Institute of Electrical and Electronics Engineers
INDUSTRY APPLICATIONS SOCIETY
CEMENT INDUSTRY COMMITTEE
EAST COAST SUBCOMMITTEE

Title; Single Point Pulse Programming for Modern Baghouses

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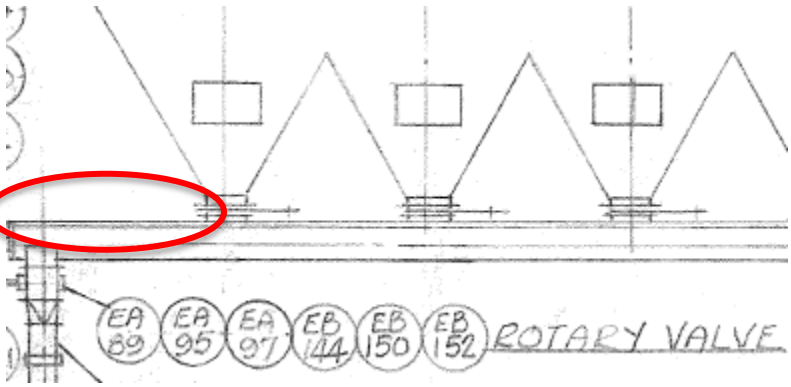
Background/Problem:

A large capacity cement mill-sweep baghouse experienced overloading of the extended screw conveyor before discharging material through the rotary airlock valve.

This problem ended up bulging and damaging the screw conveyor covers, requiring repeated repairs to avoid significant air inleakage into the ventilation system, which affects vent system capacity and even production capacity. It also resulted in repeated events of significant material spillage and related dusting and housekeeping problems.

Repeated damage to screw conveyor covers



The above problems led to a request for a larger capacity discharge system in order to handle the amount of material being discharged by the dust collector.

Investigation:

Calculations showed that the screw conveyor and discharge valve both had more than sufficient capacity to handle the amount of material that could be expected for a mill sweep ventilation system of the given capacity.

Further investigation led to questioning the operation of the baghouse. Being a modern installation, the baghouse had a programmable pulse control system that can activate cleaning not on a timer basis, but on actual differential pressure (ΔP), which is recommended to minimize compressed air consumption and extend filter bag life.

The baghouse OEM manual indicated that the baghouse was designed to operate within a ΔP range of 4.0" w.g. to 6.0" w.g. It was therefore assumed that the programmable controller should be set up to pulse when ΔP reaches 6"w.g., and stop pulsing when it reaches 4.0" w.g.

This assumption seemed obvious, but it was actually the cause of the problems above.

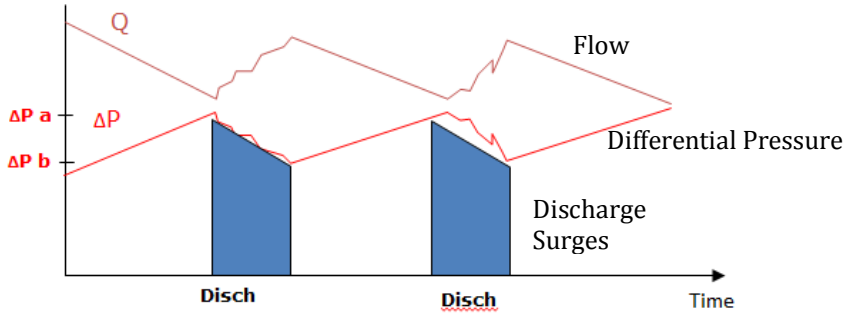
Solution:

The solution consisted in programming both the upper and lower setpoints at the same value, in this case, at 4.5" w.g. This simple change gave immediate results and avoided an expensive discharge system upgrade.

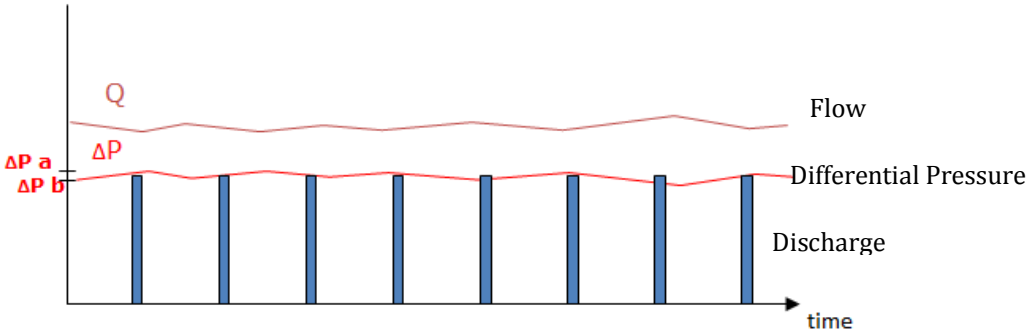
Explanation:

The recommended differential pressure range (4" w.g. to 6" w.g.) is correct, but it does not mean that the controller should be programmed to swing between these two values. Doing so caused periods of pulsing every 10 seconds for 10 or 15 minutes, followed by periods of no pulsing at all.

Because dust is only discharged when pulsing, the discharge system was going practically unused for long periods, and then overloaded during periods of pulsing, when the baghouse discharged a great amount of material, as shown below.



Having a single setpoint will maintain a consistent ΔP in the baghouse, a consistent airflow through the mill and a consistent amount of material discharged, avoiding periodic overloading.



It's important to note that this recommendation does not result in excess pulsing. The system simply pulses when higher than 4.5" w.g. and stops if ΔP is below 4.5" w.g. Sometimes it takes one pulse, sometimes two or three pulses. It essentially becomes a continuous pulsing program, but with variable time between pulses to stay at the programmed setpoint.

This problem and solution may not seem relevant for ventilation systems without the problems described, but it actually applies for optimized operation of all baghouses.