Omron helps healthcare company minimize defects with can flange inspection system

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Overview

A major healthcare company was in need of a system to automatically inspect, identify and reject any damaged empty containers that could cause downstream equipment to jam. Omron helped the company solve this need with a can flange inspection system to check for defects using vision technology.

This solution provides the following benefits:

- Performs 100% can inspection with minimal false reject rates
- Removes bad products before they can cause problems in downstream processes
- Reduces total production costs and improves product quality
- Enhances brand reputation and boosts customer satisfaction

Background

A multinational healthcare company known for a wide variety of contributions to medicine – including pharmaceuticals, nutritional products, diagnostic assays, vascular medical devices and more – was having problems with jammed equipment and line stoppages due to the introduction of damaged containers into the filler/seamer machine. This was occurring at the company's 8/13oz filling line depalletizer for a baby formula product.

Constant line stoppages due to jammed equipment negatively impacted production efficiency and increased both line downtime and waste. In addition, containers with a damaged can flange raised quality concerns because they sometimes caused the seamer machine to create a defective seal and increase the risk of contamination and spoilage. Due to these major issues, the company sought to completely prevent defective products from leaving the facility and reaching customers.

A complete Can Flange Inspection System was built by an Omron machine builder partner.

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The costly impact of defective products

If defective products are allowed to leave the facility, they can have a severely negative impact on consumer satisfaction and brand reputation. However, these faulty items can also wreak havoc on the production line.

Depending on the characteristics of production equipment, malformed products can cause machines to jam, resulting in expensive repairs and wasteful downtime. Inspection at all stages of operation is essential.

Challenge

A number of challenges had to be overcome before the inspection system was completed. The first concern was that the system needed to be installed on a platform high above the plant floor, and it was important to make sure that any rejected cans would not be dropped to floor level where they could potentially hurt someone. The second concern was the high speed at which the cans were moving and the fact that there was no separation between cans. They needed to be separated for the inspection purposes without damaging the flanges.

These two images of cans as seen by the camera illustrates how the lighting helps make each can's edges bright to facilitate inspection for circularity and defects. The image on the left shows a properly-formed can, while the can on the right has a defect.

Solution

The company's new Can Flange Inspection System analyzes the outer rim of each can to verify that there are no defects in the flange area. If it finds a defective can, it provides an output signal for NG inspection so that it can be used for line/machine control. Omron installed a visual and audio alarm using a Stack Light and Buzzer to warn operators when the system detects a bad flange, and a kick-off mechanism was designed to remove bad cans from the conveyor. The kick-off station includes a catcher and guide to direct the bad cans into a bin.

As part of the Can Flange Inspection System, Omron provided a complete control panel and camera/light mounting assembly to fit around the existing conveyor. The control panel, HMI, cameras and light were all mounted on this assembly. The electrical control panel containing all of the electrical control components, including the main controller, vision controller, light strobe controller and power supply, was fabricated in a painted steel enclosure. An 8-inch color touch screen HMI device with a video input option for displaying the vision system camera image was mounted in a separate enclosure and located near the inspection camera.

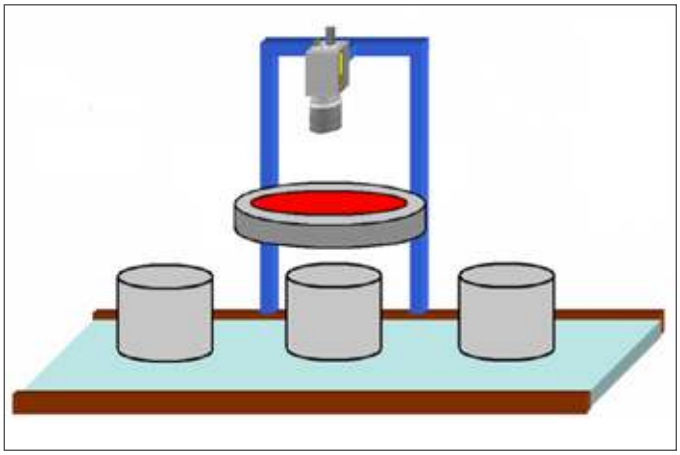
To address concerns about cans falling from the high platform, the design team integrated a reject bin guide tunnel into the inspection system. When a defective can is rejected, it is blown off the conveyor into a tunnel that guides it into a reject bin. The tunnel was made large enough to ensure that no cans would miss the target and fall onto the plant floor. To resolve the issue of can speed and separation, Omron designed a dual-wheel mechanism to separate cans ahead of the inspection site that allows them to maintain their high speeds. These two systems were integrated into the inspection system assembly described above.

Technology spotlight: FH Series vision system

Omron's powerful FH Series vision system provides high-speed, high-accuracy inspection and measurement for a wide variety of industry needs. Because the amount of image information in manufacturing is increasing, Omron developed this vision system to meet rapidly growing automation needs and higher performance requirements. Packed with technologies, the FH Series enables more customers to easily employ image processing.

FH series vision system – High-speed, high-accuracy inspection and measurement

The inspection camera was set up directly above the can, approximately 8 inches from its top and facing down onto the its flange area. A red low-angle ring light was set up just below the camera lens to highlight the flange, creating an excellent reflected ring on the flange of the can. The ring light causes the light to reflect off the outer edge of the can, turning the flange area into a solid white ring and making it easy to see its circular shape. If the can flange is defective, the rim of the can will have dents showing up as distortion of the circular shape.



This conceptual image shows the camera and lighting placement in relation to the cans moving along the conveyor.

The camera and the low-angle ring light are mounted above the conveyor, with the camera's position capable of being manually adjusted in two directions.

Results

The Can Flange Inspection System performs 100% inspection of all cans with minimal false reject rates to ensure that no bad products are delivered to the fill/seamer machine. The installation of this system improves the efficiency of the manufacturing process by removing bad products before they can cause problems in downstream processes. In addition, it eliminates the wasted time and manpower required to find and remove bad products after it has been packaged.

Installation of the inspection system also boosts the efficiency of the manufacturing process by eliminating the source for machine jamming on the filler/seamer machine. The system assists production and management personnel with evaluating product to ensure that no unwanted product is allowed to proceed through the manufacturing process.

Omron's solution served to lower total production cost and improve product quality while increasing profitability. At the same time, the system enhanced consumer satisfaction and helped to protect brand reputation through improved consumer safety. In addition to preventing faulty product from reaching the customer, automated inspection through the manufacturing process helps identify and automatically remove the defective items from the manufacturing line to increase production efficiency, reduce downtime, cut down on waste and lower production cost for an overall increase in profit.

The Can Flange Inspection System's front view shows the control panel and the operator panel.

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