



FCI ST100;
flotation cells

Flotation Cell (Frothing) Air Control in Mining Operations

Application Note Case Study ANCS012

Flotation cells are a common ore recovery technique applied in ore and mineral mining operations such as copper and gold. The flotation cell is used to float ore particles away from the crushed ore/rock mix, by driving air into the bottom of the cell to form bubbles which float to the top of the main body of liquid to create "froth." Compressors and blowers, often with very little pipe straight run, are used to "aerate" the cells. Larger mining operations utilize modern process control systems (DCS, PLC) to optimize their operations.

Problem

To ensure effective frothing, process repeatability, optimize ore recovery, and minimize energy costs the air flow to the flotation cells needed to be measured with accuracy and repeatability. The air flow rate had a wide range (turndown), wide temperature variation, and the DCS utilized Foundation Fieldbus communications interface. There was not enough pipe straight-run to create a repeatable flow profile.

Flow Conditions

- Line sizes : 3", 4", and 6" [DN75, DN100, DN150]
- Process connection: 3/4" MNPT
- Pressure: 4 psig to 7 psig [0.3 bar(g) to 0.5 bar(g)]
- Process temperature: 32°F to 140 °F [0 °C to 60 °C]
- Flow rate: Typically 35 SCFM to 1050 SCFM [1 NCMM to 30 NCMM]
- Media: Air

Solution

Install an insertion-type, constant power technology thermal mass flow meter, FCI Model ST100. Its adjustable 1 inch to 6 inch insertion length is compatible with all of their pipe sizes. It is direct mass flow measuring. Also, install a Vortab® Model VIP flow conditioner 3 pipe diameters upstream of the meter location and 3 diameters down from the nearest upstream disturbance to provide a repeatable flow profile and ensure measurement accuracy throughout the range. The ST100 included the optional FOUNDATION™ fieldbus H1, bus communications for direct connection to the facility's DCS.

FCI Flow Meter Model Number: ST100-40C0060110DFEBF0001; Vortab Model VIP-AA0300S

For flotation cell applications not requiring sophisticated bus communications, FCI flow meter Models ST50 and ST51 are also installed in numerous sites around the world

Benefits

- Revenue increase due to improved ore yields with better process control.
- Cost savings in reduced reagent use and blower run-time.
- One month payback on investment.
- Simple, low cost insertion installation into existing pipes.
- Cost savings in maintenance with no moving parts to foul or clog.
- Reduced wiring cost and DCS integration with integral 2-way FOUNDATION fieldbus comms.
- Real time temperature compensation and mass flow measuring for accurate measurement under changing process temperatures.