

Grain Processing Facility Utilizes Level Technology to Achieve High Yields

RESULTS

- Maximized production yields through accurate level measurement
- Minimized installation costs by utilizing existing tank connections
- Reduced maintenance costs by using dust-immune instrumentation



APPLICATION

Level measurement of dry corn grains and powder

Application Characteristics: 2 meter (6.6 ft) high corn silo; corn and shell mixture, large amounts of dust; dielectric constant 3 to 10.

CUSTOMER

Grain processing facility in South Korea

CHALLENGE

Maximizing production with a discrete amount of resources is a common goal across all industries. This was the case for an Asian-based facility that manufactured glucose and starch from corn feedstock. Accurate level measurement of a 6.6 ft (2 m) high corn silo was an important factor in achieving high yields.

The main challenge of the level measurement stemmed from the dusty nature of the process. The feedstock contained a dry powdery mix of both the corn and its shell. The powder was especially prevalent in the silo during the tank filling cycle. Previous attempts to measure level in the silo included ultrasonic technology, but ultimately the large amount of dust caused an unacceptable amount of measurement inaccuracy.

Another challenge with the grain silo was the triangular shape of the tank. Levels close to the bottom of the tank had to be measured and maintained for subsequent steps in the glucose and starch manufacturing process.

Finally, the tank was located in a small, constrained space. Any level instrument would have to fit in the allotted space around the silo. Modifying the tank would cost money due to down production, additional labor and additional hardware and connections.

Ultimately, finding a technology that could accurately measure level of a dusty process in a conical tank and could be installed with limited plant modifications had proven to be a source of frustration for the grain facility.



The silo, which holds the corn, provides feedstock for the glucose and starch manufacturing process.

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SOLUTION

Despite all of the restrictions and constraints of the application, the Rosemount 3300 Guided Wave Radar (GWR) transmitter seemed like a great option for accurate level measurement. The transmitter is virtually unaffected by dust and other particles, is suitable for a variety of different tanks shapes and sizes, and its compact design allows for a variety of installation options.

The GWR transmitter is based on Time Domain Reflectometry technology. Low power nano-second pulses are guided down a probe into the process media. A variety of different probes are available. For the grain processing application, a single flexible lead probe was recommended. The single lead design is ideal for solids because it eliminates many of the issues inherent in the two-lead design. There is no risk of the process pushing the two leads together, and the chance of material build-up within the twin leads is eliminated. Additionally, the dielectric constant of the corn (3 to 10) was suitable for the single lead design.

The Rosemount 3300 was installed through an existing opening in the center of the roof of the tank. This allowed it to reach the bottom of the silo despite the conical bottom. No tank modifications were needed.

Overall, the Rosemount 3300 GWR transmitter proved to be the ideal solution for the difficult level application. The transmitter could accurately measure the level of corn despite the large amount of shells and dust. The single probe lead also allowed the transmitter to be installed on the triangular-shaped tank without requiring any modifications or additional hardware. As a result, the grain processing facility was able to minimize installation and maintenance costs while ultimately increasing production yields from a better level measurement.

RESOURCES

Rosemount 3300

<http://www.emersonprocess.com/rosemount/products/level/m3300.html>

Rosemount Technical Note - Guided Wave Radar in Solid Level Applications

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The Rosemount 3300 was installed in the center of the silo, allowing it to reach well into the conical bottom.



The Rosemount 3300 fits perfectly into the existing small opening.

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