

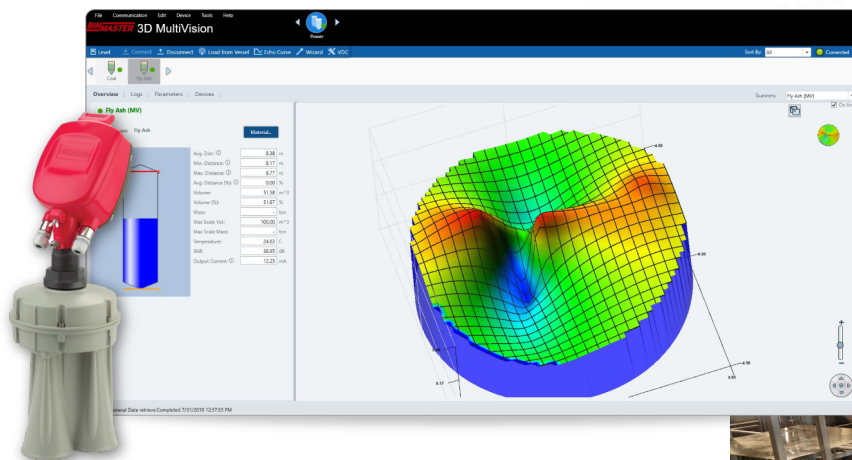
Article - Press Release

RADAR, 3D...CANT TOUCH THIS!

See through silo walls without touching product

By Jenny Nielson Christensen, MBA, Vice President of Marketing, BinMaster

Food manufacturers find non-contact level sensors attractive for a number of reasons. Of course, since nothing comes into contact with the material, there's no risk of equipment interfering with the process or rogue parts breaking off and getting stuck in equipment or contaminating ingredients intended for human consumption. Plus, they provide continuous level measurement for optimizing inventory and preventing silos from running empty. No food manufacturer wants to risk tagging a bad batch due to a missing ingredient. Today's most popular non-contact technologies are laser, radar, and 3D scanners.



CANT TOUCH THIS NON-CONTACT LEVEL SENSORS

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Today's most popular non-contact technologies are laser, radar, and 3D scanners. The sensor that might be best for your application is determined by a number of factors including the material being measured, the amount of dust in the environment, the size of the silo, and the desired inventory accuracy. Communications options for getting your needed data can also vary as well as the price of the sensor, its mounting, wiring, and installation costs.

SEE THROUGH SILO WALLS WITH 3D SCANNERS

Using a 3D scanner level sensor is like having Superman's x-ray vision. With its dust-penetrating technology, you can see the topography of what's inside the silo using the graphical option. The 3D scanner is mounted on top of the silo at an optimal location recommended for superior surface coverage, so the scanner can "see" the utmost material surface. It sends acoustic pulses that sound like chirping crickets to the material surface in a 15°, 30°, or 70° beam angle depending on the model. It then measures and maps the material surface at multiple points to detect uneven topography.

Distance is calculated using advanced algorithms that convert the difference between the timing the echo was sent and received to a distance. Data is sent via 4-20 mA or RS-485 output to software, or if you prefer an HMI / PLC. The included software records the data and calculates level, volume, and mass and creates an optional 3D visual of bin contents. 3D scanners come in a variety of models, which are generally chosen based upon the vessel size, the desired accuracy, the need for a 3D visual, and the operation's budget.

The 3D scanner is the only level sensor that measures multiple points on the material surface to account for irregular topography. To your operation, that can convert to precise volume measurement within 1% to 3% of total stored volume. For food plants, it offers the added benefit of detecting cone up, cone down, or sidewall buildup. When the MV or MVL models are used, 3D scanners are the only sensor that offers a 3D visual of silo contents. The 3D scanner is a popular choice for waste bins and rendering operations, even used in challenging materials like bloodfeather.

3D, 3D...EVERYWHERE WE SEE 3D

It seems for the past decade everything has been going 3D – 3D movies, 3D printers, and 3D video games. Even a level sensor now can see in 3D. What do all these 3D advances have in common? They enhance the user experience, make life more exciting, and in the case of 3D level sensors – your inventory far more accurate.

Can't touch this!

Sensor trends point toward non-contact technologies. Something that can't cause contamination, break off, get tangled up, or become corroded. 3D scanners use acoustic technology at very low frequencies to perform very accurately and reliably, with nothing but sound waves coming into contact with the material.

Yes, 3D scanners are proven in even the tough stuff like flour, sugar, distiller's rice, oilseeds, and cocoa. There are different models to best address a particular vessel size and the desired inventory accuracy. The big difference between 3D scanners and other non-contact technologies, such as radar or laser, is that it takes into account surface variations, which brings us to ...

