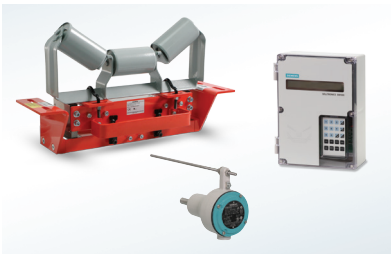




Process instrumentation

# Coming full circle with ultrasonic and weighing technologies



Nickel is a precious metal that is naturally resistant to corrosion. This makes it useful in plating other metals, or as a component in alloys such as stainless steel.

Companies that mine for nickel often increase the efficiency of their existing conveying and crushing systems through automation.



In a typical configuration, raw nickel is loaded onto a conveyor belt where it is uniformly distributed by a profiling gate located at the infeed. After travelling on the belt, it is discharged into a surge hopper above the jaws of a crusher, before being transformed from large chunks of nickel ore into smaller ones.

The efficient performance of the crusher depends upon a consistent flow of material into it. Accordingly, the monitoring system needs to know if and when there is a jam, and whether it is in the infeed or in the crusher.

## The challenge

Automating such a system presents challenges in the following areas:

### 1. Flow rate monitoring and belt speed control

A solution is needed that monitors the amount of material on the conveyor and signals to the flow control if the rate is in need of changing.





An Echomax transducer measuring the level in a crusher.

A Milltronics belt scale and speed sensor on a conveyor belt moving mining material.

## 2. Continuous level measurement

Simultaneously, another solution is required to measure the level of material in the crusher and to modify the belt speed accordingly.

For example, an automatic system has to increase the belt speed to escalate the rate of delivery of raw material if the level in the crusher gets too low, or slow it down should the opposite happen. This second condition is especially critical because, if there is too much ore in the bin, the additional load on the jaws strains the crusher, slowing it down.

Above all, such measuring devices need to work together. If they are not able to communicate, then something as simple as a blocked infeed could wreak havoc.

For example, such a jam would result in the following:

1. Less material on the belt.
2. The bin level above the crusher gets low.

In such conditions, the level measurement system in the bin would register a low-level state and automatically trigger an increase in the speed of the conveyor with the aim of feeding more material to the crusher. This action would be a waste of time however if the belt was empty in the first place.

When a feed starvation state such as this occurs, the two systems must be able to communicate the situation to the control room so that the appropriate action can be taken.

## The solution

To meet the needs of flow rate monitoring, install a Milltronics MSI belt scale, a SITRANS WS300 speed sensor, and a Milltronics BW500 integrator.

The Milltronics MSI features a unique load cell configuration specifically for belt scale applications. It has a high degree of environmental protection (IP67), and is designed to react only to vertical forces, and to allow for minimal product build-up areas. The SITRANS WS300 speed sensor's integrated circuit eliminates false pulses from vibrating conveyors, and provides a reliable speed signal with four different resolution options. Both these devices tie into the full-featured Milltronics BW500 integrator that has a wide range of industrial communication protocols, and boasts both basic and advanced functionality options for weighing applications.

This Siemens instrumentation delivers instantaneous measurement to ensure that raw material is conveyed from the infeed into the crusher at a variable rate that is based on the level of material in the crusher.

The second system requiring a level measurement solution is the crusher. The best option in this case is a non-contacting device in the form of an Echomax XPS10 transducer mounted in the open air above the bin and connected to a SITRANS LUT420 ultrasonic level controller.

The SITRANS LUT420 is the world's most accurate ultrasonic level controller. Programmable in eight different languages through a web interface, the unit is very easy to use and commission, and its proven use of Sonic

Intelligence ensures that the signal processing from the transducer is reliable and accurate. The Echomax XPS10 is a rugged transducer with a range of ten meters (33 feet) so that it can be safely mounted away from any moving material.

With a very broad process instrumentation portfolio, as well as the experience to back it up, Siemens is a natural choice to provide the solutions for nickel producers the world over.

### **The benefits**

With this configuration of Siemens equipment, nickel plant installations have two systems that work together with high and low alarms on both the crusher bin and the conveyor belt.

The mA output of the SITRANS LUT420 acts as an analog input into the VFD of the conveyor to control its belt speed so that when the level of raw material drops in the crusher hopper, the belt speeds up, and when the level gets too high, the belt slows down.

In addition, the on-board relays of the SITRANS LUT420 also make it possible for high and low set points to activate an alarm to ensure maintenance crews do a visual inspection and diagnose any problems.

Similarly, the mA output of the SITRANS BW500 can monitor flow-rate, as the unit has on-board relays for load-based high and low set points. The control room uses these relays to monitor for feed starvation on the conveyor.

In fact, the successful automation of the crusher application means a nickel producer can come full circle in terms of plant automation. This circle begins with the removal of manual operator intervention that results in the promotion of safe practises, which leads directly to the improvement of plant efficiency and the reduction of maintenance costs. The money saved can then be invested into even more automation.

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