. A common practice in manufacturing and production plants is running more than one type of product or size of product on a single line. Changeover mislabeling occurs when line workers do not change the label at the same time as the product.

In both cases of mislabeling, severe repercussions to the consumer can occur if important ingredients or user instructions do not match the product content. Attaching the wrong label to a package could cost the manufacturer revenue, reputation and potentially endanger the health of the consumer who trusted the label.

Manual Inspectors

Advances in automated technology have steadily increased line speeds. In many cases, manual inspectors are not able to process parts as they pass at these speeds. This leaves the company vulnerable to uncaught labeling issues.

Equipment Malfunctions

Manufacturing plants produce tens of millions of products every year and the need for multiple print runs is commonplace. A slight printing error in the ingredient list, product quantity or product claim can affect the purchasing decision of the consumer. A misaligned, crinkled, torn, or incorrectly positioned label affects the end user's perception of the product and company image. It can also have dire consequences if an ingredient is omitted from the label, but not the product.

System Override

As companies try to maximize profits, line and production managers are under pressure to produce more products in a shorter amount of time. Without a fool proof quality system in place, a known label defect might be overlooked and shipped out in order to meet company quotas.

4 What is the Impact of a Recall to a Manufacturer?

As stated earlier, mislabeling violates FDA regulations and renders the packaged product the object of mandatory recall. A recall affects the future viability of a company's reputation and profitability.

Reputation

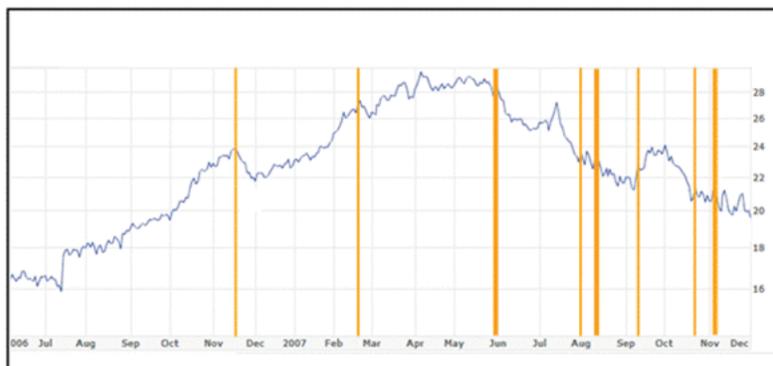
Brand reputation is formed based on the behaviors and actions of the company, and how the consumer perceives those behaviors and actions. It is especially important for retail and consumer product companies to maintain the reputation and integrity of their brand throughout their business operations. Maintaining a connection with buyers is critical since this bond can be easily undermined if consumers believe companies are selling products unworthy of their reputations. Product recalls weaken the bond between company and consumer.

Brand equity puts a value on the strength of a brand in the market. United States retailers estimate 17% of faulty goods were attributed to labeling errors. Types of labeling errors that affect the way a consumer perceives the company are folded, flagged, torn, missing, skewed and doubled labels. These labeling mistakes can cause dangerous confusion and looks unprofessional in the eyes of a consumer. Consistency and quality help build and maintain a company's equity.

Company Profitability

The ramifications of a recall are far reaching. Twenty-one percent of consumers will never buy anything from the parent company again. Fifty percent will switch brands temporarily and fourteen percent will completely discontinue purchasing the product.

As illustrated by this 2006-2007 chart of a Fortune 500 company stock shown below, the impact of a product recall can be devastating on a brand and on shareholder value. The orange bars mark share price at the time of a recall.



Averting a recall due to label mix-up saves the company's overall reputation, brand equity and bottom line profits. Prevention of label mix-up is a proactive way to continually improve and maintain consumer confidence.

5 Utilizing Machine Vision to Prevent Label Mix-ups

Today, label quality and correctness can be easily and affordably monitored through the use of machine vision technology. With an understanding of where the labeling issues occur on the line, a production manager can implement a reliable vision-based label mix-up prevention program. Some label mix-up prevention applications currently employed by packaging companies include: integrating vision into a factory management system, automating the code entry process, introducing a double blind code entry system, instituting a Label Control Number program, and implementing anti-vision circumvention technology to new or existing vision solutions.

Integrate Machine Vision into a Factory Management System

From a line's central control point, the production manager enters the recipe for the product to be run into the system. The recipe is then automatically distributed and programmed into all of the equipment on the production line including the vision system. Using the Factory Management System to program the vision system greatly reduces the risk of inspecting for the wrong labels on bottle.

