Mass flow rate measurement of bulk solids on conveyors

Whether driven by environmental regulations or a commitment to manufacturing excellence, today's processes often require precise measurement of the mass flow rate of solids moving along conveyors from point A to point B.

Presently, the most common technology for the task is the mechanical scale that usually includes a weigh bridge, a load cell, and a speed sensor. Small vertical displacement of the weigh bridge needs to take place in a reproducible fashion, free from debris, for accurate measurement. Any user of a mechanical conveyor scale understands the frequent and costly maintenance needed to keep the system working at its potential.

The WEIGHTRAC 31, a radiation-based weigh scale offered by VEGA, is a system that provides the mass flow measurement of bulk solids on conveyors with no moving parts. The lack of moving components eliminates daily routine maintenance and allows it to make the measurement with proven dramatic reduction in operational costs as compared to mechanical scales.

The system infers the mass on the belt by passing a beam of gamma energy through the material on the belt, then the belt, then down to a radiation detector below the belt. The radiation field strength registered by the detector is proportional to the amount of mass through which it passes, by a well-known physical law.

Note: the gamma radiation emitted from the Cesium 137 isotope inside the source holder *does not make the material or the belt radioactive*. Keep in mind that the radiation field at the vertical uprights of the WEIGHTRAC 31 is at, or slightly above, background radiation level.

Calibration is a simple, two-step process: First, measure the count rate of the empty conveyor belt. Next, measure the count rate when the belt is loaded, then enter the product weight into the calibration table.

The WEIGHTRAC 31 system accepts input from a belt speed sensor, as do mechanical scales. In most cases, these sensors use rotary encoders to determine the belt speed. They need to be spanned to properly report the linear belt speed. VEGA provides tachometers for speed input, and the configuration software, PACTWARE, makes for an easy setup of the weight application.

Totalizing the weight passed on the conveyor is also a feature of the WEIGHTRAC 31. The totalized weight value output can be sent to a counting display from VEGA or another supplier, or to a customer DCS.

The WEIGHTRAC 31 even provides mass flow measurement of solids on screw conveyors. Mechanical scales are not designed to make the measurement on screw conveyors due to their construction, but the WEIGHTRAC 31 can.

Any measurement system has limits. Just as with any measurement system, it must meet the needs of the application. Light loads are a common challenge for the WEIGHTRAC 31 and mechanical scales. There needs to be enough change in mass between empty belt and loaded belt for the sensor to provide sufficient measurement resolution.

The good news? VEGA has boiled this limitation down to a three-factor equation used as a litmus test to check the application details and performance of the WEIGHTRAC 31. VEGA has produced radiation-based weigh scales since the 1960s. We know where they work well, and where they don't. VEGA strives to gain customer satisfaction with our measurement solutions and will not provide them without the promise of success.

If you're searching for a more cost-efficient method of measuring the mass flow of solids on conveyors, then the WEIGHTRAC 31 may be your tool. For more details on our WEIGHTRAC 31 and to arrange a no-cost application evaluation, reach out to VEGA.