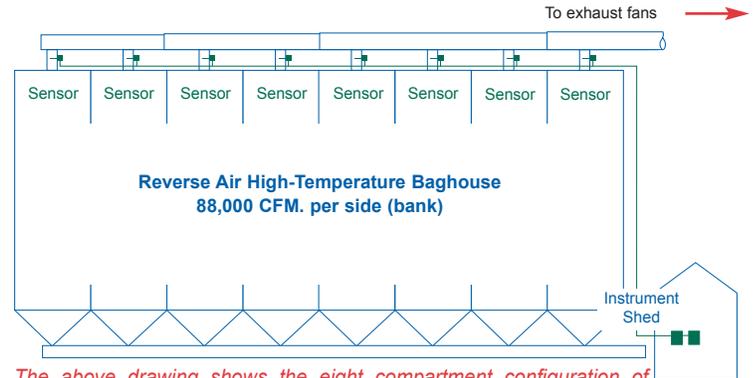


SUMMARY

This steel manufacturer chose Auburn's triboelectric technology to provide a dramatic, cost-saving solution that reduced dust collector maintenance.



The above drawing shows the eight compartment configuration of triboelectric sensors in one of the two banks of dust collectors.

Problem

At this southeastern steel manufacturer, or mini mill, various shapes of steel are produced largely from scrap sources. The steel mill utilizes electric arc furnaces, venting and capturing emissions by large baghouses. The baghouses are integral to the manufacturers' process and as such, are critical to reliable operation. Leaks in bags create downtime incurring lost production costs. Other expenses include the cost of labor for clean up and repair. Reducing the frequency of baghouse problems was also of paramount consideration for the steel mill. Leaking bags created large spills that required many hours of clean up as well as hazardous exposure for the operators and risk to conformance with environmental regulations.

The Search for a Solution

The steel mill previously installed opacity monitors to comply with environmental regulations and determine baghouse problems. The company found this technology to be unacceptable. Although the optical technology allowed operation within environmental guidelines, they were not successful in detecting bag failures early enough. Often, hours or days could elapse before a baghouse failure was detected. Clean up of large amounts of product, possibly tons of material, created large expense and inconvenience.

Solution

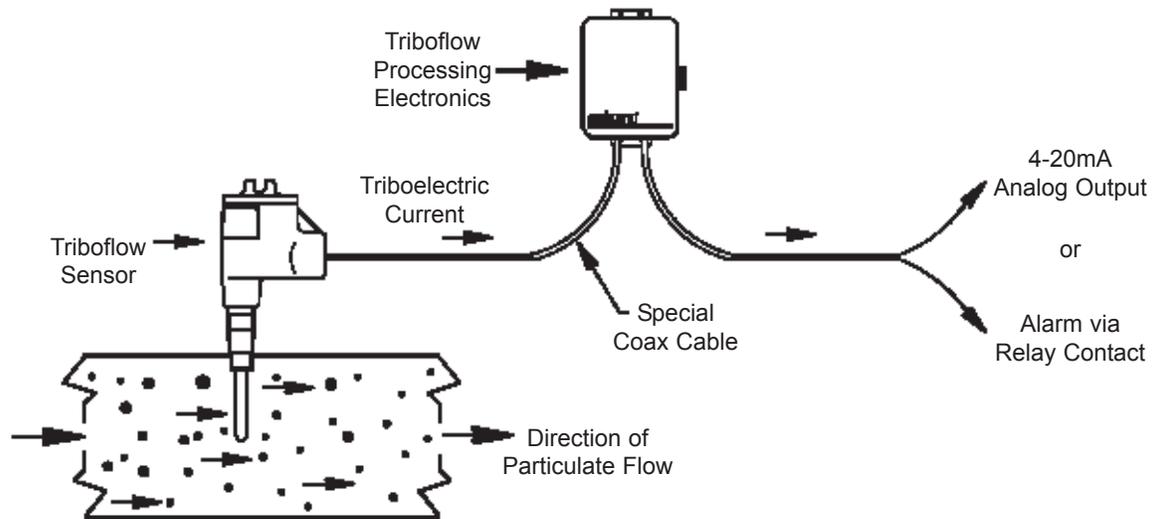
After much investigation of baghouse monitoring equipment, the steel mill chose triboelectric technology. The decision to use this technology was based upon Auburn's experience with other steel mills, reputation in the industry, and the local service history. The company purchased two Multichannel Dust Emission Monitors capable of monitoring all 16 modules of their baghouse, reducing initial capital cost. In addition, baghouse parameters were monitored from a centrally-located, convenient location.

Results

The equipment was installed and Auburn technicians visited the plant to assist with start up. The instruments were quickly calibrated through a simple procedure. After 18 months of operation, the company had zero incidents of undetected baghouse leaks. Compared with previous technology, this reduced maintenance cost on the bag-houses significantly. According to the Maintenance Superintendent, the system has been invaluable to the steel mill and provided an excellent return on investment.

An Introduction to Triboelectric Technology

Auburn Systems pioneered triboelectric measurement technology almost twenty-five years ago. Triboelectric technology has proven to be the simplest, most reliable, and least costly method of monitoring the flow of dry solids and particulate emissions. The technology has been tested and approved by the US EPA for use as compliance bag leak detection for specific MACT standards and for Title V CAM Rule.



Auburn's extensive Triboflow product line includes individual, stand-alone devices to large-scale, PC-based networked systems.

Triboelectric Effect

When two materials are rubbed or collide together, a transfer of charge takes place from one material to the other. This is known as the triboelectric effect.

Principle of Operation

A probe, electrically isolated and ground referenced, is inserted into a gas stream containing particles. The continual transfer of charge that takes place as each particle impinges on the probe generates a triboelectric current. All dust collectors leak to some degree. The constant particulate material leakage establishes the signal baseline. Because the current is directly proportional to the mass concentration of the particulate under somewhat constant conditions, triboelectric measurement devices are able to detect slight gradual changes in particulate concentration indicating the onset of a filter bag leak or instantaneous changes indicating broken bags.

Applications

Triboelectric measurement can be used for almost all materials and is suitable for use with particle sizes varying from a few millimeters to sub-micron. Triboelectric measurement devices can detect baseline signals as low as 0.005 mg/m³. Triboelectricity can be used to monitor particulate emissions in the outlet duct of any dry dust collector including baghouses, cartridge collectors, HEPA filters, drum filters, cyclones, multicyclones and ESPs.

Triboelectric measurement is generally used in bag leak detectors to indicate relative changes in particular concentrations. However, since the triboelectric current is proportional to the mass concentration of the particulate, it can also be used as a quantitative monitor. The triboelectric signal must be correlated with a Method 5 stack test to provide quantitative monitoring in lbs/hr; mg/m³, or other specific value.