Multiple points speak volumes

3D scanners do something different than any other sensor. They measure and map multiple points, unlike other sensors that take only a single measurement. When these measurements are married up with the volumetric

dimensions of the silo in the software, very high-volume accuracy of 1% to 3% of vessel capacity is possible. Materials that tend to pile unevenly, don't flow freely, or are prone to buildup are especially good candidates for 3D sensors. The size of the vessel also matters. Very large or wide silos will tend to have irregular topography. Multiple filling and emptying points also impact how material is distributed in a silo. Even with free-flowing materials there will be cone up and down conditions that impact volume calculations.

Leave other sensors in the dust

Who wants to scale a silo and go inside one to clean a sensor? No one. 3D scanners don't only perform consistently in high dust; by design they also resist dust in the first place. The acoustics of the sensors generate just enough vibration to keep the sensor horns clean.

For sticky stuff, there is a Teflon-coated antenna option for especially problematic materials. Flour, dry milk, and powdered sugar are good candidates for the Teflon option. It's also suitable for soybean meal, which tends to be very sticky and can build up on a standard antenna, especially under humid conditions.

Maximum performance, minimal maintenance

3D scanners don't require an air purge to keep them clean. This saves money and reduces complexity of the initial installation. Plus, there are no compressed air costs over time, and it can be a challenge to find dry air. Why is 3D different than other non-contact sensors? It comes down to the unique three-antenna design and the materials used to manufacture the sensor. Plus, the acoustic pulses emit a cricket-like "chirping" sound that resonates and creates an almost imperceptible vibration that knocks the dust off the sensor. In most cases, a 3D sensor requires only an annual cleaning.

King of the control room

In many manufacturing operations, the control room is king. There is a vast infrastructure of equipment specifically designed to manage storage and process control equipment. Operations monitor and measure many different parameters such as flow, temperature, moisture, vibration, pressure, speed, position, and weight in addition to level. All information is centralized in a single location and is generally secured on a local area network (LAN). It is commonplace in many operations for data from the 3D scanner to be sent to a control room for processing and monitoring.

3D can LAN

The 3D level scanner is commonly used on a Local Area Network (LAN) for easy access and data security. It is adaptable whether there is a single silo using 3D technology, or the sensors are used on all silos at a facility or corporation-wide. Either scenario is easily achievable, with 3D scanner systems being very scalable, allowing additional silos to be added at a later time as operations evolve and capital investments come to fruition. MultiVision software makes it easy to view all the silos in an operation, sort them by material, location, or alert status.

The good dirt is in the data

For some operations, current data is good enough. However, 3D software does much more than simply alert to a full or empty condition. It can generate robust inventory monitoring data used not only in production, but also by purchasing and finance. Just-in-time replenishment and reducing safety stocks is simplified using current and historical usage data. Inventory valuation and financial reporting is streamlined significantly using an operation-wide inventory management system. Historical reports, charts, graphs and a plethora of useful information can be generated using automated reports sent to key individuals on a routine basis.

