



Sultan Acoustic Wave Technology

Cement Powder Level

Hawk Products: HAWK Acoustic Wave Level Sensor

Material Measured: Cement Powder Level

Industry: Cement Plant

Problem

General description:

An **Acoustic Wave** level sensor is used to monitor the level of cement powder in a storage bin or silo. Each silo contains cement of particular type specifications. One or several silos will contain a particular type of cement product.

Most manufacturers or shippers of cement powder will have multiple storage silo level applications. Bins are generally fed pneumatically, or via air slide from a process or delivery vehicle. Product is normally removed from the silos via pneumatic transfer pipe or 'clam shell' or slide gate a downstream product manufacturing process, or road or rail truck.

Solution

Control system function:

The measured distance output of the sensor (communication, relay, or analogue) passes to a control system.

As level changes occur in the silo, the control system will continuously monitor the sensor output. Often the level output will be used for simple inventory management purposes. Cement silos may be holding vessels for material prior to bulk shipment by truck, train, ship, or bagging and packing for lower volume sale (at plants manufacturing the cement themselves). Silos may alternatively be storage vessels feeding a process which manufactures some concrete or mortar or mix product from the cement. The control system simply needs to know how much of a given product is available, and where it is located at any given time in order to control outlet pipes or gates on silos to supply the correct material to a loading or packing facility, or the next part of a downstream manufacturing process. High or low alarm set points are often used in addition to the analog level measurement. In some cases, independent, redundant (separate) point level switch products are used for high or low level alarms, though this function can also be achieved by the Acoustic Wave instrument (using relay outputs) if required

Advantages over alternatives:

Contact technologies such as guided radar (TDR) or mechanical dipping systems can work, but due to their contact with the material, may wear and eventually break cables or tapes.

Mechanical dippers will require maintenance and wear quickly in fine, abrasive cement installations. Guided radar and continuous capacitance based systems generate huge pull down forces on the silo roof, and upper cable mounting, so consequences of cable breakage or silo damage must be considered. Laser systems will not operate reliably over time in the presence of dust, and will suffer from dirty buildup on lenses within a short time.

Traditional ultrasonics or non contact radar may not have enough power to reliably penetrate through dust, and may have difficulty in dealing with varied surface shapes of the material during filling and emptying phases, or suffer from false reflections from structures inside the bin. An **Acoustic Wave** level sensor mounted in the top of the silo will provide reliable, maintenance free measurement in dusty conditions of varied material filling and emptying profiles.

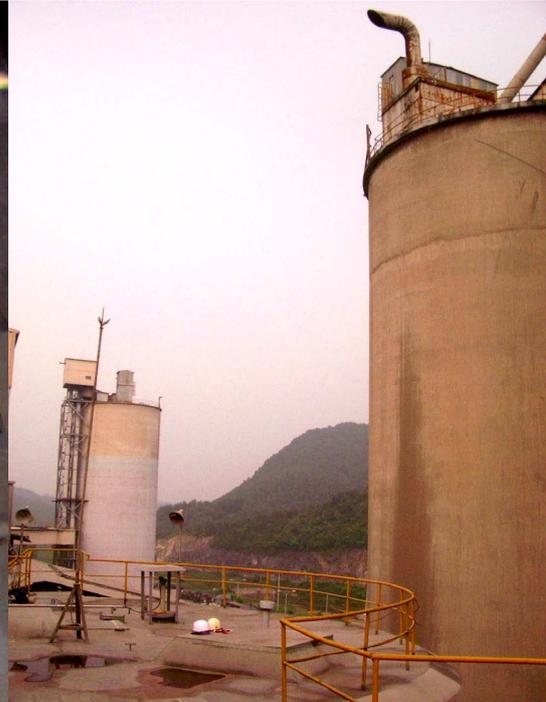
Instrument type selection and setup specifics:

Choose a 5 or 10kHz remote sensor with 10" isolated flange and cone for maximum reliability in detecting cement powder over typical distances of 10-160 ft from the mounting, with varied surface profiles. Integral types are inconvenient to set up once installed in inaccessible or high locations. If good access is available, then Integral types may also be used. Mount the sensor away from in-feeding cement flow and dust extraction systems. Position the mounting to have the clearest possible view down in to the bin (provide maximum possible separation from structures or ledges). Ensure that the cone end is clearly inside the main volume of the silo- not raised inside a mounting nozzle.

Generally, positioning the sensor vertically over the conical out feed section of the silo, or vertically within the central 2/3 of the silo roof, and clear of high level switches, structures, or in feeding material will give best results. Set 'Fill Rate' and 'Empty Rate' and 'Fill Damp' and 'Empty Damp' appropriate for the process conditions. 'Gain' or 'Slope Distance' may need adjustment to increase sensitivity in more difficult installations where returned echoes are too small. Be sure to set reasonable High (nearest) and Low (farthest) output levels even if relay control will be used. Set relays as required.

Application Success Story





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