

3D Technology for Measuring, Mapping Ideal for Demanding Applications

Since BinMaster introduced its 3DLevelScanner in North America in 2009, inventory accuracy in bins, tanks and silos has improved significantly. Nevertheless, the company hasn't stood still and has continued to introduce new improvements and upgrades to the acoustics-based sensor.

When it was initially introduced, BinMaster's 3DLevelScanner delivered many advantages to the forefront of level measurement technology.

For one thing, the sensor's low frequency signals were able to penetrate dust in environments where radar and ultrasonic can perform inconsistently.

The device 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.

It also can measure and map the material surface and provide a 3D visualization of the contents that shows the low and high areas in the bin.

BinMaster's 3DLevelScanner has undergone an evolution over the past three years with new features and upgrades being added as a result of the customer feedback generated from over 600 installations throughout Canada and the United States.

New software has been developed, including MultiVision software that allows an entire network of vessels to be viewed on a single screen.

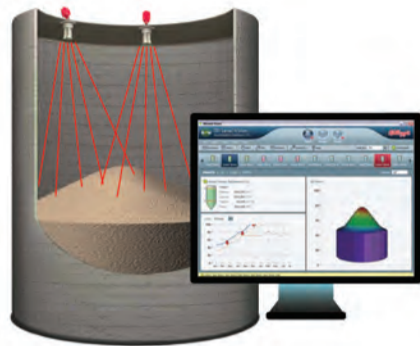
The MVL multiple scanner solution was created to provide better accuracy for very large vessels. Specialized extensions were designed to allow for installation in vessels

with structure in the top of the bin.

With each installation, BinMaster worked closely with customers to solve their biggest level measurement challenges in powders and bulk solids across the agricultural, bio-energy, chemical, cement, food, mining, plastic, and power industries.

Mine Over Matter

A frac sand mine (including a silo 42 feet in diameter and 118 feet in height) was concerned for employee safety and wanted



The MVL multiple scanner solution.

to eliminate the need to climb bins to take measurements. Silica sand, often referred to as frac sand, can be especially difficult to measure.

The shape of the particle itself can prove challenging, as it gives the sand a tendency to deflect signals, which can lead to false or inaccurate readings.

The mine had tried radar with limited success, but found the measurement data inconsistent and unreliable.

The angle of repose of the sand at times could be very steep, which caused the signals to bounce around in the silo and give

false readings.

The mine installed a 3DLevelScanner Model M which could penetrate the dust as well as take multiple measurements of the material to calculate an average level in the silo.

Signal deflection proved not to be an issue for the acoustics technology employed by the 3DLevelScanner. It was able to measure the sand reliably and accurately and eliminated the need for employees to climb the silo to take measurements.

Bigger is Better

Grain bins are getting larger all the time and as the need for storage grows, operations want to maximize the storage they have available.

A grain facility storing corn and soybeans found themselves with three 105 foot diameter bins and no way to measure them.

They were climbing the bins and dropping tape measures through a hatch to determine inventory levels.

However, the bins are center fill and have five discharge points which can make the grain levels vary throughout the bin, making a single tape measurement very unreliable for estimating inventory.

As the bins were extremely wide and a high level of inventory accuracy was desired, a 3DLevelScanner Model MVL-2 which employs two scanners was specified for each of the three bins.

One scanner was mounted near the center, but out of the material flow, and the other was mounted well away from the sidewall to allow the scanner to measure the maximum amount of surface area.

As each scanner takes multiple measurements in a 70° beam angle, the MVL-2 multiple scanner system was able to take measurements across the 105 foot bin. A controller that comes with the MVL-2 combines the measurements and generates data that provides the lowest point, the highest point and the average level of the bin.

Additionally, the 3DLevelManager software generates a 3D visualization of the bin contents, approximating the location of high and low points in the customer's bin.

MultiVision software is also used at this grain facility as it was important for them to manage the grain inventory in all three bins.

The MultiVision software enables the customer to view all three bins on a single screen and then view each bin in detail, along with its 3D image at the simple click of a mouse.

The facility is now able to push the data out to all of its local users in real time, so they can more efficiently schedule deliveries and shipments.

The MVL-2 multiple scanner system with its multiple point measurement technology provides an accurate inventory level that helps the facility maximize storage capacity while keeping the operation running smoothly.

Powders Behaving Badly

Alumina powder is among one of the toughest materials to measure. It's extremely dusty and behaves unpredictably when stored in silos, prone to clumping, piling up and making the topography in the silo as variable as a lunar surface.

This Quebec-based manufacturer was attempting to measure multiple 100 foot

diameter, 100 foot tall silos with multiple filling and emptying points.

Their only solution was to climb each silo and drop a tape measure in 20 different locations and then write the measurements down and climb down the silo to average the measurements.

This procedure was very inefficient and arduous during the winter months in Quebec.

Safety was the major driver in getting an alternative to manual measurements in place, but the operation also needed reliable data and a device that measured only a single measurement point wasn't a viable solution.

Due to the wide diameter of the silos, the 3DLevelScanner MVL-2 with two sensors was specified for this extremely high dust application.

Optimally locating the two sensors using the Locator Software, the sensors are able to measure and map multiple points on the material surface, which is a far safer alternative to climbing the silos.

The 3D visualization can be used to detect high and low spots in the bin to help manage filling and emptying points.

Another benefit of the 3DLevelScanner over other technologies in high dust powders is that it requires very little maintenance, needing only occasional cleaning.

Not a Happy Meal

Soy meal, and the process of measuring it, was a particularly troublesome job at this milling operation.

The environment in the 42 foot diameter by 120 foot tall concrete silo is characterized by extreme levels of soy meal dust that is moist and clings to sensors, walls and other internal structures.

The mill had tried both radar and ultrasonic and neither proved to work consistently over time.

Any device they tried got caked with soy meal dust, making the measurements unreliable or nonexistent, and creating a maintenance nightmare. Since soybean meal doesn't flow freely, a single point measurement system would not account for variations in the level throughout the silo.

BinMaster's 3DLevelScanner Model MV was installed in the silo and proved to perform in the dusty environment, providing consistent measurement readings, unlike the technologies previously used.

The minimum, maximum and average distance data was able to take into account variations in the material surface and provide a more reliable inventory estimate.

Despite the high levels of soy meal dust, the sensors continued to perform over time requiring only occasional cleaning, significantly reducing work for the maintenance crew. The MV Model also features 3D visualization of the contents, detecting high and low spots in the silo which may be a signal that buildup is occurring in the silo and cleaning may need to be scheduled.

This article was written by Jenny Nielson Christensen, director of marketing with BinMaster. Christensen can be contacted at jchristensen@binmaster.com

BinMaster

Circle 100 on Reader Service Card



Although the 3DLevelScanner is coated in dust, the inside of the device is clean and operable.



BinMaster is continuing to introduce new advances to its 3DLevelScanner.

The more you know...
the faster you can build your control panels.

Knowledge is power.
SmartWire-DT™ from Eaton is the first innovation that effectively reduces the complexity, commissioning and complications involved with wiring control cabinets.

Eliminate point-to-point wiring and replace it with a simple eight wire cable that connects components in minutes, not hours.

Learn more at:
www.eatoncanada.ca/MotorControl/SmartWire-DT/

EATON
Powering Business Worldwide



EATON TECHNICAL EDUCATION CONFERENCE
ETEC
CALGARY 2013
April 9-11, 2013