

Taking Control ... To A

# HIGHER LEVEL

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*“BinMaster will provide the most thorough and exact solutions to the challenges and opportunities presented by the customers we serve.”*

## Vibrating Rod Provides Reliable Switching In Powder & Dry Bulk Solids

The BinMaster® Vibrating Rod is a vibration-type level control instrument. The rod of the sensor vibrates when there is no material covering the active rod. When the rod is covered with material, the vibration is dampened and an electronic circuit forces a relay to switch. When the blade becomes uncovered, the vibration restarts and the relay switches back.

The rod is fixed at two points in such a way that it forms a perfect swinging-system with very low mechanical losses (also called transversal vibration). If you hit the end of the rod, it will vibrate on its resonance frequency and ring like a tuning fork. In action, the vibration is driven by a piezo-system, which receives electrical pulses from the electronics. These electric pulses enlarge the size of the piezos, which leads to a bowing of the rod. Since the pulses are on the exact frequency of the rod in resonance, the entire rod starts swinging. A second piezosystem works as a swinging detector. If the piezo becomes distorted, it sends a voltage signal to the electronics, which can determine whether the rod is



vibrating or not.

One of the technical advantages of the Vibrating Rod is its high sensitivity. Why is the BinMaster Vibrating Rod so sensitive? The idea of its design is to bring a very small portion of energy into the rod. This is accomplished by a vibrating system that swings exactly on its resonance frequency. The system does not lose any energy (e.g., to the wall of the bin), so only a very small amount of energy is needed to keep the rod vibrating. Because the amount of energy in the rod is so small, it

is very easily absorbed by the material around it.

Of course, it's easiest to detect heavy material with vibrating rods; heavy material absorbs vibrations very easily, and it's difficult to push away (sand for example). Light material is easy to “push” away (polystyrene), so it can't absorb heavy “pushes”. It can only absorb small amounts of energy. Because the BinMaster Vibrating Rod introduces only a small amount of energy, and therefore only pushes

*(Continued on page 2)*

- ◆ Point Level Sensors
- ◆ Inventory Measurement
- ◆ Flow Detection
- ◆ Dust Detection
- ◆ Aeration & Vibration



## Provides Reliable Switching

Continued from Page 1

very lightly, it can detect very light material. The high sensitivity, however, doesn't affect the sensor's ability to detect heavy materials. Without adjusting, you can detect both light and heavy materials.

The BinMaster® Vibrating Rod uses a single-blade design. The biggest advantage of the single-blade design is that...well, it's a single rod! The typical (still popular, but very old-fashioned) fork design causes



Single Blade Design

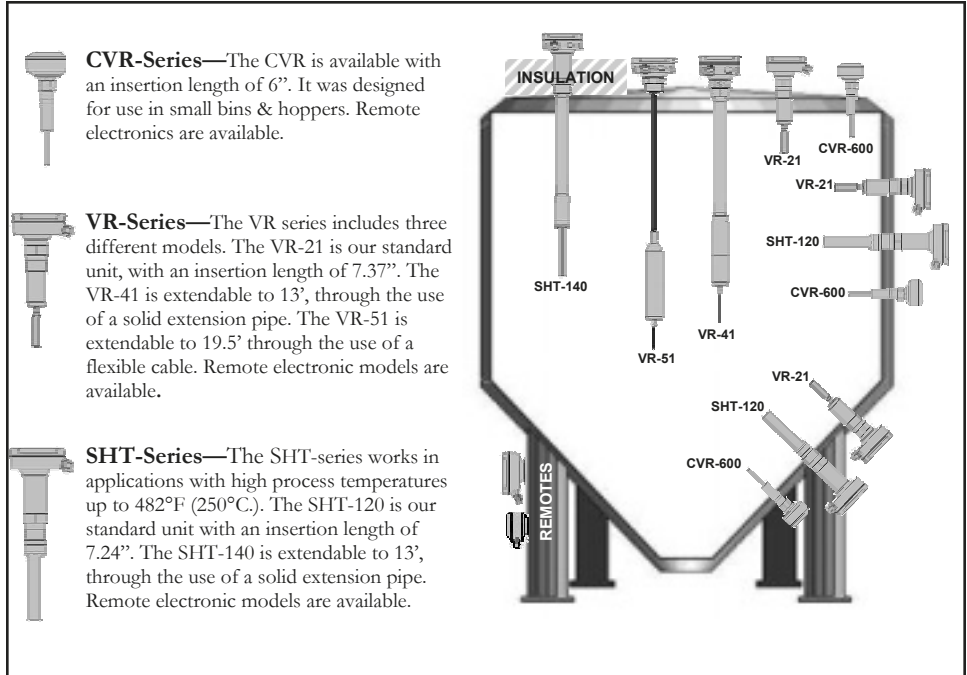
material build-up and inaccurate results. The material being monitored can become wedged between the two rods and create a bridge. This happens especially in low-level alarm applications.

