Honeywell

Application Note - Transportation

Value Added SMART Position Sensor, 35 mm Linear Configuration, for Gear Position Sensing in Automated Manual Transmission

Background

Automated Manual Transmission (AMT), also known as semi-automatic transmission or clutchless manual transmission, uses electronics to combine the advantages of manual transmission and automatic transmission, while mitigating the disadvantages of each (see Table 1).

Table 1. Manual and Automatic Transmission Advantages

Manual Transmission	Automatic Transmission
• Better fuel economy: increases savings and lowers emissions • Better overall vehicle performance regardless of road/driving conditions	• For the driver: - Easier to operate: no clutch pedal to depress or gears to shift - Easier to learn: less training is required - Reduces fatigue, especially in stop-and-go traffic: increases driver retention • Extends transmission and clutch life/reliability (and ultimately the engine): Reduces maintenance

Instead of the driver determining when to shift gears, then manually depressing a clutch and moving the gear shift lever to engage the desired gear, AMT uses electronic sensors to provide a computerized transmission control unit with continuous input on factors that affect potential gear shift, such as road grade and road and load conditions. Internal electronics then determine optimum gear level and shift point, synchronize the required gear change timing and engine torque, engage the clutch, and execute a quick, smooth gear shift, all without driver intervention.

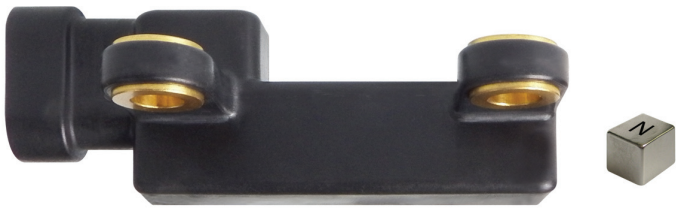
Long-haul trucking, which uses vehicles such as those shown in Figure 1, has especially benefited from the advantages of AMT.

Figure 1. Long-Haul Truck

Solution

Honeywell's SMART Position Sensor, 35 mm Linear Configuration, can be used to determine gear position in AMT transmissions (see Figure 2).

Figure 2. SMART Position Sensor, 35 mm Linear Configuration



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Sensor in the Application (See Figure 3)

The SMART Position Sensor, 35 mm Linear Configuration, consists of two parts: the sensor itself and a magnet actuator.

The sensor is mounted on an aluminum housing through which it can detect the position of the magnetic actuator embedded in an aluminum hub. When a shaft attached to the aluminum hub moves back and forth a specific distance in relation to a specific gear whenever a gear change takes place, the relative position of the moving magnet actuator to the fixed sensor also changes, providing an output to the engine control unit which then determines which gear the vehicle is in.

Benefits

- Accurate absolute position sensing of air gap values down to 8,5 ±1,0 mm [0.334 ±0.039 in]
- Senses through non-ferrous materials
- Operates in tough, automotive environments through its non-contact design, IP67, IP69K sealing, automotive grade EMI/EMC specification, and unique packaging materials which make it more resistant to vibration, shock, and extreme temperatures

See Table 1 for a complete list of features and benefits.
For more information on this product, click here.

Figure 3. SMART Position Sensor, 35 mm Linear Configuration, Providing Gear Change Sensing in an AMT Transmission

