

Cost-Effective Solution for SO₂ Emissions Reduction with Fork Density Meters

RESULTS

- Simple, low cost installation – reducing instrumentation costs
- Improved quality control of lime (Calcium Hydroxide), optimizing the desulfurization process costs
- Longer product lifetime, given the rugged meter design, reducing operation and maintenance costs



APPLICATION

Flue gas desulfurization (FGD) is a technology used for removing sulfur dioxide (SO₂) from the exhaust flue gases emitted by coal- or oil-burning power plants. The SO₂ is created when the power plants burn coal or oil to produce steam to power the steam turbines that drive the electricity generators. The tall flue gas stacks of a power plant disperse the gas emissions by diluting the pollutants in ambient air. As a result of stringent environmental protection regulations regarding SO₂ emissions – which have been found to cause acid rain – power plants are now removing SO₂ from the flue gases.

One of the most common methods used to reduce SO₂ emissions is wet scrubbing, which uses a slurry or alkaline sorbent such as limestone, lime, or seawater to scrub the gases. In an FGD system, flue gas normally passes through a fly ash removal device, then an SO₂ removal device. When using the wet scrubbing method, the reaction of using limestone or lime slurry produces the resultant slurry called calcium sulfate. The calcium sulfate is then further oxidized to produce a marketable gypsum through a technique known as forced oxidation.

As part of the flue gas desulfurization process, the density of the process liquids is measured at the following locations in the pipeline:

- Limestone/lime slurry production line
- Limestone/lime slurry feed line into Absorber
- Recirculation line in the Absorber
- Calcium sulfite slurry line going into the Oxidizer
- Gypsum slurry production line



Installation of a Micro Motion Fork Density Meter in FGD process pipeline



For more information:
www.MicroMotion.com/power
www.MicroMotion.com



CHALLENGE

A power plant in China needed to install several density meters in a wet scrubbing FGD system that were workable in the following process conditions and met the following commercial requirements:

- Abrasive slurry with a particle size of 10 to 60 μm , and 60 to 70% solids concentration by weight
- Accuracy requirement of 1 to 8 kg/m^3
- Nominal flow rate of 150 m^3/hr
- 3" 150# process pipe
- Resistant to plugging
- Low pressure drop
- Low maintenance and low cost
- 1.5 to 2 year performance warranty

- Continuous real-time density measurement
- Easy direct insertion installation
- Good resistance to abrasive fluid
- Wide selection of wetted material applications
- Online diagnostic tools available through the ADView software application

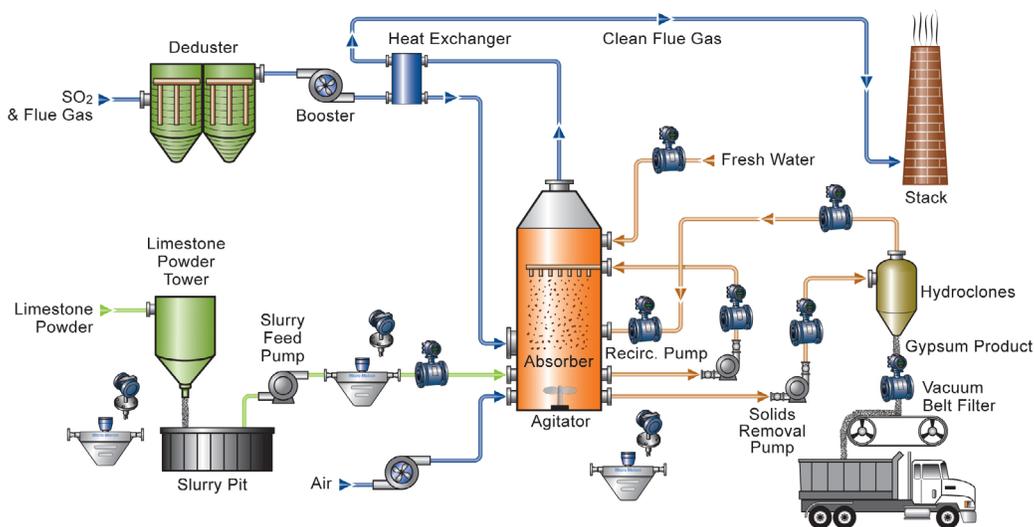
The customer installed each meter in a T-piece pocket at a specific angle with 1" recessed from the pipe ID. Each meter was installed at a vertical pipe with slurry flowing upwards. The angle was chosen to ensure that the slurry within the pocket was constantly refreshed, which prolongs the lifespan of the vibrating tines of the meter because of the abrasive slurry.

Overall, with this installation, the customer received the following benefits:

- Simple, low cost installation – reducing instrumentation costs by approximately \$500–\$700 per meter
- Improved quality control of lime (Calcium Hydroxide), optimizing the desulfurization process costs by reducing waste of raw material
- Longer meter lifetime, given the meter’s resistance to abrasive fluid, reducing operation and maintenance costs by about \$10,000 per year

SOLUTION

The power plant chose to install multiple MicroMotion® Fork Density Meters. Typically, tube density meters or Coriolis flowmeters would have been selected given the particle size and solids concentration. However, by changing the installation, the customer chose to install the Fork Density Meters for the cost competitiveness of these meters. In addition, these meters also provided the following benefits:



A diagram of the typical process of an FGD system using the wet scrubbing method to remove SO₂ from the flue gases

