The Insider

...because it's what's inside that counts

Get More Data and Accuracy from a SmartBob System

The SmartBob sensor works like an automatic measuring tape without the danger and hassle of climbing bins to take measurements. You can set the sensors to take measurements at predetermined intervals of your choosing – every 30 minutes, once an hour, every 6 or 8 hours, once a day – whenever it's best to "be on top" of your inventory levels. SmartBob measurements are accurate, taking the measurement in the same location with reliable repeatability. The sensors are dependable for continuous level measurement year after year.

A SmartBob system can be used in any industry or application where there are bulk solids, powders, granules, or pellets in a bin, tank, silo or other storage vessel. Whether you have one bin to be measured or hundreds, a SmartBob system can be configured with a variety of consoles, software and a wide selection of accessories such as special probes and mounting plates to ensure your system works optimally.

Wired or Wireless?

Customers with a network of bins can choose traditional wiring and often do, since there is likely already wiring for other equipment on the bins. However, if there is a need to send the data to a location in a scale house or office, optional wireless communications may be used to reduce installation costs. So long as there is a line of sight between the two wireless transceivers, data can be sent up to one-half mile without expensive wiring.

Where to Mount and Measure?

Measuring in the proper location in a center-fill, center discharge vessel will provide a more accurate average level. For a cylindrical vessel with a center filling point and a center discharge, it's proven that the optimal location for mounting the remote sensor is one-sixth in from the outer perimeter of the vessel. This location takes the material's angle of repose into consideration when approximating the average material level in the vessel.

When a vessel is being filled, the material forms a "cone up" and material is higher at the center and lower near the sides of the vessel. If you draw a horizontal line at the (one-sixth) point the sensor probe comes into contact with the material surface, there is a peak at the center of the vessel and voids at the sides. If you take the material in the peak and fill-in the voids, it will flatten out the angle of repose. The same is true when the vessel is being emptied and material is lower in the center and higher on the side forming a "cone down". Mounting the SmartBob sensor one-sixth from the outer perimeter is proven over and over again to calculate the most accurate level reading for a vessel. Generally, you can expect accuracy in the range of five to seven percent.
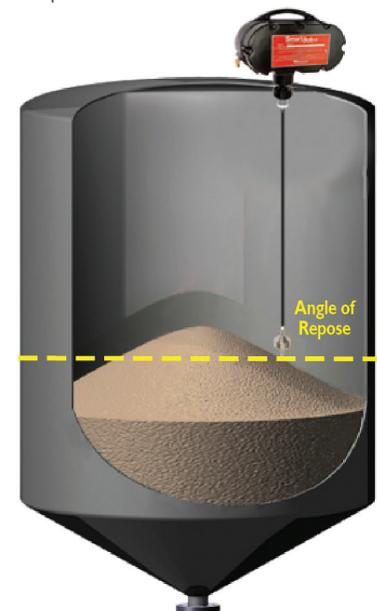
Mounting SmartBob one-sixth from the outer perimeter accounts for angle of repose.

What's Inside

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Point Level Sensors • Inventory Measurement • Flow Detection • Dust Detection • Aeration & Vibration

Digesting the Data

An important consideration is where you want the data to go, who will use it, and how it will be used. Do you need height of product or distance to product (headroom)? Is an estimate of the volume in cubic feet or bushels important? Or, perhaps a weight estimate is what you are after. Will the data be used by production, purchasing, logistics, or finance – or everyone? It's fairly common to take a 4 – 20 mA signal and send the data to a PLC in a control room. Many plants are set up that way and then simply monitor the SmartBob measurement data along with data from other equipment being monitored.

