Continuous bin level measurement

BY JENNY NIELSON CHRISTENSEN

"Bio-Massive" Solutions

Effectively managing and rotating inventories, ensuring employee safety and getting more work done with fewer people is the reality facing many biomass operations today. Continuous bin level management systems from BinMaster can help optimize inventory levels, virtually eliminate the need for employees to climb bins, and save valuable time by allowing bin measurements to be read from a personal computer or other centralized location.

When selecting an accurate, reliable device that is best for a particular application, one should take into account several variables, including how many bins need to be monitored, what level of accuracy is required, how frequently do measurements need to be taken, how important is headroom vs. bin volume, are level measurements needed during filling or emptying, is the environment extremely dusty and is non-contact technology required.

Multiple-Point 3D Measurement

The BinMaster 3DLevelScanner is a non-contact, dust-penetrating bin volume measurement system that uses patented, acoustics-based technology to measure bin contents at multiple points within the bin. It is proven to work in dusty environments, where technologies such as radar and ultrasonics have failed. Its accompanying 3D Level Manager software generates detailed log reports and automatically sends the reports to a personal computer for easy remote monitoring. It offers very low maintenance and is self-cleaning, making it ideal for high-dust environments.

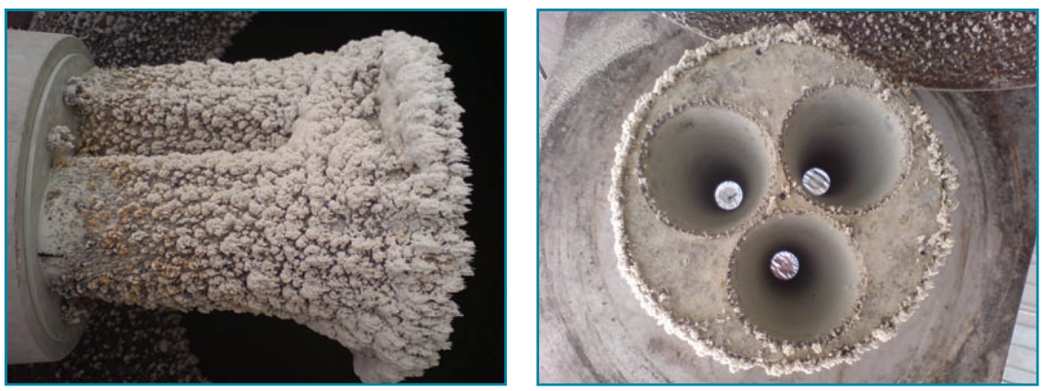
An illustration of Binmaster's acoustics-based 3DLevelScanner measuring bin volume at multiple points. Multiple-point measurement is helpful when used in materials prone to buildup.

The 3DLevelScanner technology uses a two-dimensional array beam former that sends very low frequency acoustical pulses and receives echoes of the pulses from multiple points within the bin. Unlike standard ultrasonic, radar or cable-based units that are measuring one point and determining a single distance, the 3DLevelScanner takes measurements from multiple points within the bin and uses these points to determine the volume of material in the bin.

Multiple-point measurement is helpful when used in materials prone to buildup and rat-holing, or where there are points in the bin that are lower or higher than the majority of the bin contents. By taking multiple measurements and then using an algorithm that assigns a "weight" or "strength of accuracy" to each point to determine the average volume and height or distance, the 3DLevelScanner can provide a very accurate estimation of bin volume.

There are three models of the 3DLevelScanner offered with ranging list prices. The base Model S 3DLevelScanner works by taking an average of all the numerous measurements within a 30 degree coverage window, and calculates the average volume from the measurements within that window. Models M and MV 3DLevelScanners sample points from a wider, 70 degree beam angle on the surface of the material in the bin. The Model MV also offers visualization software for highly specialized mapping applications.

The 3DLevelScanner provides the user a scaled 4-20 mA output that can represent either the product or headroom volume. Using an optional HART or RS-485 connection, the



The self-cleaning BinMaster 3DLevelScanner, featuring APM technology, is highly effective in dusty environments common in the biomass industry. (Left) While the exterior is caked with dusty material, (Right) the sensors remain clean to continuously receive accurate readings.

Benefits of the 3DLevelScanner	
Multiple Point Accuracy	Takes measurements from multiple points vs. a single point, taking into account variations that can occur on material surfaces.
Non-Contact Measurement	There is no risk of moving parts coming into contact or being buried by bin material.
Dust-Penetrating Technology	The acoustical-based, low frequency technology is unaffected by dust.
Unaffected by Material Type	Can be used in corn, soybeans plus a variety of powders, granulates, pellets and other solids with no need for special calibration.
Long Measurement Range	Appropriate for tall bins (taller than they are wide) and is able to measure a range up to 220'.
Low Power	Consumes very little power, making it cost effective to operate.
System Redundancy	Three independent transducers help to ensure accuracy.

user can connect to the scanner using the 3D Level Manager software. This advanced software allows the user to view real-time data from the scanner and make configuration changes remotely from a personal computer.

SmartBob2 Cable-Based System

Many materials used in the biomass industry behave predictably and feature only slightly variable bin material surfaces. In many corn or soybean applications, operators require bin level measurements just a few times a day, but still desire a very reliable, repeatable, and easily understood measurement system. The SmartBob cable-based system is a lot like doing a manual measurement with a tape, but it is automated, precise, and without the risk of human error. When the SmartBob sensor is positioned properly on the bin and given correct parameters, calculated values from a SmartBob system are very accurate.

BinMaster's SmartBob technology is simple in concept. When prompted, the cable drops and the weight comes into contact with the material surface and immediately retracts, taking a very precise measurement. These measurements are sent to a personal computer equipped with the Windows-based eBob software program, that displays data for up to 16 bins at one time, or a C-100 Control Console that can display and manage data from up to 120 SmartBob sensors. SmartBob2 sensors are very easy to install and do not require any calibration. The inside atmosphere of the tank has no effect on the measurement, so dust, temperature or humidity will not affect the sensor. SmartBob2 is autonomous to material characteristics and makes minimal contact with the stored material when taking a measurement.

The SmartBob2 sensor can be used into bins up to 180 degrees, while the SmartBob-TS1 sensor can be used in smaller bins up to 40'. Rugged and safe, the SmartBob2 sensor is completely sealed in a strong, lightweight molded polycarbonate enclosure, which is explosion proof and rated for Class II, Groups E, F & G certifications. Requiring no field calibration, SmartBob2 is easy to install, needs minimal wiring or can be used with the SmartBob wireless transceiver.

The SmartBob II is a cable-based system that is useful in corn or soybean applications where level measurements only need to be made a few times a day.

Jenny Nielson Christensen is the director of marketing at BinMaster Level Controls. BinMaster is a division of Garner Industries, an ISO 9001:2000 certified company established in 1953 and headquartered in Lincoln, Neb.

All photos courtesy of Binmaster Level Controls.

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