

# level measurement

■ featured columnist

## Surface mapping: Not sliced bread but still pretty good

Continuous level measurement of bulk solids is about one thing, answering the question “how much stuff do I have.” And usually the desired engineering unit is in terms of volume or weight. “Measuring” volume or weight is not always practical, sometimes it isn’t viable at all.

Consider your existing silos. How do you weigh the ingredients within the silos if the silos weren’t installed with load systems when they were first erected? Not easy or inexpensively, that’s how. So what can you do? You use a continuous level measurement sensor and system to measure the empty space distance (or the level of the material) and then convert this to volume and/or weight. These sensors offer a viable and cost-effective approach, but the accuracy of the calculated value of volume and weight is not as good as your accounting department may desire so you need another approach. Weigh systems are too costly to install and bolt-on weigh systems aren’t much more accurate than converting from a level measurement and are still expensive by comparison to a level sensor.

Something new is coming into view. In

the last decade we have seen the introduction of measuring systems that attempt and promise to provide users with higher accuracy of volume or mass values than what a calculated value from a level sensor can offer. These new systems utilize multiple or moving level sensor technology and also sophisticated software to map the surface of the material pile. Together with data provided by the user, these surface mapping systems determine the volume of material within the bin based on a profile of the surface created from multiple distance measurements by the level sensor. Surface mapping systems are available based on the use of laser and ultrasonic level sensor technology.

I believe that surface mapping 3D-level systems are the future for bulk solids storage vessel applications and are credible in large bins today. While expensive, typically \$5,000-\$10,000 and up, they have the potential to provide a major improvement in measurement accuracy of volume. Their market success will be based on how much value users really place on the ability to more accurately determine the volume of material within a

bin. They should be considered if this increase in accuracy is a necessity, as an alternative to weigh systems such as load stands and bolt-on load sensors and strain gauges.

However, I believe that two other improvements are needed in surface mapping systems. First, they will need to operate accurately and effectively within smaller diameter vessels. I feel the laser-based systems may have an advantage here because of their narrow beam versus a 60-degree beam angle with the ultrasonic system from APM. Second, their price needs to come down by at least 30-40 percent. I think both of these items will be addressed within the next five years and yes, surface mapping volumetric level measurement based systems may indeed be the next best thing since sliced bread.

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