

Lehigh: consistent feeding

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Utilising the Schenck Process Multicor®-S800 Coriolis Mass Flow Meter (CMFM) guarantees precise accuracy for the Lehigh kiln feed system. A Multicor-S80 CMFM is installed for metering fly ash in the finish grinding mill for producing a new inter-ground type of cement.

The Process

For Lehigh Cement its process begins at a quarry 306km (190miles) away from Edmonton where limestone is mined and crushed into chunks. The limestone is transported to the plant in some 300 rail cars each week.

7.9in (20cm) limestone is by rail car to Edmonton. Some 300 rail cars of the limestone are shipped

Lehigh Inland Cement, Edmonton, Canada, is a wholly owned subsidiary of HeidelbergCement. For more than 50 years the plant has been producing high quality cement for customers throughout Canada and the US. With production exceeding 1Mta of cement, Lehigh has installed the highest quality equipment and systems in its plant. Because consistency and accuracy are critical in the production of cement, Lehigh Inland relies on Schenck Process weighing and feeding equipment for maintaining a consistent feed to its kiln and to meter fly ash into its finish grinding mill.

After the raw material is unloaded and stockpiled it is fed into a hammer mill crusher along with clay that is mined at the plant site. The limestone and clay are mixed at a 3:1 ratio.

Now called preblend, this mixture is conveyed to the preblend dome where it is stacked by a radial arm stacker in a continuous, circular pile up to 700 layers deep (12m high or 40ft). Further mixing of the preblend is done in this area before being conveyed to the surge bin.

The surge bin temporarily holds the preblend and feeds the mixture on to a conveyor system where small amounts of sand, bottom ash, iron ore, and more

limestone are added if necessary assuring that the limestone and clay are in correction proportion to produce cement. From the surge bin the preblend is conveyed to the roller mill.

The roller mill is comprised of three x 27t steel wheels that pulverise the preblend into a powder-like mixture resulting in the creation of kiln feed. Over 230t of kiln feed are produced each hour. In this stage the kiln feed is sampled multiple times to determine if it meets specification. If low in any of the raw materials, adjustments are made from the additive silos to correct the mixture.



Figure 1: Lehigh Inland Cement produces over 1Mta of cement

From the roller mill, the kiln feed is carried by high pressure air to the homogenising and kiln feed silos, where it is continually mixed for maintaining a powdery consistency.

**Multicor®-S800
Coriolis Mass Flow Meter**

After leaving the silos the kiln feed goes into a calibration bin and from there it enters the Schenck Process Multicor-S800 CMFM. The S800 offers cement producers a number of key features including, dust containment, compact design, direct weighing technology, repeatability, and accuracy.

Lehigh chose the S800 for all the features previously mentioned, but their decision was based primarily on a desire to increase the accuracy and reliability of the system versus the one they had been using. The previous kiln feeding system utilised impact flow meters with pneumatics transporting the materials into the flow meters. Air slides were used to deliver the kiln feed to and from the flow meters. The combination of the impact flow meters, pneumatics, and air slides would create pressure and ventilation differences from one side of the system to the other resulting in a sucking action on the flow meter paddle causing it to go down. This would negatively affect the overall accuracy of the system.

With the installation of the Multicor-S800 CMFM, Dave Moule, Lehigh Cement plant engineering superintendent, stated "for our particular application the variation in pressures or ventilation did not affect the Schenck Process coriolis

Figure 2: Schenck Process Multicor®-S800 kiln feeding system provides accuracies of ±1 per cent



Figure 3: the Schenck Process Multicor®-S800 Coriolis Mass Flow Meter decreased fluctuations in feed rates and increased overall capacity



meter. We could count on the equipment to give us the same results regardless of any outside forces or plant disturbances." The increased accuracies produced by the Schenck Process kiln feed system allowed Lehigh to run at a higher feed rate, which has led to greater production capacity. The Multicor-S800 CMFM is capable of feed rates up to 600tph with accuracies of ± 1 per cent.

Continuing the kiln feed process

After being metered from the S800 the kiln feed enters an air slide and then into a high pressure air pump, which conveys the materials to the top of a preheater tower. The material enters the tower at a temperature of 90°C (194°F) and within 20 seconds falls through the tower and emerges from the bottom at a temperature of 850°C (1562°F). From there the kiln feed enters the kiln where it is heated to 1400°C (2552°F), resulting in the creation of clinker.

After cooling, grinding, and milling the clinker into cement the finished product is stored in one of the companies 24 on-site silos. From there it can be easily shipped to customers in bags and bulk form, by rail or truck.

Multicor-S80 solids flow meter

As part of a separate cement manufacturing process within the Lehigh plant another Schenck Process product named the Multicor-S80 CMFM is installed for metering fly ash into the finish grinding mill for producing a new inter-ground type of cement. Moule commented, "This process allows us to reduce the clinker content in the cement product by substituting unclassified ash, which has cement type properties without compromising product quality, resulting in a substantial specific energy savings."

Traditionally, fly ash has been used in concrete at levels ranging from 15 to 25 per cent by mass of the cementitious material component (Thomas 2007). Because it plays such a vital role in the production of cement the accuracy provided by the Multicor S-80 is critical. Fly ash is typically provided to cement plants for little or no cost and if an inadequate amount of the material is metered into the process from the use of inaccurate equipment it reduces the



Figure 4: the Multicor®-S80 meters fly ash with precise accuracy into the finish grinding mill for producing a new cement product for Lehigh

cost savings realised by the use of fly ash for the plant. It also results in producing off spec product. The installation of the Multicor-S80 has provided Lehigh with a product that has the capability of reaching accuracies of ± 0.5 per cent when metering over two tons per hour leading to precise measurements all in a dust tight compact design.

Moule added, "a short pay back period also made the equipment an excellent investment for Lehigh."

Results

With the installation of the Multicor-S800 CMFM and Multicor-S80 CMFM, Lehigh

Inland Cement has been able to increase their kiln feed and fly ash metering accuracies with the added advantages of dust containment and a compact design that meet's the plant space requirements.

Moule added, "We were not meeting our accuracy and production goals prior to the installation of the Schenck equipment, but with the coriolis meters in place we had the reliability and accuracy that we were seeking." ■

References

THOMAS, Michael (2007): "Optimising the Use of Fly Ash in Concrete", Portland Cement Association, Skokie, IL.