Use Bar Codes to Program Product Codes into the Vision System

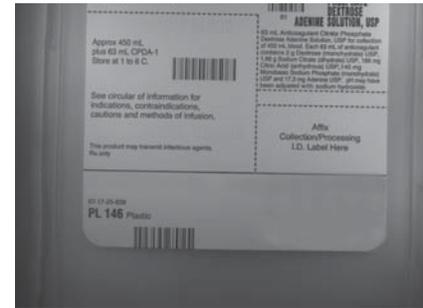
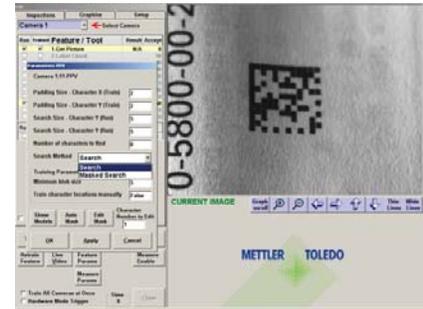
In this method, daily product planning sheets are printed to include a bar code that corresponds to a product/label type. The vision system operator scans the bar code for the next product with a hand held scanner attached to the system. Based on the input from the scanner, the vision system automatically does a changeover to inspect the labels on the new product being run. Using a barcode scanner instead of an operator to activate a product changeover in a vision system greatly reduces the chances of incorrect label information being entered into the QA loop.

Introduce a Double Blind Code Entry Procedure

Double blind entry is a code verification method by which two separate individuals are required to enter the product/label/expiry code into the vision system before a product run. If both the entered codes match, the vision system accepts the code and will verify that all products going through the system display the same code. Any product not presenting the proper code will be rejected from the production line. Double blind entry is a very effective method for reducing the number of labeling and coding issues caused by operator error – its effectiveness comes from having two different operators enter codes into the system.

Utilize a Label Control Number Program

Many companies have started implementing a Label Control Number system whereby each of a product's labels is assigned a unique ID/control number. Every time label information is changed or the design of the label is altered, the control number is changed. A vision system is used to ensure the proper version of a label is being applied to a product by monitoring the Label Control Numbers of the labels as they run through the inspection system.



5 Utilizing Machine Vision to Prevent Label Mix-ups

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Implement Anti-vision Circumvention Technology

With production schedules being tight, there may be temptation to run, pack and ship product no matter what condition the packaging is in. Operators have come up with a multitude of ways to try to bypass a vision system. Attempts include switching the inspection system to “bypass” mode to hanging an image of a “good product” between a camera and the production line so that the camera only sees the image of a good product. Anti-Vision Circumvention software detects and defeats attempts to go around the quality control that machine vision provides by monitoring and logging how product is presented to the system. It studies the X, Y, and Z position of the product on the line and throws up a red flag if there is not enough variation of position from one label to another.



6 The METTLER TOLEDO CI-Vision Advantage

METTLER TOLEDO CI-Vision inspection systems are designed to be simple to operate and maintain, thereby making it extremely easy for line operators to take “ownership” of the system. Once a new CI-Vision System has been installed and adjusted to specific customer needs, it requires minimal maintenance, and can easily be operated by existing line personnel.

Should there be any need for assistance after the system is installed, tested and commissioned, METTLER TOLEDO CI-Vision maintains a network of technical assistance centers around the world. METTLER TOLEDO CI-Vision offers multiple levels of machine vision training for operator, maintenance and administrative personnel. The goal is to make everyone involved with a quality assurance program as comfortable and competent as possible with the installed vision application.

Since 1979, METTLER TOLEDO CI-Vision has designed, built and installed turnkey machine vision systems to inspect a variety of products and processes. Each standard system is configured specifically to the individual customer’s needs. Custom systems are also developed to meet unique application demands. The technology used in machine vision systems is continuously changing, and METTLER TOLEDO CI-Vision takes advantage of each development. For example, its newest 360 Complete View system utilizes software that enables multiple cameras to inspect containers in any orientation. It then creates a complete 360-degree image of the result, while at the same time inspecting for label presentation and correctness. All of this takes place at line speeds of up to 600 products per minute. METTLER TOLEDO CI-Vision was also the first to develop Anti-vision Circumvention technology, which detects and defeats attempts to go around the quality control that machine vision provides.

6 The METTLER TOLEDO CI-Vision Advantage

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Many of today's less sophisticated machine vision systems do not offer the ability to automate changeovers, which limits them to performing on dedicated lines. Brand owners whose lines package a variety of products should be sure that the system they buy does enable automated changeovers.

Purchasers of machine vision systems need to be aware that rapidly changing technology may leave them behind if they choose a system or a manufacturer not adaptable to those changes. As you evaluate the system you are considering, evaluate the company that stands behind it as well.

7 About METTLER TOLEDO CI-Vision

METTLER TOLEDO CI-Vision is a leader in the design, manufacture and installation of machine vision inspection systems for a wide variety of applications, ranging from manufacturing and molding operations to high-speed beverage and food packaging lines. METTLER TOLEDO CI-Vision inspection systems include all hardware, software, installation, startup, training and documentation.

www.mt.com/ci-vision

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