



PROCESS INSTRUMENTATION

Grain storage facility improves inventory control with radar level transmitters

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Challenge

A customer in the Northwest United States operates a grain handling facility with almost 100 silos. They store and ship grain globally. The facility receives grain via rail or river barges from various states, or seasonally from local farmers. Often, the grain requires cleaning and, in other cases, pre-blending before it is moved to the shipping silos. From the silos, it is transferred to ships for export. It is critical for the customer to know how much inventory they have available in order to effectively fill the various compartments in the ships. For this reason, they need reliable level measurement in their storage silos, as well as in their shipping silos. The conditions in the silos can vary depending on the condition of the grain. Sometimes, the grain can be extremely dusty and sometimes, due to the humidity in the environment, the dust becomes like a paste. This can lead to buildup on the level measurement sensors.

Using the plumb bob technology, the operators measure the level of most of the silos once each morning and then, on demand in groups or individually as needed by the operators in the control room. The level readings are then displayed on their PC-based HMI system that the operators can view in the control room. The operator's preference is to have a real time level measurement from all silos, not just on demand.

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When the conditions are ideal, the on-demand contacting device works well. However, the cable does not always function properly when buildup is present, and it requires additional maintenance. This means that plant personnel must go on top of the silo and pull the cable. Occasionally, the cable gets buried and when this happens, it requires two people to work the cable out of the grain. This not only takes several hours to correct, but if the cable breaks there is even greater risk to the operation due to the increased delay in moving product to shipping or other storage silos. Retrieving a broken cable is an even more involved endeavor. Lost production, additional time in port for the ships, and the associated labor for such an event potentially adds thousands of dollars to the overall costs.

Solution

The plumb bob technology currently in place does a good job when silo conditions are not challenging. Having a reliable level measurement instrument, regardless of the internal silo conditions, is a must. For this reason, the customer chose to test a non-contacting level device and installed a SITRANS LR560 radar level transmitter, the latest in radar technology today.



The customer chose their most active and problematic silo to evaluate and compare the radar transmitter performance against the contacting cable technology that was currently in use. The activity in the silo is due to the constant movement of product. This particular silo is used as an intermediary step between the storage silos and the shipping silos. It is also used for pre-blending of grains. Dust is more prevalent here than in the other silos. The evidence can be seen by the dust accumulation around the vent area when compared to the rest of the silos.

Most grain silos have a cylindrical geometry. But, the customer chose a narrow interstice silo (or star-bin silo) to test the LR560 radar transmitter. This type of silo is generally a more challenging application for traditional level radar transmitters because the multiple curved internal walls, and their close proximity, can cause signal degradation.

The customer has a plumb bob type instrument installed in the same star-bin silo as the LR560 test unit. The LR560 level measurement is within a couple inches of the contact level measurement. More impressively, when the grain is depleted, the LR560 instrument reads the level down into the cone, 118.5 feet away. The SITRANS LR560 transmitter operates at

78 GHz, resulting in an extremely narrow signal. No other radar transmitter on the market today can read down into the cone of a narrow silo and yield a reliable and consistent level measurement.

The control room operators can see that the LR560 level transmitter can provide the type of output that they want and need, on a continuous basis.

Benefits

Time savings: No maintenance required. Because the SITRANS LR560 radar transmitter is a non-contacting instrument, the risk of product contamination is eliminated and no extended delays are caused as when cables break.

Improved process reliability: Continuous level measurement is a real time indicator of what is in the silo. A cable getting stuck at a certain distance can lead to misinterpretation of the current level. After a cable is stuck, there is no level history prior to the request on demand.

Easier to use: The LR560 transmitter was set up using the quick start wizard and no further tuning or maintenance is required.

Unique product features: The local user interface allows for ease of configuration and set-up. The narrow 4 degree beam angle enables reliable depth penetration into the silo and ignores potential silo wall interference. Furthermore, the LR560 transmitter is installed in an existing 14 by 4 inch diameter standpipe. No need for the customer to incur the added time and expense to core drill a hole on top of the silo to accommodate the new LR560 instrument installation.

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