

Contact Image Sensor Improves Label Inspection Processes

Contact image sensor (CIS) technology refines manual label inspections

Greg Wolfe, founder and CEO of Sobel Imaging Systems, Inc. (Huntington Beach, CA; www.sobelis.com), tasked with improving manual label inspection for a large medical device manufacturer, sought out machine vision technologies that could be easily integrated with existing printers. The refined machine vision processes had to manage more than 1,000 label formats and types while addressing workflow and space constraints. Instead of implementing common line scan cameras, which have distortion at the ends of the field of view and extensive workspace requirements, Sobel Imaging opted for KD Series contact image sensors (CIS) from Mitsubishi Electric US Inc.

Sobel Imaging Systems is a leader in developing and deploying label inspection systems in the medical device industry, where regulatory compliance in packaging and labeling is a high priority. The KD Series CIS application was developed for a medical device manufacturer that was struggling with its manual label inspection processes. The company wanted to deploy machine vision systems technology on existing label print lines without causing disruptions to existing labeling processes.

CIS offers significant advantages over traditional machine vision imaging technology. Existing labeling processes have long used optical reduction systems that require multiple cameras, lenses, brackets, and complicated calibration procedures. CIS technology, on the other hand, uses a single camera to create sustainable production techniques to enhance packaging integrity and efficiency. The higher image quality produced by CIS can improve thermal print inspection systems, which in turn helps make manufacturing techniques more efficient.

Manual Label Inspection Limitations

Regulatory compliance regarding packaging and labeling is a high priority in the medical device industry, and quality departments are fully aware of the limitations of relying upon human

inspection methods. Deploying machine vision can dramatically improve thermal print inspection applications, but many machine vision technologies are limited.

The medical device manufacturer working with Sobel Imaging had investigated other machine vision systems, but they were found unfeasible for many reasons. The manufacturer needed to create more than 1,000 unique label types, which required managing more than 1,000 machine vision inspection files. This was difficult for many machine vision systems to handle. Furthermore, machine vision that uses optical character recognition struggles to read characters without adequate spacing. Finally, standard machine vision cameras cannot inspect labels without major modifications to packaging lines and workflow processes. Integrating machine vision technology that addressed each of these issues into existing printers, while causing minimal labeling disruptions, was the top priority for Sobel Imaging Systems. A KD Series CIS model from Mitsubishi Electric, developed for the label inspection market, proved to be an ideal solution.



Using CIS for Print Inspection Applications

CIS technologies integrate lenses, light, and image acquisition into a single small head. The compact design and short working distance allow inspection solutions to be easily implemented into standard labeling equipment and printers, resulting in lower costs and significantly less spacing requirements. Thus the KD Series CIS dramatically improves label inspection processes in the medical device industry.

The KD Series CIS uses a single row of pixels, extending the full width of the label and generating a uniform and consistent image across the entire label. For large and/or high-gloss labels, this provides a significant advantage over traditional area-based machine vision cameras. Furthermore, the KD Series CIS incorporates high-resolution technology (300–600 dpi), generating high-quality images that improve print quality with inspections of small characters.

Sobel Imaging Systems implemented KD Series CIS solutions from Mitsubishi Electric for the large medical device manufacturer, allowing it to inspect labels up to 9 inches in width. The highly compact solution (width 150 mm) was integrated with current Zebra 1220 Xi4, 170Xi4, and ZT620 printing systems, helping to minimize disruptions to current labeling processes. The one-to-one optical system has a sensor resolution of 600 dpi. It utilizes GigE Vision along with hardware image processing and illumination control.

The KD Series CIS offers repeatable and reliable machine vision, acquiring undistorted images with sharp edge transitions. Furthermore, CIS machine controls enhance inspection efficiency by checking for package material quality and integrity.

Improving Label Inspection Techniques

KD Series CIS machine vision technology incorporates a high-resolution imager (300–600 dpi), which results in very high-resolution images and high print-inspection quality. Furthermore, the one-to-one optical system has a sensor resolution of 600 dpi, hardware image processing, and illumination control, allowing for more dynamic image formation adjustments compared to conventional optical reduction systems.

Sobel Imaging Systems developed customized PC software application solutions for the medical device manufacturer, allowing end users to easily configure and implement the technology for simple image acquisition and control. The label inspection software has an easy-to-use interface that can be integrated with a customer's enterprise database/ERP software in real time for complete closed-loop inspection processes.

The KD Series CIS integrates an array of sensor ICs, a rod lens array, and a light source inside a compact image sensor module. A short working distance means that the system can be installed closer to the surface of the web than traditional machine vision cameras. Its rod lens arrays improve accuracy because of its 1:1 imaging ratio, creating images with less distortion than ordinary line scan camera systems.

The KD Series CIS specified for this application features a 150 mm scan width, 2,448 total pixels, and a GigE Vision interface. Red and white LED illumination controls can be turned on and off, along with PWM ratio controls. The simple installation and compact design make the system ideal for use in medical device inspection applications. For more detailed KD Series CIS model information and specifications, [download the data sheet](#).