Research paper on hall effect sensors

Hall Effect sensors are transducers that respond to a magnetic field through varying their output voltage. They mainly consist of a thin piece of rectangular semiconductor like gallium arsenide passing a continuous current in it. They are used in current sensing, speed detection, positioning and proximity switching. They are also used many ignition distribution systems and monitoring of the engine rotations per minute. They produce an on off voltage signal that can vary from maximum to zero and then back to maximum (WMC 1).

Functioning

A hall sensor has three terminals or wires. One terminal is for the ground, the second terminal for the output, and the third terminal for the reference voltage. to yield an output signal , the hall effect sensor must be supplied with a reference voltage which can be five to twelve volts . The process of generating a voltage with a magnetic field is known as the Hall Effect. The supply voltage is useful in the creation of the switching effect that takes place inside the sensor (WMC 2).

The Hall Effect yields a square wave output, which can be monitored by an onboard computer. The basic principles in which the hall effect operates is that when an electric current is applied on a piece of metal inserted between two magnetic fields , it creates a secondary voltage in the metal in the right angle to the applied voltage. The voltage change in hall sensors occurs in a silicon chip placed at right angles to the magnetic field. If a metal blade is placed between the magnetic field and the silicon chip, the magnetic field is blocked resulting in the chip’s output falling to zero. Additional circuits are used regulate supply voltage and amplification of signal. In car ignition

systems some shutter blades are mounted on the rotor , crank shaft pulley or cam gear to make the sensor to produce a trigger or position signal as the crankshaft rotates (WMC 3).

The benefits of Hall Effect sensors are they can measure a large current; they are functional in large temperature ranges and can measure zero speeds. Hall Effect sensors also operate in no contact operations so there is little wear and friction. They therefore have a high number of operating cycles. . Their main disadvantages are that they may be affected by external magnetic fields, large temperature drifts and huge offset voltage (Ramsen 114).

Works cited

Ramsen, E., Hall Effect sensors: theory and applications. Elsevier. 2006. Print.

Wells Manufacturing Corporation.” Understanding Hall Effect sensors”. Wells counter point

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