The high pressure of material piled above the rods can press material between the two rods. When the material level sinks below the rods, the fork will still be on "full" status, because the bridged material will dampen the vibration. The user will realize there is a problem only when the bin is empty and its process disturbed. The same thing happens if a rock or another large-sized material is jammed between the rods. The fork cannot vibrate and the sensor will fail! With a single rod, bridge building and jammed material is not possible, so false readings are not a problem.

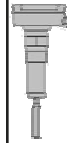
The rod of the BinMaster Vibrating Rod is formed like a double-edged sword. We do this for one simple, but very important, reason: There is no chance that material can build up on the blade. The blade is so sharp, all material flows around it, unlike single round rods. The larger the surface of the rod, the higher the risk of material accumulating on it.

The most sensitive part of the rod is the tip. The body of the probe is not sensitive at all, so the build-up of material on the body surface has no effect on the vibration. This helps when material sticks to the side wall. Other sensors need a separate extension in order to extend the rod further away from the vessel wall. The BinMaster Vibrating Rod does not need this.

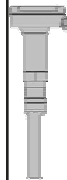
Other sensor rods have larger diameters than the BinMaster Vibrating Rod. This causes more material to build up around the rod, which dampens the vibration



**CVR-Series**—The CVR is available with an insertion length of 6". It was designed for use in small bins & hoppers. Remote electronics are available.



**VR-Series**—The VR series includes three different models. The VR-21 is our standard unit, with an insertion length of 7.37". The VR-41 is extendable to 13', through the use of a solid extension pipe. The VR-51 is extendable to 19.5' through the use of a flexible cable. Remote electronic models are available.



**SHT-Series**—The SHT-series works in applications with high process temperatures up to 482°F (250°C). The SHT-120 is our standard unit with an insertion length of 7.24". The SHT-140 is extendable to 13', through the use of a solid extension pipe. Remote electronic models are available.

and results in inaccurate readings. The bigger the diameter, the bigger the problem. The only way to compensate for this is to make the amplification of the driver stronger. Higher amplification, however, means more energy in the vibration, which makes the instrument less sensitive. The biggest problem with stronger amplification is that the rod forms a hollow space in the material by pressing the material aside and building a tunnel around itself. This happens especially with light powders, such as flour. The result is that the sensor can vibrate in the hollow space it has formed, again causing a false alarm.

The BinMaster Vibrating Rod doesn't suffer from this disadvantage. Because it has a sword-shaped rod, material cannot build-up on it and damp the vibration, causing false readings. The amplification can be kept very small, so the risk of hollow spacing is extremely low.

