TRIBO SERIES
CASE STUDY

Portland Cement Manufacturer Upgrades Technology, Improves Operation and Reduces Costs

SUMMARY

One of the largest Cement factories in America was interested in reducing frequent visual emissions inspections mandated by new Portland Cement (MACT) rules in effect since June 2002. A second issue was the need to measure solids flow in the finish mill operation to determine the rejects flow rate. During a recent upgrade to the finish mill circuit, the rejects flow, which is traditionally measured using an impact flow meter, was eliminated due to the building height requirement of about 6 ft for such equipment. The plant was looking for a flow measuring device that could be incorporated in existing airslides without any building height requirements or other modifications. Both problems were resolved by installing triboelectric dust and bulk solids flow monitors.

Background

Portland cement manufacturing involves a combination of operations to crush and grind raw materials, such as limestone and silicatious clay. The ground mix is converted into lime (CaO) in the rotary kiln which upon being heated to about 2700 °F (1500 °C) will form Calcium Silicates - the active ingredient in portland cement. The product from the kiln, which is known as clinker, is mixed with gypsum, and ground to a very fine product, known as Portland cement. Other cement types may be produced by including different additives such as Granulated Blast Furnace Slag and Limestone and Silica Fume. This particular plant produces about 10 different cement types, each with its own characteristic properties.

Problem #1 - Emissions Monitoring

Most of the material streams in a modern cement plant are dry streams. Therefore emissions control is an essential part of the plants operation. In addition hereto the plant is required to monitor the operation of its dust collectors on a frequent basis. The main dust collectors on the kilns are monitored continuously by both the plant and the Department of Environmental Protection (DEP). The raw and finish mill operations dust collectors are required to be visually assessed on a daily basis, as a 6-minute observation. The plant is required to inspect eight dust collectors in this way. The plant was interested in automating this task and applied to the DEP for substitution of the daily visual observation with an automatic method. An additional benefit is the triboelectric monitor will continuously monitor emissions,which is a significant improvement over the labor intensive daily 6-minute measurement.

Problem #2 - Flow Control

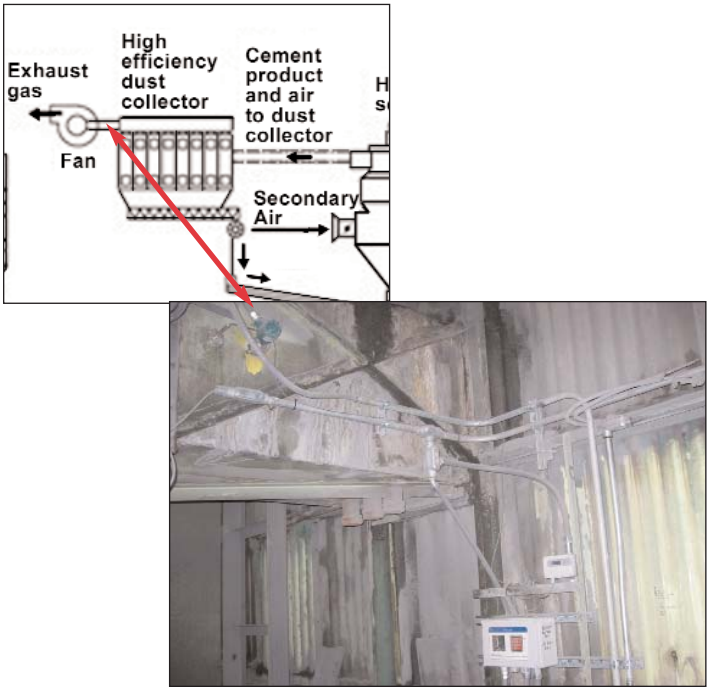
A classic problem in the cement production is to know how much material is going through an air slide. The traditional solution is to install an impact flow meter, which requires significant head room, and therefore can not easily be installed in existing systems. In this case the plant wanted to be able to know the material flow in the reject air slide from the finish mill high efficiency separator, the O-Sepa (Here, "reject" refers to classified particles requiring additional milling). This information is required for continuous and automatic closed-loop adjustment as well as information to the operator.

Our Solution

Install triboelectric dust emissions and bulk solids flow monitors - invented by this company many years ago - to solve both problems.

Problem #1-Solved

Local environmental emissions control regulations required visual inspection of emission control equipment (process dust collectors) at great inconvenience for the plant. The plant wished to use electronic monitoring but substitution was not envisioned in to the operating permits, as written. The plant received permission to go ahead with the installation of four dual-channel TRIBO.*dgds*, configured for low level dust detection. Within a short time, they proved to be more reliable and less time consuming than the mandated visual dust monitoring procedure. The plant has submitted a waiver request to the DEP for the elimination of the labor intensive visual observations in lieu of the triboelectric monitoring.



April, 2003
Figure 1 TRIBO.*dgd* Installed

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Problem #2 - Solved

Few, if any, alternatives exist to provide a highly cost efficient feedback suitable for closed loop control in as challenging an environment as this - a control application made more difficult due to frequent changes of product mix, each having unique flow properties. TRIBO.*dgd* was installed on the reject air slide of this finish mill and provided a wide dynamic range that was able to capture all of the different flow levels without the need for manually adjusting sensitivity. By effectively monitoring the flow rate, the closed loop system will be able to better control the feed rate into the finish mill, providing a more uniform operation of the mill resulting in an even better product quality and uniformity.

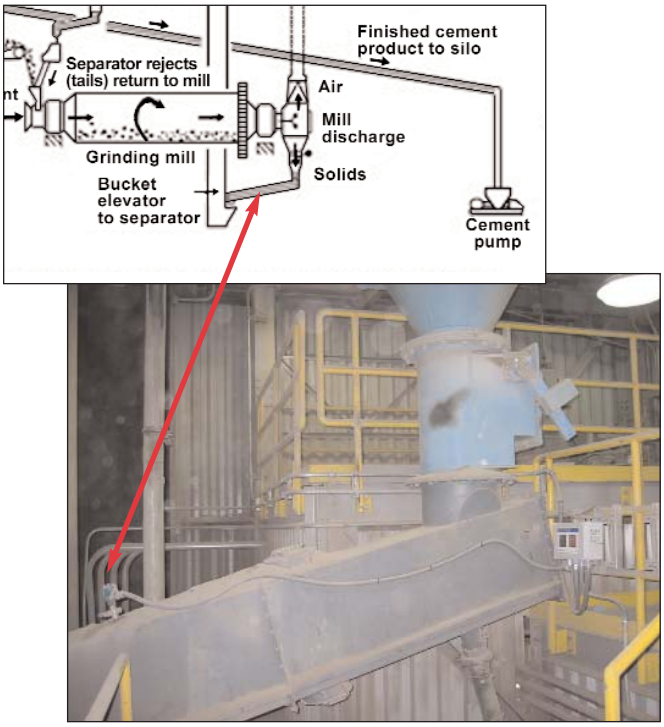

Figure 2 Reject Air Slide

Conclusion

The installation of triboelectric dust and monitoring equipment solved two tough monitoring problems for this major cement manufacturer.

Previously, dust monitoring rules required daily visual inspection of each dust collector for 6 minutes (Method 22) and if dust was detected, followed by another visual inspection (Method 9, which can only be performed by certified "smoke readers"). The operators successfully eliminated Method 22, freeing up about 2 hours of manpower a day. If the monitors detect a leak, the plant must perform corrective action within 24 hours.

The air slide application is but one example where critical materials flow information is contributing to more efficient manufacturing for a number of process applications in several industries.

Here we applied our technology to serve both needs.