However, there are other options that may be integrated into your SmartBob system. One is a local control console (model C-100) that can be mounted at ground level in a convenient location either in a control room or a protected outdoor environment. One console allows monitoring of the level of up to 128 bins from a single location at ground level. The push-button control panel is easily programmed with the necessary bin information

C-100 Control Console

such as diameter and height and each bin is assigned a location number. By simply walking or driving up to the console, the user can scroll through measurements for all of the bins. There is also a feature to take a measurement on demand. Instead of looking at the last measurement taken, a

measurement can be initiated and reported immediately, providing the most updated information.

For monitoring information from a personal computer, BinMaster's eBob software is a comprehensive, graphical solution that's easy to use. It allows for viewing measurement data for a single bin, a group of bins or all the bins in the network. Bins containing the same material can be color coded and grouped together for easy monitoring. Measurements can be programmed at pre-determined intervals or a measurement can be taken on demand. Plus, programmable alarms can alert when levels get too high or too low. Alternatively, automated emails can send bin levels at predetermined times each day or send a message only when there's an alert that a bin has reached a critical level. eBob software is the easiest way to manage inventory without ever leaving the office.

Tim Sattler— eBob support

Submersed solids? Super high temps?

Whether you're new to SmartBob or you've been a customer for years, there's always something in the works at BinMaster. Customers are always suggesting new features or applications for SmartBob. For example, SmartBob2-SS for submersible solids can be used in a brine or liquid / solid interface application to measure the level of solids that have settled at the bottom of a tank. If you're dealing with temperature extremes, there's a high temperature SmartBob option with a 12" standpipe for process temperatures between 250°F and 500°F. For temperatures up to 1000°F, the SHT super high temperature option includes a 36" standpipe to distance the electronics from the heat source. If it's cold in your climate, an optional motor

SmartBob2-SS measures submersed solids.

gearbox heater will ensure performance when temperatures are consistently frigid.

Big Bins or Warehouses to Measure?

When a vessel is very large, such as 105' diameter or more or you're trying to manage material inventory in a warehouse, measuring the level in more than one location and then averaging the measurements will provide a better approximation of inventory levels. BinMaster's new eBob MultiBob software allows you to install up to 32 SmartBobs in a single vessel and get an average level automatically – a huge advantage for measuring extra big bins or flat storage warehouses. If it's simply necessary to detect cone up or

Two sensor MultiBob system detects cone up or cone down.

down conditions in a round bin, then two SmartBob sensors will get the job done. One common configuration for large bins containing materials like grain or sand is a five SmartBob configuration with one sensor each to the North, South, East and West and one in the center. This is helpful if the bin is filled at the center and has multiple discharge points that need to be taken into account. By viewing the data for individual sensors, it can be determined which part of the bin has higher or lower material levels.

Compacted Material? Irregular Shaped Tanks?

It's common knowledge that many materials have a greater bulk density at the bottom of the tank than near the top, due to the weight of material compressing downward as the bin is filled. The most recent version of eBob software has a new strapping table feature that allows you to enter data that accounts for compaction of material in the bin. By adding valuable weight-to-distance data into a table, the estimate of material in the bin can be tailored to exactly how material behaves in your bin. Another great use of strapping tables is with cone-bottomed bins to account for less material due to the tapering of the cone. Strapping table data also allows for more accuracy in measuring irregular tanks, such as a cylindrical tank installed on its side.

Strapping table in cone-bottomed bin.

Designing a SmartBob System

It's easy to get started with a SmartBob system. Simply give us a call to discuss your bin measurement objectives, materials and application or send us an email to info@binmaster.com. Todd, Nathan, Scott, Doris, Matt or Mike will walk you through the process and get you started. Whether you need one sensor, want to build your system over time, or are looking for a corporate wide solution, we're here to help you find the right solution for your operation and budget.

When the measuring gets rough…Get 3D!