Environmental changes have no effect on the function of the BinMaster Vibrating Rod. Detection depends on the ability of the material to absorb energy, which is not a matter of pressure, temperature or humidity. Quite to the contrary, the relative permittivity ( $\epsilon$ ) of the material is unaffected by material changes. As long as the material has a minimum density of 1.25 lb/cu. ft. (the density of light polystyrene), it will be detected by the BinMaster

Vibrating Rod—no matter what kind of material it is. It is not a problem for the BinMaster rod to detect material in bins where there are material changes from time to time. A density of 1.25 lb/cu. ft. is very low, and there are only a very few applications for lighter material. ●



New SHT Series Vibrating Rod is designed to work in high temperatures—up to 482° F

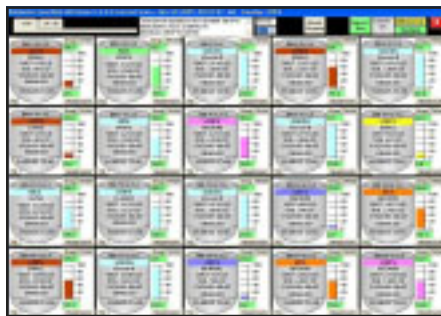
## Hansen Trucking Discovers the Power of eBob



*By Brian Weaver*

The SmartBob2™ inventory measurement system allows Hansen Trucking dispatchers to get real-time inventory reports for bins they load out of. In the past, they have relied on informal information: what hour the mill is running, what species of wood the mill is on and drivers' visual reports, which consisted of looking through a small screen in the bin side to see if material was covering it—then giving a best guess as to what was there.

The SmartBob2 system uses the same technology as old steam boat captains. They would drop a weighted rope with knots tied into it over the side, so they could ascertain the depth of the water.



**eBob software main Workstation Screen**

While the SmartBob2 sensor is a little more advanced than that, the technology is the same. The SmartBob2 system drops a

Using a pulse wheel and optical encoder, the SmartBob2 system measures the cable on the way out and on the way back in, then sends this information to a Web server, where Hansen's dispatchers can access it through eBob™ software to get real-time readings of how much material is in the bin.

This information is displayed two different ways. The first display is a graphical representation of the bin (just a picture of the bin showing the amount of material in it). From this screen, the dispatcher can request the bob to drop, in order to take a real-time reading. Otherwise, the bob is on a schedule to drop every 20 minutes. The other display is a string report, which contains a graph, so the dispatcher can look at the past history of the bin. The graph shows the last 10 hours of measurements taken. This way, the dispatcher can tell when and how much has been taken out of the bin.

Hansen currently has four of these bobs running and five more being installed in various mills, with the hope of having one in every bin they haul out of within the next two years. The Plum Creek mills have been especially receptive and helpful in the installation of these bobs. ●

*(Brian Weaver is the Driver Recruiter/Web Technology Coordinator for Hansen Trucking, Inc., in Columbia Falls, Montana.)*



**A SmartBob2 sensor installed on a chip bin at the Plum Creek sawmill in Columbia Falls, Montana**



**A SmartBob2 sensor, installed on a sawdust bin at the Plum Creek sawmill**

## Coming Soon...New SmartBobTS1

Designed after its predecessor, the SmartBob2 inventory measurement system, the SmartBob-TS1™ sensor is an economical and compact inventory tracking sensor built for use in smaller tanks and silos. The small, yet rugged, design allows you to use SmartBob-TS1 sensors in vessels as deep as 30 feet. From a simple manual push-button console with eBob software, the SmartBob-TS1 sensor gives you more communication options than any other system. The SmartBob-TS1 sensor also has an optional built-in 900 MHz wireless modem, eliminating the need for running long lengths of communication cable. This provides

two-way wireless data communication between a SmartBob-TS1 sensor mounted on top of a storage vessel and the control source on the ground.

The SmartBob-TS1 measuring principle combines reliability with simplicity in a wide variety of applications. Whether it's ground feed in a silo on a farm or fine granular solids in a plastic processor's material storage silo, SmartBob-TS1 has the power and flexibility to handle it. Airborne dust, filling noise, steam, temperature, or steep coned bottoms pose no problem for the SmartBob-TS1 sensor.

Contact us today for more detailed information and pricing. ●

**SMART Bob TS1**



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# Vibrating Rod Design Offers Big Advantage...A Single Rod!



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ISO 9001 CERTIFIED

See this bike in BinMaster Booth #2123 at the 2006 Powder & Bulk Solids Show—May 9, 10 & 11.



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