

Matt Morrissey and John Dronette

Are you paying to ship air with your grain?

After harvest, grain begins its journey from the farm to grain terminals and then on to be used directly or manufactured into countless numbers of products. An operator oversees that grain is loaded into trucks or rail cars, transporting it from farm to cities around the world.

This operator knows that the cost of shipping dry bulk materials can be the most expensive part of a product cost and loading rail cars and trucks can be a little tricky. If the operator fills the car too full, the company is handed a large fine. But leaving space in the car means the company is paying to ship air! So what is our operator to do?

Nine out of ten isn't great

There are many different ways to fill a truck/rail car, including:

- belt conveyor with belt scale
- directly with no control
- screw conveyor
- volumetric gates

Belt conveyors with installed belt scales provide much better accuracy than the other methods listed here. Without control, our operator would gauge how much grain is pouring into the rail car using only sight and the elapsed filling time.

With a screw conveyor's volumetric measurements, operators cannot always be sure that the conveyor's trough or tube is completely filled with material. As well, the material's moisture content can cause errors in measurement, since material can stick to the screw's center pipe. Volumetric gates open to release a certain amount of material, but only provide between 5-10% accuracy.

Using these other filling methods, typically railcars will only be filled with dry

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Stored grain is unloaded into waiting trucks or rail cars to be manufactured into products or used directly.



SITRANS WF100 flowmeter plus SITRANS SF500 weighing integrator provide complete control and accuracy.



Figure 1: Grain enters the flowmeter through the flow guide and then strikes the sensing plate.

bulk materials to 90% of capacity to avoid the heavy fines of overloading the car. But in doing so, the company shipping grain is also now paying to ship air!

When you think about it, if all of the rail cars could be filled to capacity, it would only take nine cars to ship the product. So, effectively every 10th rail car or truck is shipped empty!

Flowmeters to the rescue

The new SITRANS WF100 dry solids flowmeter can reduce your shipping cost by measuring the bulk material as it is loaded in to the rail car or truck. With an accuracy of $\pm 1\%$, this flowmeter gives our operator the ability to load rail cars and trucks to 99% of capacity, reducing total shipping costs by as much as 9%.

The SITRANS WF100 measures dry bulk materials as they are gravity fed through a pipe. Material enters the meter through a flow guide, which directs the material to impact the sensing plate [Figure 1]. The force at which material strikes the plate is measured and used to calculate the instantaneous flow rate. That flow rate is then integrated with time to calculate the accumulated total.

Setup and calibration

To first calibrate the flowmeter, our operator uses a static calibration weight, which simulates a reference flow rate, and then performs a material test. By running a known amount of grain through the flowmeter and then comparing the results, the operator learns the exact adjustment value of the particular grain to be measured.

The SITRANS WF100 is capable of measuring a wide range

of material sizes and densities. The variety of liners available for corrosion or abrasion resistance makes them well suited for measurement of materials ranging from grain to dry chemicals.

The Siemens SITRANS WF100, when used with a SITRANS SF500 weighing integrator, provides instantaneous flow rate and an accumulated total of material as it is being fed. The built-in control in the SITRANS SF500 provides a relay output when the rail car or truck is full.

Now our operator knows exactly when to stop the filling process and how to ship grain without paying to ship air.

Matt Morrissey is the Product Manager for Weighing Technology at Siemens. John Dronette is Siemens' Product Marketing Manager for Weighing and Feeding in the US.

Siemens Industry, Inc.
Process Industries and Drives
100 Technology Drive
Alpharetta, GA 30005
1-800-365-8766

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