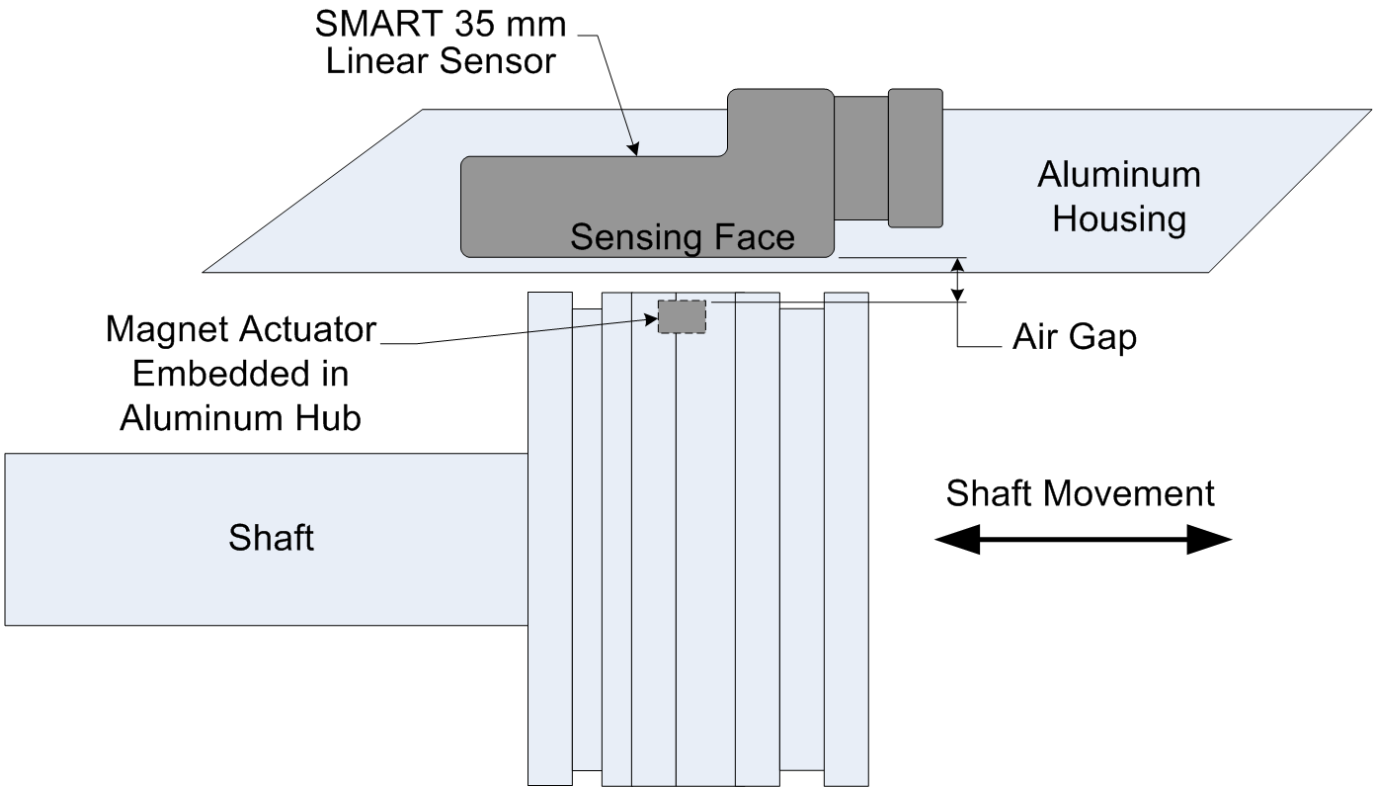

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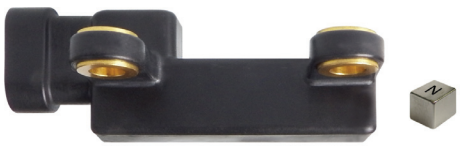
Table 2. SMART Position Sensor, 35 mm Linear Configuration Features and Benefits

SMART Position Sensor, 35 mm Linear Configuration	Features and Benefits (★ = competitive differentiator)
	★ **Reliable, durable:** Non-contact design reduces wear and tear, improving reliability, and durability, and minimizing downtime ★ **Easy to install:** Installation takes four simple steps (1: position sensor; 2: drill holes; 3: mount sensor; 4: locate magnet actuator/make electrical connection) vs. up to 14 steps some competitive products require, simplifying installation and reducing set-up costs • **Rugged:** As there are no moving parts within the sensor, Honeywell utilizes unique packaging materials that make the sensor more resistant to vibration, shock, and extreme temperatures ★ **Flexible:** Air gap of up to 8,5 ±1,0 mm [0.334 ±0.039 in] between sensor and magnet expands application opportunities; variety of output options (analog standard and other RS232-type baud rates) are available, expanding application opportunities ★ **Cost effective:** Adaptable, non-contacting design allows customers to eliminate unnecessary connections for installation, thereby reducing installation steps, installation time, and components • **Accurate:** Accurately measures values down to 0,04 mm [0.0016 in] ★ **Adaptable:** Electronics on board allow for flexible packaging and component compatibility with existing systems ★ **Lightweight:** More than 50% lighter in weight than LVDT (Linear Variable Differential Transformer) technology • **Simplifies design-in:** Easy-to-configure sensor array fits virtually any linear movement path ★ **Self-diagnostics feature:** Can reduce equipment downtime by providing predictive maintenance input • **Combined patented MR sensor and ASIC technology:** Provides enhanced differentiation and performance • **IP67, IP69K sealing**: Allows use in many harsh applications • **Qualified for automotive grade EMI/EMC specification:** Provides protection against environmental frequency interference • **RoHS-compliant materials:** Meet Directive 2002/95/EC

Find out more

To learn more about Honeywell's sensing and control products, call **1-800-537-6945**, visit **sensing.honeywell.com,** or e-mail inquiries to **info.sc@honeywell.com**

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