

Influent load, Effluent treatment and Environmental solids monitoring

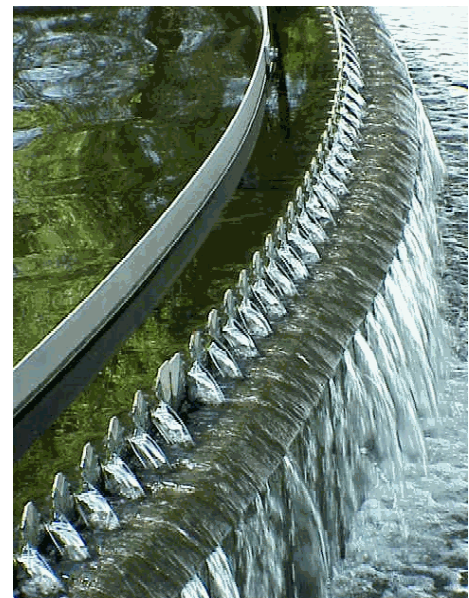


Environmental Applications

There is an increasing requirement to control the impact from manufacturing on the environment. Environmental outflow within approved consent limits is the result of effective water effluent treatment. This treatment has to cope with changing conditions and plant throughput. A treatment system has to be able to maintain outflow within these consent limits and cope with disturbances that can breach these limits. Environmental constraints are becoming even tighter and require either; treatment plant improvement or restrictions on the throughput. Costs for effluent treatment are increasing either through plant capital or waste disposal (sewer water or landfill) fees. In order to reduce these effects the treatment plant needs to be operated more efficiently and use controls to cope with changing demands.

Environmental monitoring

AshCon sensors continuously measure the suspended solids content and turbidity level of the outflow either to river, sea or sewer (secondary treatment). Solids range from 0-50 mg/L(ppm) with Turbidity 0-100 NTU. These measurement levels are typically higher for sewer outflow ranges. Normally a consent is based upon solids with the turbidity reading used to correct the solids measurement if samples are turbid “milky” ($0.45\mu\text{m}$ particles). Turbidity measurement is according to ISO7027 (90deg backscatter). The application software includes an average for the real-time calculation of hourly and the 24hr “composite” value that is equivalent to the retained composite samples used for laboratory tests. Both measurement and “composite” values are logged each 5 mins. An automated water zero verification each cleaning cycle can be used to check the cleanliness of the sensor and alarm if limits are exceeded. The measurement alarm indicator and a control relay can be used to divert the water outflow to a buffer tank.



Effluent treatment

The treatment process has to cope with changing demands and operational disturbances. Typically, each treatment plant is unique for an application. For aerobic plants this will include primary clarification, aeration and secondary settlement. For anaerobic processes the feed solids have to be limited to maintain the operational balance. This may include primary effluent treatment processes similar to an aerobic plant. Each plant can include; a DAF, a filter or surge tanks to help balance the operation of the process.

AshCon sensors provide a measurement of solids at the key stages of effluent treatment.



For a primary clarifier, feed solids can be monitored to allow operators to respond to changing loads on the clarifier. Increased solids can demand a higher polymer addition rate to prevent solids passing the clarifier and overloading other parts of the plant. A “shock” secondary polymer dose routine can be added using alarm limits. Chemical costs can be optimised or capacity increased under normal operational conditions. Later stages of the treatment process require measurement; of activated sludge, secondary clarifier feed and accepts. Sand filters can be monitored to prevent blinding and indicate the correct time to backflush / purge the filter bed.

For an influent/effluent sensor application the correct sensor features need to be selected. An AC400 sensor is able to determine the fibre / filler proportion whereas the AC200 sensor measures total solids. An AC100 sensor is simple sensor for open channel installation. The AC200 sensor can have a Turbidity (90deg. Scatter) channel added. Each sensor has to have a cleaning routine that can include; a brush cleaner, water flush and air purge. It is important to clean sample lines as well as the sensor. Each sensor can be removed by an operator and immersed in water to verify the sensor cleanliness. An automated water zero sequence can be added to monitor sensor cleanliness. Sensors can be mounted within a cabinet for outdoor protection. Each sensor has on-board data-logging, comms. and real-time trending.



Influent Load Tracking

The source of a disturbance or high operational solids can be continuously tracked to prevent overloading the treatment plant. A process shutdown, washout or spillage are common sources.



AshCon sensors located at collection sumps or in flumes / drains provide an immediate indication of the solids level. An ash sensor will indicate high ash levels that can require more polymer addition to maintain effective treatment. If these measurements are linked together a plant-wide view of influent load to the effluent treatment plant is provided. This will allow operators to immediately respond to changing treatment requirements and prevent plant overload. Effluent streams suffer from ; slime build-up, debris collection and blockages. Each sensor includes an automated cleaning routine either using an air purge or water flush. Care has to be taken positioning a sensor to avoid debris / strikes and access to services required for cleaning. Each sensor is zeroed on clean water and can measure up to 20,000 ppm (mg/L) or 2%Cs. The measurement is connected to the mill DCS or to radio telemetry.

An integrated strategy for; influent management, effluent treatment and outflow monitoring is an effective approach for reducing the risk of overloading the process and exceeding consent limits.

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