



Direct Flow Control System Minimizes Pressure

August 1993 - ESCOR's proprietary Dissolved Oxygen and blower control system with direct flow control for basin balancing is proving itself on a particularly demanding project. The integrated system at Niagara Paper, Niagara, WI is controlling four 300 horsepower multi-stage centrifugal blowers which provide air to three aeration basins. The system provides individual DO and air flow control for each basin to provide optimum process control and energy savings. Making ESCOR's job more difficult was a difference of nearly two feet in diffuser submergence between basins!

On smaller systems it is usually not cost effective to control the air flow and DO independently for each basin. Most plants can achieve at least a 20% reduction in energy by automatically controlling blowers and manually controlling the air flow distribution to individual basins. Plants that have three blowers with motors smaller than 200 horsepower each typically cannot recover the cost of the additional controls by the improved efficiency.

Using separate automatic basin controls improves the energy savings achieved with an ESCOR system to at least 25%. For a facility the size of the Niagara Paper treatment system the additional energy savings pay for the additional hardware in about a year. The process performance is also improved because the variations in DO level between basins are eliminated.

The conventional approach to controlling air flow from a common header to multiple basins uses discharge pressure control. The intent is to minimize the impact each basin's valve movement has on other air flows. This logic requires an additional discharge pressure drop of 1 psi or more across the basin valves to maintain control. The result is a waste of approximately 10% of the blower power.

ESCOR's proprietary flow control logic eliminates the need for discharge pressure control. Using an air flow signal from each basin, it keeps one valve completely open to minimize system pressure.

A few conventional systems incorporate a "most open valve" scheme into discharge pressure control, but they are not as efficient or accurate as the Niagara Paper strategy. **It automatically determines which valve should be at maximum position.** This not only produces minimum back pressure, but provides consistent air flow and DO control despite process fluctuations. If the total air supply is limited by blower capacity or turndown the ESCOR system distribute available flow proportionately, eliminating the problem of independent control loops forcing all basin valves to their limits.

The Niagara plant employs another improvement over conventional controls - the elimination of 4-20 mA positioners on blower inlet and basin control valves. ESCOR's direct valve control algorithms eliminate the expense, wiring, and calibration costs associated with conventional positioners.

The Niagara mill has a Distributed Control System (DCS) and SCADA software, and originally planned on expanding it to implement DO and blower control. After learning about ESCOR's technology, however, the plant engineers concluded that they would get superior control at lower cost with the ESCOR system. Critical process signals, such as DO level and blower status, are wired to the DCS for monitoring only. ■

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