CASE IN POINT: 3D is good fodder for this foodie

The hunger for better data

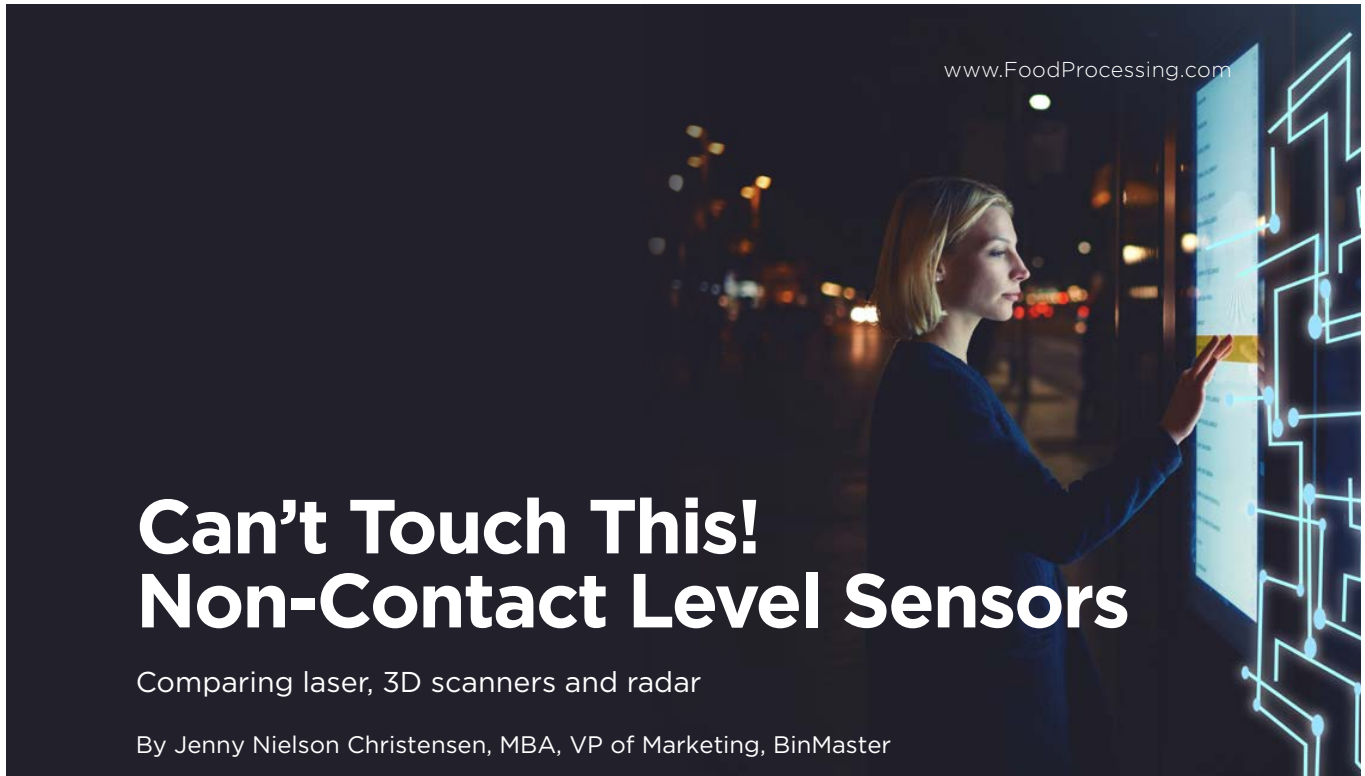
This food processor needed highly accurate volume measurements in order to know when to prepare to refill the silo, as the silo is almost always emptied completely before filling again to prevent damage to the material. They were seeking both accuracy and stability at batch empty rates of approximately one-half ton per minute and were primarily interested in headroom or distance to product from the top of the silo. The material is very dusty and prone to sidewall buildup and bridging with the material surface being characterized by highly uneven topography during the emptying process. The 3D scanner was evaluated against radar systems from several different vendors.

The recipe for success

The MV model of the 3D scanner was mounted on a 100-foot tall, 27-foot diameter, carbon steel silo containing granular rice. The device was mounted on an existing flange using an adapter plate and mounted halfway between the center and sidewall. The silo is a center fill, center discharge configuration and the internal environment is very dusty. However, the low frequency acoustics-based technology was able to penetrate the dust. Unlike the single-point measurement radar devices being tested, the 3D scanner MV model sampled multiple measurements within a 70-degree beam angle inside the silo. Allowing material to settle in the silo and then visually mapping the contents helped the customer more closely manage inventory and schedule refilling at an optimal time and provided a more accurate estimate of silo volume. Based upon the success of the first silo, 27 additional units were installed at the location.

Feeling satisfied with 3D benefits

Sampling measurements from multiple points when the material surface of the silo is uneven provided a more precise headroom measurement and silo volume than the single point radar level measurement device. The advanced mapping and visualization software – available on the MV model – is helpful when used in material prone to sidewall buildup and bridging, where there are points in the silo that are lower or higher than the majority of the silo contents. Calculating volume after an empty or fill cycle, when there is a “cone down” or “cone up” is more accurate when multiple point measurement is used. Had a single measurement been taken, silo volume estimates could be significantly higher or lower than the actual volume



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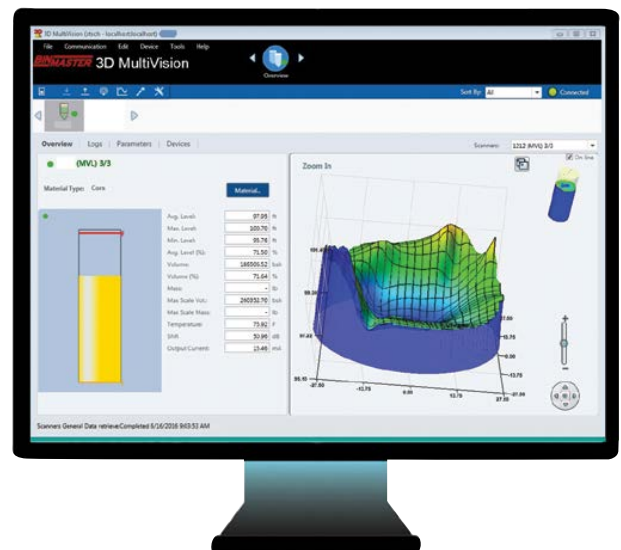
Comparing laser, 3D scanners and radar

