

Pulverizer air flow monitoring



Power and Energy Case Study 302-2

Application

Measurement and control of mill airflow in coal-fired boilers to minimize pulverizer performance problems is an industry-wide challenge. Minimizing NO_x emissions and maximizing plant efficiency have now taken center stage for this task.

A major factor in maximizing plant efficiency involves accurately measuring air flow to control mill slugging, feeder run-back and reduction of coal spillage. The flow measurement is used to accurately control hot and cold air ratios in coal pulverizers for major power boilers. The use of mass flow rate, mass weighted averages, air temperatures, and the specific heat of air facilitates fuel-forward calculations to anticipate the mass-weighted air temperature of burner coal duct/air mixture.

Depending on boiler capacity, coal-fired plants have multiple pulverizers ranging from three to as many as ten or more per boiler. The measurement of pulverizer air flow is critical to monitor emissions, maximize efficiency and prevent pulverizer damage which causes reduced generation capacity with increased maintenance and replacement equipment costs. Loss of air flow in a pulverizer requires reducing the load proportional to the amount of reduced fuel flow resulting in increased load and revenue costs.

Challenge

Pulverizer air flow measurement presents many challenges when selecting an instrument that provides reliable, repeatable measurement. Typical applications are high temperature, highly erosive with potentially clogging and fouling air (containing fly ash), and typically irregular velocity flow profiles due to inadequate straight run in the duct system. These conditions contribute to highly unreliable, inaccurate and maintenance-intensive issues to typical measuring devices such as multi-port and pitot tubes.

Project parameters

User	Coal fixes plant
Location	Michigan USA
Media	Air (with fly ash)
Line Size	48" x 36" [1.2 x .9m]
Flow Range	40,000 to 90,000 ACFD [1,133 to 2,549 ACMD]
Pressure Range	2 to 70 in. H ₂ O [5 to 174 mbar]
Temperature Range	100° to 580°F [38° to 304°C]

Solution

FCI's MT91 multipoint thermal mass flow meters were selected to replace multi-port pitot tubes because of their standard features to measure a wide flow range over a very high temperature range of air containing highly corrosive fly ash which clogs and fouls pitot tubes. FCI's multipoint mass velocity

probes were constructed with all welded 316 stainless steel and chromium carbide coating to resist erosion and fouling. The MT91 flow element is filter-calibrated in-situ to correct for irregular velocity profiles due to flow obstruction and lack of adequate straight run.

FCI flow meter specifications

Model	MT91 multipoint mass flow meter
Media	Air
Flow Range	0.25 to 150 SEPS [0.08 to 46 NMPS]
Pressure Range	to 50 psig [3.4 bar(g)]
Temperature Range	-50° to +850°F [-45° to +454°C]

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FCI is ISO 9001 certified/conformance to AS9000