



Pattern Matching Vision Sensors Deliver 100% Inspection of a Specific Feature with Minimal Setup

Sometimes, all it takes to reduce waste and increase productivity may be monitoring one critical package element. If that element is always in the same place, or it should be, these low-cost vision sensors are just right. They require minimal setup and are easy enough to reset on the fly for fast production changeover. Let's look at how pattern-matching sensors deliver 100% inspection of a specific feature.

Cosmetic Tube Registration Slashes Scrap

Access Business Group, Inc., formerly Amway, was scrapping 1 to 3% of its moisturizer and other personal-care product tubes because of an unreliable photocell on the tube filler used for reading registration marks on tubes. By changing to a pattern-matching vision sensor, scrap rate was reduced to 0.1% or less, at least a 90% reduction from previous scrap rates.

Tube Filling Process

Access uses bottom-filled tubes on an IWK Model TFS-20 rotary tube filler for its pumpable personal-care products. The filler indexes 14 tube-carrying pucks through eight stations at the rate of 50 tubes/min, with a top speed of 65 tubes/min. Tubes range in volumes from 30 mL to 250 mL or more, and they are supplied in a product-dependent variety of shapes and colors.

At the filler's second station, the puck-held tube is rotated in place until the sensor's camera sees the registration mark, then signals a clutch mechanism to stop the rotation. The mark on the tube's backside must be seen and read correctly to properly orient the tube for filling. The tube is held in this same orientation in the puck as it indexes to subsequent fill and seal stations to ensure the seal is parallel with front-of-tube graphics. An off-center seal yields an unusable tube.

What's So Hard to See?

The registration mark on the tube's backside measures 1/4" x less than 1/8" wide. Typically the mark is printed in black. On dark tubes, it may be a white or gray box. Tubes can be either opaque or translucent, depending on the product. Access's biggest challenge was pinpointing the mark on hard-to-read translucent tubes.

"The prior [photocell] sensor was very troublesome because it was affected by tube characteristics, including reflections, even with the lights out and the room dimmed," says Bob Farmer, senior cosmetics facility engineer at the time. "The Omron vision sensor virtually eliminated that problem."

Solution Installation

Access replaced the photocell with a bracket-mounted, Omron F10-S30R pattern-matching vision sensor, located about 4" from the tube, pointing upward at a 15-degree angle to reduce glare. The sensor's controller, separate from the machine's PLC, is housed in a clear plastic enclosure mounted on the filler frame about two feet from the sensor. The use of the new sensor was part of a wider implementation of economical vision sensors on all five of Access's IWK tube fillers.

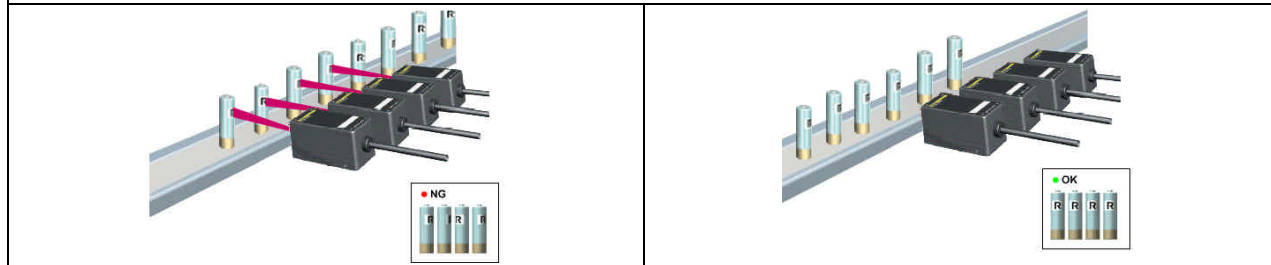
Comments About the Results

Access personnel acknowledge that the F10 [vision sensors] and its grayscale capability may be “overkill” for the application, but they give a high level of assurance in return. “It’s very forgiving,” notes Farmer, even though the position of the registration mark varies slightly from tube to tube. “It works great,” adds setup mechanic Russ Leach. The sensor features one-button teach function and a camera that can be set for auto, normal or wide-field views depending on the product being run. An additional benefit of using the F10 is that personnel don’t have to work with the lights out anymore.

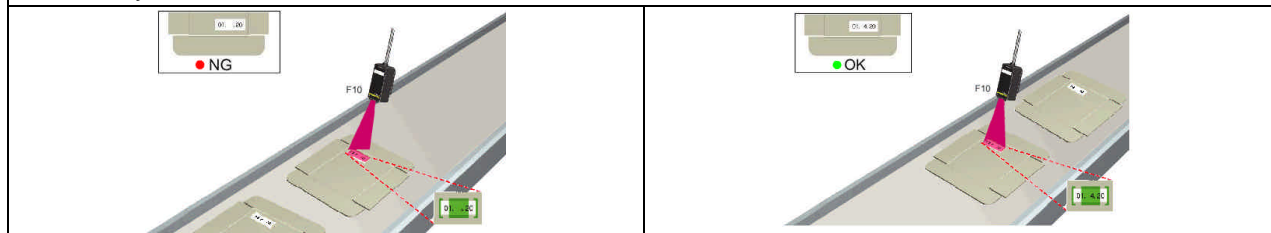
Wide Range of Packaging Applications

Pattern-matching sensors have been successfully applied to some challenging packaging applications. Examples include reliable detection for correct date, product position, and product identification stamp.

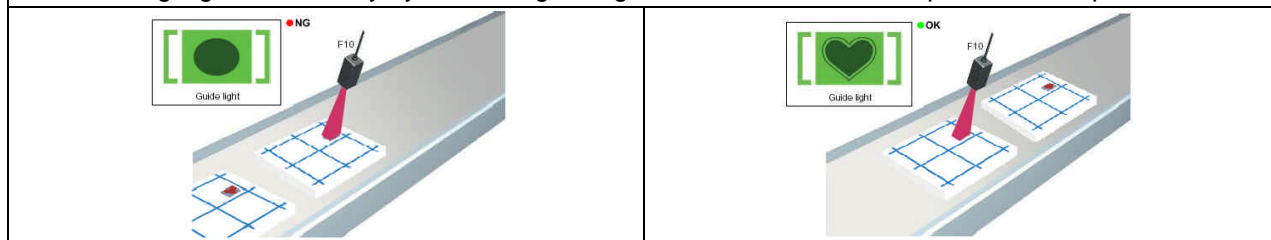
Rotational Positioning of Batteries: Target patterns can be quickly and easily registered to inspect marks and positioning, or to prevent the inclusion of incorrect product types. When all four batteries are facing the same way will the sensors OK them for packaging.



Inspecting for Missing Characters in Dates: The F10 pattern matching sensors are able to determine when characters are missing or the wrong character appears in printed dates on carton stock. Less expensive than OCR/OCV systems, the sensor compares the inspected image to a correct model stored in memory.



Inspecting for Missing Pages: The sensor compares the inspected object with a registered pattern, enabling detection of solid color objects. The sensor identifies an incomplete signature of printed pages or the wrong signature entirely by monitoring a single location for the correct pattern or shape.



For More Information:

[Vision Solutions Selection Guide](#)

[F10 Vision Sensor Data Sheet](#)