Application Note

Rotary Position Sensors

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MATERIAL HANDLING EQUIPMENT

Introduction

Various types of equipment are used for material handling such as forklift trucks, counterbalance lift trucks, scissor lifts, and other types of robotic equipment. Typically, variable control devices are integrated into the equipment to control the speed of the lift and speed of the truck. It is important that the variable controls be of high quality and reliability, able to operate in adverse environments and offer long deployment of life to ensure the safety of the operator as well as the materials being handled.

Background

Traditionally, variable control models used for speed controls were based on contacting technology. In general, contacting technology components are rated for 1 million to 10 million shaft revolutions and operate over a temperature range of -40°C to +125°C. However, designs have evolved to newer platforms that require technological enhancements for operator safety.

Newer platforms have been migrating to non-contacting solutions where component wear is no longer a concern. Originally, optical designs were used in the transition from contacting to non-contacting technology. However, optical designs are not application friendly in extreme temperatures, humid or dusty environments such as those encountered by material handling equipment.

In addition, redundant output designs are also being considered to ensure a fail-safe operation mode. Optical encoders with redundant output designs are feasible but at a much higher price. A better approach to address both issues is to consider a non-contacting magnetic solution.

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VIABLE TECH SOLUTIONS

Non-contact Hall Effect

Non-contacting magnetic, also known as “Hall Effect,” technology offers a reliable and high-quality solution where contacting technology falls short. Discovered by Edwin Hall in 1879, Hall Effect refers to the potential difference on opposite sides of a bar-shaped conducting or semi-conducting material (Hall element). This potential difference (voltage) is produced by a magnetic field applied perpendicular to the Hall element through which electric current flows. Figure 1 is provided to illustrate this concept.

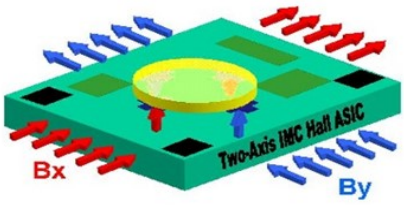

Figure 1: Hall Concept

Hall Effect technology produces an analog output similar to that of contacting type potentiometers without the aid of a physical wiper contact. There are no internal contacting parts subject to mechanical wear or failure, making this technology ideal for use in harsh environments where extreme levels of shock, vibration, temperature changes, moisture and dust particles are present. Figure 2 demonstrates the typical configuration for the Hall Effect sensor where a magnet is rotated over a pre-programmed integrated circuit (IC) thereby producing an analog signal output.

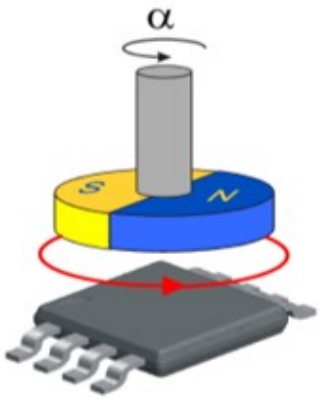

Figure 2: Typical Hall Configuration

CTS Solutions

Our 285 non-contacting rotary position sensor is the solution of choice for this application. The Series 285 is based on Hall Effect technology and has no internal contacting parts to wear. Extended life of the 285 and 286 with ball bearings can be sued for millions of cycles, greatly reducing service replacement cost and equipment down time. In addition, the high quality linearity of the sensors, provided a higher accuracy output for better wheel imbalance detection.

The output is constant and stable over the life of the product unlike contacting potentiometers that require periodic calibration to maintain accuracy. By transitioning from contacting technology to non-contacting technology, the need for periodic calibration, maintenance and service checks are virtually eliminated. Additional benefits from this upgraded technology include cost savings from reduced maintenance and reduced equipment down time.

Both series also offer IP rating options for equipment that is exposed to harsh environments. Standard flying leads offered on this model eliminate the need for soldering wires to the unit, making installation a quick procedure.

Custom configurations are also available on request. Contact an authorized CTS Sales Representative for additional details.
Contact us with any questions at https://www.ctscorp.com/contact.