

A close-up photograph of a person's hand holding a small amount of blue, spherical fertilizer granules. The hand is positioned over a small green seedling with four leaves growing out of dark, rich soil. The background is a soft, out-of-focus green, suggesting an outdoor agricultural setting.

SIEMENS

PROCESS INSTRUMENTATION

Phosphate mine turns to Siemens for accurate measurement and improved safety

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If you asked the general person on the street about phosphorus, you might get a puzzled look. He or she probably wouldn't know that this little-known element is fundamental to all living organisms. Phosphorus is essential for the creation of DNA, cell membranes, and for bone and teeth formation in humans. Phosphorus is one of three nutrients, along with nitrogen and potassium, used in commercial fertilizer, giving it a vital role for food production. Unlike many modern innovations, it is impossible to manufacture phosphorus synthetically. This places greater importance on phosphorus mining.



Siemens Milltronics MMI's compact design and drop-in installation offer a significant cost savings at heavy duty industrial sites.



The Milltronics MWL weight lifter's modular construction easily adapts to different conveyor widths, including conveyors with belt widths as large as 96 inches.

Although the lion's share of the phosphoric acid mined globally (approximately 82%) is used in the production of fertilizers, the other uses for the mineral are wide-ranging. The remaining 18% is used in the production of feed phosphates, medicines, and food products. In addition, phosphorous is used during the treatment of metals, in medicine and in dental solutions. Demand for phosphoric acid for the production of feed, food-grade and industrial phosphates is over 6 million tons per year. With projections that the world population will reach 9 billion by 2050 and require 70 percent more food than we produce today, phosphorus is crucial to global food security.

World's largest producer of phosphate ore

A large phosphate mine in Eastern Asia began the search for a belt scale supplier. Given the nature of phosphate mining, the company had high requirements in terms of reliability and accuracy for heavy-duty applications. As with any mining process, high accuracy is important, as the ore is weighed to determine mine production rates. In particular, the mine sought to improve safety, minimize maintenance time, reduce the need for spare parts, and modernize their production processes.

Challenge

Conveyor belt scales are designed to continuously calculate bulk material flowrate by measuring belt load and speed. They can be installed in many locations throughout a mine or mineral processing operation for rate control, production, and inventory monitoring. Proper selection is important, because with increased accuracy comes greater cost.

In addition to high accuracy and reliability, this mine had two specific requirements for the modernization and expansion of production. First, calibration of the belt scale had to take place without stopping the conveyor. Proper calibration is like picking up the right tool for the right job. Without it, accuracy is at risk. Second, safety of staff was paramount. Employees

needed to be fully protected and not required to touch any moving parts of the conveyor.

The mine invited Siemens to test their Milltronics belt scale systems at two mines on the vacuum filters and load mills. Tests were conducted over several months using a variety of calibration methods to ensure accuracy and reliability even with uneven, heavy or light loading.

Siemens solution

Belt scales work by responding to vertical forces, both desired and undesired. Many issues are a result of problems with the conveyor or improper commissioning. Careful evaluation of the application, proper installation, calibration, and routine maintenance will yield many years of continuous and reliable service. A typical belt scale system is made up of a weighbridge structure supported on load cells, an electronic integrator, and a belt speed sensor.

Siemens offered the Milltronics MSI belt scale and the Milltronics MMI belt scale (a combination of two or more MSI belt scales working in tandem). The compact design of the single idler model allowed for quick and easy installation, as well as reducing the amount of total weighing space required. This allowed for a more suitable area in the conveyor to be selected. A Siemens MWL calibration weight lifter was used so that the calibration weights could be placed on the scale without the workers needing to reach into the conveyor system. A Sitrans WS300 speed sensor mounted on a self-cleaning bend pulley or a Milltronics RBSS return belt speed sensor, and a Milltronics BW500 integrator completed the belt scale system solution from Siemens. Installation, initial configuration, and commissioning of the belt scale system were carried out by a local Siemens service partner.

After testing a variety of systems from different suppliers, the mine chose a package with the MWL calibration weight lifter. The Milltronics belt scale fully meets the mine's re-



The rugged design of the Milltronics RBSS speed sensor is ideal for heavy duty applications. The RBSS offers easy, low-cost installation while providing accurate belt speed detection.

requirements for accuracy, easy maintenance, long-term stability, and simple and fast methods of calibration.

Improved performance without sacrificing safety

Milltronics MSI is a heavy-duty, high-accuracy, full-frame single-idler belt scale used for process and load-out control. Milltronics MSI provides continuous in-line weighing of a variety of products in primary and secondary industries. It is proven in a wide range of tough applications from extraction (in mines, quarries and pits), to power generation, to iron and steel, food processing and chemicals. The MSI's patented use of parallelogram-style load cells results in fast reaction to vertical forces, ensuring instant response to product loading. This enables it to provide outstanding accuracy and repeatability even with uneven loading and fast belt speeds.

Like the MSI, the Milltronics MMI is a heavy-duty, high-accuracy scale with multiple idlers. It is ideally suited for the harsh conditions of nepheline mining.

The total belt scale system provides indication of flow rate, total weight, belt load, and belt speed of bulk solids materials on a belt conveyor. The MSI or MMI is installed in a simple drop-in operation and may be secured with just eight bolts and existing idler sets, secured to the belt scale. With no moving parts, maintenance is kept to a minimum, with only periodic calibration checks required.

An added benefit of the Siemens system is the Milltronics MWL, a mechanical calibration weight lifter for Siemens belt scales. The MWL mechanically raises and lowers the static calibration weights and then stores the weights securely above the belt scale calibration arms, allowing the operator to apply the weights safely without having to lean into the conveyor. Safe and easy application of belt scale reference weights with the MWL ensures the operators remain external to the conveyor.



Milltronics BW500 is a full feature integrator for use with both belt scales and weighfeeders. Belt load and speed signals are processed for accurate flow rate and totalized weight of bulk solids.

The two belt scale systems were installed on belts carrying nepheline ore before and after the secondary crusher. The first belt width is 60 inches, with a heavy-duty feed rate of 3200 TPH. The second belt width is 54 inches and the feed rate is 500 TPH.

Following installation of the Siemens belt scales at the material dosing portion of the mill, the mine noticed improved performance and higher quality of material components in the finished product. With the belt scales installed, inventories are now measured in real-time, preventing costly inventory adjustments. They were also able to improve safety while increasing output.

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