CTC AppNotes

A series of technical documents written by members of the CTC community

Proximity Probe Material Compatibility

Many customers assume that proximity probes will react exactly the same when pointed at any shaft made from any type of steel. The reality is, that different steel materials create different signals when being monitored by proximity probes. This is due to the varying amounts of carbon, iron and other trace materials used to modify the properties of the shaft so it will perform properly in specific situations or processes.

Most common shaft material—4140 steel

When proximity probes were originally invented the most common steel used for machine shafts was 4140 steel, which made it an excellent choice for standardizing the probe outputs for industrial uses. Over time, the needs of the industrial sphere have changed, due to new uses for old materials and also due to the many new materials and alloys available. This makes it very important to be able to calibrate probe outputs to accommodate the newer alloys.

Figure 1. Proximity probe driver. It is the driver itself that must be specially calibrated to the material to be monitored. Probe tips and cables are

Assumptions that, just because one material is similar to another automatically leads to similar outputs from the proximity probe systems. Even though 316L stainless steel is similar to 420 stainless in material composition, it is readily visible from Table1 that the output of a sensor attuned to 420 stainless steel would be similar to 4140 steel, 316L stainless steel is significantly different enough to cause possible errors in measurement, that could either cause an unwanted shutdown of a machine, or, worse yet, possibly cause a machine to fail destructively. The good news is that with enough lead time and knowledge of the materials used in the shafts, a sample target can be made, and in most cases, probe systems can be tuned so as to offer adequate protection for monitoring the shafts properly.

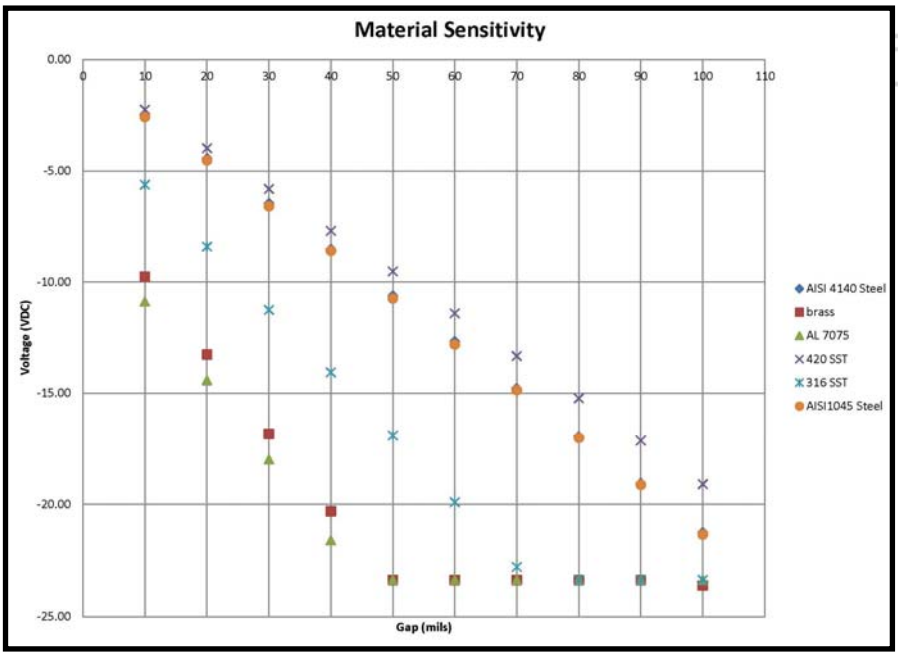

Figure 2. Chart of measured sensitivity across various materials as tested at 70°F . Note the discrepancies across various materials.

If you have any questions feel free to contact CTC directly. Call toll free 1-800-999-5290 in the US/Canada or +1-585-924-5900 internationally, or alternatively, email techsupport@ctconline.com.