What do sand, cement, limestone, coal, flour, soymeal, distiller's grains, and fly ash have in common? They are all very difficult to measure due to the fact they don't flow freely when being loaded or discharged from a bin, tank, or silo. Instead, they want to pile up and form an uneven material surface that can vary significantly from one point in the vessel to another. When this happens, a single measurement point in the bin might not provide a good inventory estimate, especially if the point being measured just happens to be a very high or low spot in the bin. BinMaster's 3DLevelScanner was designed to improve inventory accuracy in bins, tanks and silos containing difficult to measure materials. The sensor's low frequency signals are able to penetrate dust in environments where radar and ultrasonic can perform inconsistently. The acoustics-based sensor meets the challenges presented in industries where uneven topography makes it difficult to get a reliable level or volume estimate. Unlike many devices that measure a single point, the 3DLevelScanner measures multiple points in the bin, taking into account variations in material topography resulting in significantly improved accuracy. In addition to providing data on minimum, maximum and average level, BinMaster's 3DLevelScanner provides a highly accurate estimate of the volume of material in the vessel.

Advanced software that loads onto a PC utilizes the measurements to map the material surface and provide a 3D visualization of the contents that shows the low and high areas in the bin. If the bin is very wide, multiple 3DLevelScanners can be installed in strategic locations to span the material surface. Advanced software combines the measurements from multiple 3DLevelScanners and creates a single visualization of the material contents and reports the level and volume data.
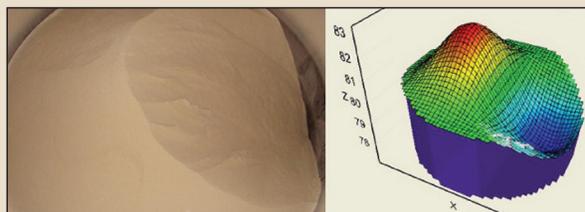
Material in the bin on the left. 3D visualization on the right.

BIN LEVELS
without CLIMBING!

Rotary

Diaphragm


Vibrating Rod

Capacitance Probe
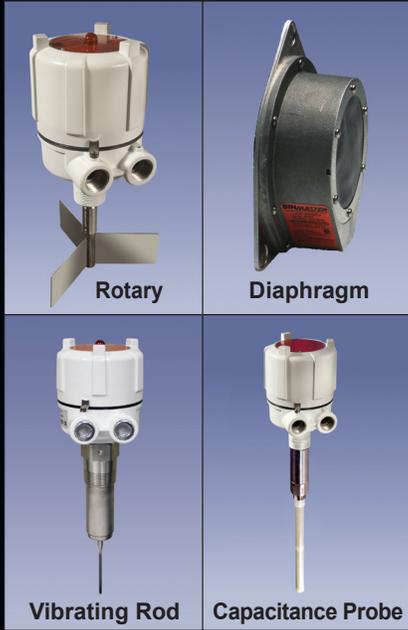
BIN MASTER ®
Bin Level Indicators

3D LevelScanner

Reliable, Non-Contact Level Measurement

BinMaster's 3DLevelScanner is proven to perform in difficult powders and solids, where other level measurement technologies can be unreliable. Its patented, acoustics-based technology penetrates dust and the sensor requires minimal maintenance.

It continuously measures and maps multiple points on the material surface to ensure high accuracy, and offers optional 3D visualization of tank contents. MultiVision software allows you to view and manage inventory for all your bins from a PC on a single screen.
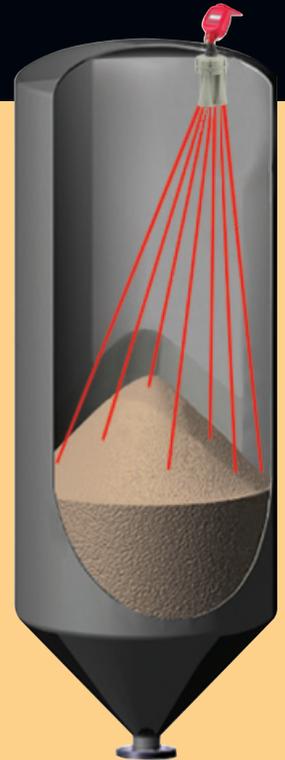
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