SICK
Sensor Intelligence.

Top 5 Applications for Inductive Sensors on Packaging Machines

Simple Sensors Deliver Productivity Boost

Amid the multitude of advanced technologies being integrated into automated packaging operations today, one of the most reliable and versatile components —inductive sensors—have been holding their own for decades. These simple sensors pack a big punch for OEMs and end users alike. We've compiled a list of the top five places where inductive sensors can positively impact productivity.

Many factors make inductive sensing attractive to modern packaging applications. Because the sensor uses inductive variations in an internally generated magnetic field to detect the presence of metallic objects, there's no need for the sensor to physically contact the target itself. That feature alone offers a host of advantages—consistent performance for a variety of product or machine position and counting applications in harsh and sanitary environments, resistance to dirt and other substances, adaptability to high-speed functions, and many more.

And because they contain no moving parts, inductive sensors tend to last longer than their mechanical-based counterparts (e.g., limit or reed switches). That makes them ideal for installation in machine configurations where access is limited, while also reducing replacement and maintenance costs. Inductive sensors' inherent durability also reduces the risk of unexpected—and costly—failures that can result in everything from the occasional missed item to full-scale line interruptions.

A new benchmark for inductive sensor technology

But though they share the same operating principle, not all inductive sensors are alike. For example, variations in component tolerances can have a significant effect on sensing distance, reliability, and temperature range. Similarly, how an inductive sensor is manufactured can also greatly influence its performance.

Just as the packaging environment has undergone a radical transformation over the decades, the design, composition, and performance of inductive sensors have evolved significantly since their 1950s-era forebears were introduced. Perhaps the best example of the "state-of-the-art" is the wide range of inductive sensors from sensor manufacturer, SICK, Inc., Minneapolis, Minn.

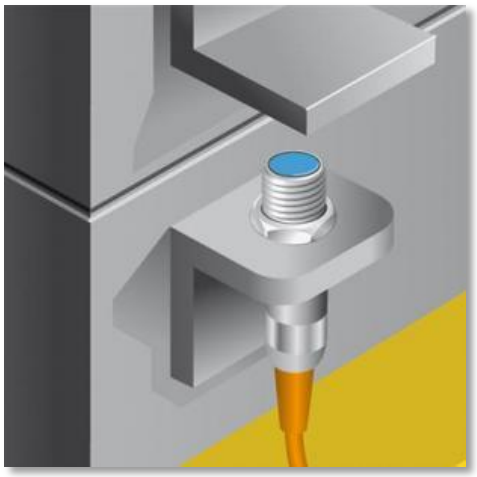
A proprietary Application Specific Integrated Circuit (ASIC) makes the difference. The built-in custom chip can be digitally calibrated after the manufacturing process, virtually eliminating the uncertainty of production-related tolerances. With the sensor parameters programmed on the ASIC, the sensing range is precisely defined, reliable, and repeatable. Users are thus assured that any target falling within that set distance will be consistently detected. The custom chip also takes the place of multiple components found in other inductive sensors, making the device simpler, yet literally able to do more with less.

ASIC technology also offers a high level of electromagnetic compatibility (EMC)—a critical factor given the preponderance of electronic and wireless devices found in today's packaging environments. The ASIC-based circuit incorporates a variety of circuit protection components that enhance the inductive sensor's resistance to electromagnetic interference. While standard manufacturing tolerances are +/-10 percent, the tolerances of SICK inductive sensors with the custom chip are +/-1 percent. That means a ten-fold improvement in reliability, both for the sensor and the overall system itself.

Then, there's the innovative process that SICK uses to manufacture its ASIC-based inductive sensors. Rather than using conventional multi-part assembly, hotmelt filling applies a pliable material around the sensor components. This unique casing design also allows the sensor to the rigors of even the most challenging environment, providing protection against shock, high vibration, humidity, and temperature extremes (-40º to +80º C).

Putting inductive sensing to work – Top applications

Given these attributes and capabilities, a SICK inductive sensor with ASIC technology can be applied to a variety of packaging system design and operation needs.



1. ***Position detection on a mechanical moving part***

   The process of inserting items into packages or cartons using metal flags fitted on conveyor chains is a relatively simple, yet precision-driven function, as exact positioning is essential to ensure accurate alignment of the product and its target. When mechanical limit switches are used, the packager risks wasted product, empty containers, line jams, and other problems due to wear and interference factors. The responsiveness and reliable detection qualities of inductive sensors, on the other hand, ensures more consistent alignment and follow-through functions. That results in less waste and fewer system interruptions, even at high line speeds.

2. ***Gear tooth detection for motion monitoring***

   Reliable, repeatable results are also critical when monitoring the position of chain guides or flexors, which drives other components of conveyor system. Often, simple detection sensors don't account for variations such as the product's location on the conveyor,

resulting in a late or even missed switching point. With SICK's ASIC chip technology, a packager can be assured that inductive sensor's high repeatability mitigate these variations, producing more consistent and synchronized detection.

3. ***Valve position control during processing***
   Most high-hygienic processes such as dairy or yogurt production utilize valves to switch system feeds from ingredients to cleaning solutions, then back when sanitation process is complete. Timing is critical for this operation, as is confirmation that the valve is in its proper position. Relying on a mechanical limit switch for such a critical function raises any number of reliability issues, as wear and accumulation of substances on the components could easily result in only partial movement of the valve, or no change at all. Because a well-manufactured inductive sensor is more resistant to these issues, processors have greater assurance of long-term, consistent valve operation.

4. ***Foil seal detection inside plastic caps***
   Is a cap's foil seal there, or isn't it? This simple question is usually answered through the use of a photoelectric sensor that "sees" inside the cap. With a wider range of foil seal material now being used, certain colors and textures may be missed by a photoelectric sensor, resulting in false readings. Because an inductive sensor looks merely for the presence of metal, the seal material's qualities are irrelevant. And because the cap is essentially transparent to the inductive sensor, there's no need to have the cap oriented to match the sensor's position as it passes by.

5. ***Can position detection on a beverage line***
   The metal detection qualities of a SICK inductive sensor with ASIC technology are also valuable on packaging lines for beverages and other canned products. In these settings, photoelectric sensors may not respond properly to reflections and color changes, or be compromised by sprays and leaks. The reliability of the ASIC sensor's programmed range, and the highest repeatability allows machine builders to incorporate a consistent space between the sensor and its targets, preventing potential damage while preserving seamless operation.

Making sound detection decisions

These are just some of the many ways an inductive sensor with custom ASIC technology can benefit a packaging or process operation involving close-proximity metal targets. Though all process-, material-, and owner-specific factors should be considered in selecting the best component for a particular function, there's little doubt that the versatility, ruggedness, and reliability of inductive sensors make them a valuable, cost-effective contributor to an owner's long-term productivity and growth objectives.

For more information about inductive sensors for packaging applications, contact Mark Langridge, Director, Sales & Marketing, Packaging, Food, Beverage and Consumer Goods at mark.langridge@sick.com, or visit our packaging sensors resource page at www.sickusa.com/simplesensors.