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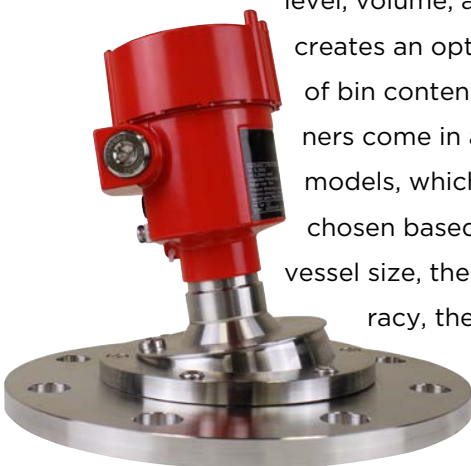
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A key advantage of 3D scanners to operational efficiency is volume accuracy in large silos. When silos are over 45 feet in diameter, more than one 3D scanner can be used on a single vessel. The software takes into account measurements taken by multiple sensors and aggregates it to a single volume and single 3D visual.



Download the complete white paper [here](#).

Need Volume Accuracy?

START SEEING RED.



3DLevelScanner



Works in Dust

Measures & maps entire material surface for unsurpassed accuracy



Non-Contact Safety

For all types of granules, pellets & powders to comply with FSMA

3D Visual

X-ray vision into your silo's topography, detects buildup



Low Maintenance

Resists buildup, simple annual maintenance, no charge required



Real-Time Inventory

MultiVision software tracks volume across entire operation





Sensors and software for YOUR industry

Industry	Bulk Material	Sensors	Software	Applications
Agriculture Farming Livestock	Grain Flour Beans Fertilizer Seed Liquids Bins, silos, tanks, piles, domes	Rotary level indicator Capacitance probe Vibrating rods Diaphragm switch Tilt switch Radar SmartBob 3D sensors Ultrasonic Flow detector	BinCloud BinView AgriView Binventory FeedView 3D Multivision	Prevent overflows Process control Inventory management Remote monitoring Monitor piles Flow detection Bin aeration Dust detection Aeration Ag Chemical Storage
Bioenergy	Corn DDG Biomass Wood pellets Wood fiber Forest residue Bins, silos, tanks, piles, domes	Rotary level indicator Capacitance probe Vibrating rods Diaphragm switch Tilt switch Radar SmartBob 3D level scanner Ultrasonic Flow detector	BinCloud BinView Binventory 3D Multivision ResinView	Prevent overflows and outages Process control Inventory management Remote monitoring Flow detection Slurry tank detection Measure DDGS
Cement	Sand Gravel Clinker Rock Powder Bins, clinker silos, tanks, piles, domes, chutes, crushers	Rotary level indicator Capacitance probe Vibrating rods Diaphragm switch Tilt switch Radar SmartBob 3D level scanner Ultrasonic sensor Flow detector Plugged chute detector Airbrator Diffuser air pad	BinCloud BinView Binventory 3D Multivision CementView	Prevent overflows and outages Process control Inventory management Remote monitoring Monitor piles and bunkers Inventory domes Plugged chutes Measure crusher levels ESPs or clinker silos Prevent conveyor overloads Silo aeration
Food processing	Brewing Foodstuffs Solids Slurries So much more... Silos, mixers, batching tanks, conveyors, pipelines	Rotary level indicator Capacitance probe Vibrating rods Diaphragm switch Tilt switch Radar SmartBob 3D level scanner Ultrasonic sensor Flow detector Airbrator Diffuser air pad	BinCloud BinView AgriView Binventory 3D Multivision	Prevent overflows Inventory management Remote monitoring and VMI Process control Sanitary level measurement Detect levels in mix or slurry tank Detect levels on conveyors Flow detection Silo aeration
Mining	Lump coal Ores Aggregates Fine alumina powder Silos, crushers, conveyors, domes	Rotary level indicator Capacitance probe Vibrating rods Diaphragm switch Tilt switch Radar SmartBob 3D level scanner Ultrasonic sensor Flow detector Airbrator Diffuser air pad	BinCloud BinView Binventory 3D Multivision CementView	Inventory management Monitor piles Prevent overfills or outages Detecting plugged chutes Measuring inventory in domes Level measure in crushers or bins Prevent overloading Process tanks Remote monitoring Silo aeration Dust detection
Plastics	Resins Flakes Powders Granules Regrind Silos, bins, containers, hoppers, tanks	Rotary level indicator Capacitance probe Vibrating rods Diaphragm switch Tilt switch Radar SmartBob 3D level scanner Ultrasonic sensor Flow detector Airbrator Diffuser air pad	BinCloud BinView ResinView Binventory 3D Multivision	Prevent silo overflow Eliminate outages Inventory management Remote monitoring Vendor managed inventory Flow detection Bin Aeration Dust Detection