Analog Sensing: Where and How It’s Used
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When sensing metal objects, sometimes the standard inductive proximity sensor simply doesn’t cut it. For instance when sensing a rotary cam – the oblong shape necessitates a sensor that can detect the different shapes/sizes and where the object is within the sensing range. A simple prox sensor that merely detects the presence/absence of a target obviously would not apply. For these and similar applications, inductive linear analog sensors are the best alternative.

Inductive linear analog sensors work on the same principle as inductive proximity sensors, but for the analog output. Inductive sensors contain an oscillator that creates a high-frequency electromagnetic field that radiates from a coil wrapped around a ferrite core in the front of the sensor. When a target enters the high-frequency field, eddy currents are induced on the target’s surface and influence the sensor’s oscillator output.

The difference between inductive prox sensors and inductive analog sensors is in the output: rather than a target moving in and out of the sensing field causing the sensor to produce an ‘on’ and ‘off’ (presence/absence) signal, the target remains within the sensing range and the sensor determines the position of the target within that range, therefore the sensor is never really in an ON/OFF state. Rather, the analog output measures Voltage (0-10 V) and/or current (4-20 mA) proportional to distance (the targets distance to the sensor face while in the axial plane).

Analog signals, as opposed to digital signals in standard inductive sensors, provide more sophisticated outputs with the ability to determine the position of the target within the sensing range. This makes inductive analog sensors ideal for applications that require sensing odd shapes, close proximity or necessitate high repeatability. Further, analog sensors are able to provide two to four times higher repeatability. Whereas a typical non-analog inductive sensor’s repeatability is less than or equal to 2 percent of its rated operating distance, inductive analog sensors have 1 percent repeatability and in some cases (after the sensor has been “on” for 30 minutes to account for anomalies) 0.5 percent repeatability can be achieved.

Typical applications where analog sensing is utilized include where four analog sensors are mounted on four legs to ensure a target is properly centered, or where two sensors are placed on either side of an object to determine its thickness. Analog sensors are also used to detect the tension of an arm as it swings back and forth, as well as to detect bearing wear and mechanical shaft run-out, position feeding over an angled target, position of odd shaped targets including cones, and small part identification. The most appropriate sensor type/shape is dependant upon the target, though analog sensors generally can be found in all types (barrel, rectangular, ring-style, etc.) and sizes (i.e. 4mm to 80mm; dependant on the manufacturer).