



Dairy Effluent Treatment

Dairy Crest puts emphasis on environmental credentials

CASE STUDY

PRODUCT

7200 Monitor
Turbi-Tech2000LA Sensor
Turbi-Tech2000LS Sensor
840 Transmitter

CUSTOMER

Dairy Crest
Davidstow Cheese Processing plant

APPLICATION

MBR and DAF Plant Control
Effluent Monitoring



Throughout the food and beverage industries, there is a constant requirement to monitor and control wastewater and effluent before discharge from the plant in order to comply with environmental regulations. In addition to this, process plants must also recognise that unless close control is exercised over all stages of waste treatment, the process itself can become ineffective.

At the Dairy Crest Davidstow cheese processing plant in Cornwall, considerable effort is made to ensure that all wastewater and effluent associated with the manufacturing process is treated and analysed before being discharged into the River Inny. During 2003, the Davidstow creamery underwent a multi-million pound expansion programme, which included an upgrade of the effluent treatment plant located approximately half-a-mile from the main site. The upgrade included the installation of an MBR system and an additional aeration tank (AT3) which provides the feed to the MBR system. These operate in parallel with the DAF (Dissolved Air Flotation) and AT2 aeration tank which feeds into the settlement and Lockertex filter plant.

The effluent treatment plant has to accommodate an inflow of around 1,800 and 2,200m³ per day of wastewater and has the capability to discharge up to 2,600m³ per day, this being the maximum consent to the river. The wastewater consists mainly of washes from vats and tankers and includes a relatively high level of fat, COD and pH. EA discharge consent levels that have to be complied with include suspended solids up to or equal to 20ppm, ammonia at 7ppm and TOC at 30ppm, with pH being monitored at 6 - 9pH. The total flow of the incoming effluent stream is recorded daily, with an accumulative sample being taken every 15-20 minutes for the Company's laboratory to analyse and provide daily OD readings. Turbidity, pH levels and temperature are also monitored at in the inflow to the balance tank and divert tanks.

The monitoring of suspended solids or turbidity in wastewater from dairies and dairy food processing plants is a key parameter for assessing the quality of the effluent in respect of meeting consent levels. The results can be used as an aid for minimising waste, as well as indicating if there is any significant product loss through operator error. Nowhere is monitoring more important than at the final stages of the treatment process and at the point of discharge.

"Within the dairy industry, biological treatment plants are at constant risk from excessive quantities of milk and waste liquid from production processes finding their way into the biological treatment plant," comments Angus Fosten of Partech Instruments. "The problem is that dairy product residues can contain relatively high levels of BOD and these can upset the delicate balance of the biological treatment plant. Re-establishing the correct balance in the treatment plant can be expensive and lengthy, resulting in plant downtime and loss of production."

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Partech's instruments play key roles at various stages throughout the treatment processes at the Davidstow plant. On the aeration tank (AT3), Partech's OxyGuard DO monitor is employed to measure the level of dissolved oxygen and ensure that the treatment process maintains the correct levels for effective treatment.

In the event of the DO dropping below the required level, the instrument will bring the standby blower into action to increase the DO content. Once the correct level has been re-established, the instrument shuts down the standby blower. With 0.5 million gallons of activated sludge in this tank, keeping the DO level at the optimum point is critical as it determines the quality of the outflow to the next stage of the process.

The Partech DO Monitor enables plant operators to maintain optimum levels of biological activity and run the plant as effectively and efficiently as possible. Too little DO can lead to biological inactivity, whilst too much wastes energy and can cause unnecessary wear to the aeration system.

The Partech OxyGuard sensor is mounted into the tank using the Pioneer Mounting System, which protects the probe from excessive fouling and maintains a fixed position 18 and 20 inches below the surface. The sensor combines an electrolyte, anode and cathode within a robust housing and the internal sensor design means that the electrolyte and anode are not consumed. The membrane only needs replacing if damaged and there is no internal drift.

When it comes to measuring the quality of the outflow from both aeration tanks, whereas the treated effluent from the AT3 tank passes to the MBR system, the treated effluent from AT2 tank passes via a settlement tank into the lockertex filter system, which is equipped with a Partech Turbi-Tech 2000LS turbidity monitoring system prior to point of discharge. At this point of the process, monitoring for pH, temperature, TOC and ammonia is also undertaken. A sample is taken every 20 minutes and should a problem be detected, then an alarm signal is transmitted to the control room where the discharge flow can be diverted for retreatment. Where the flows from both aeration tanks merge prior to discharge, another Turbi-Tech LS turbidity monitor takes a final reading to ensure that the discharge consent level is not exceeded and that the health of the River Inny is not compromised.

Employing continuous turbidity monitoring within the treatment process provides a reliable and effective approach to identifying when a problem has occurred, allowing plant operators to take prompt remedial action. It also has the added benefit of indicating the performance of the treatment plant by measuring the presence of undissolved solids prior to discharge. Turbidity is widely used within the food industry on both final effluent and crude effluent. On the crude effluent a turbidity monitoring system can provide a reliable method of on-line measurement to alarm or divert high strength wastewater into a separate holding tank for onward processing.

Partech Instruments has a long history of providing solutions for determining turbidity and levels of suspended solids in effluent treatment plants within the dairy industry. A well used and proven approach involves the installation of its Turbi-Tech 2000 Sensor and 7200 Monitor, which together provide operators with a constant indicator of the levels of suspended solids and turbidity at given points with the treatment process.

Available in two versions, the LS and LA, Partech's Turbi-Tech 2000 sensor uses Infrared 90° Light Scatter or Light Attenuation as its measuring principle. The LS version is designed to monitor low levels of solids or turbidity and is typically installed at the final effluent discharge point. The Turbi-Tech LA has an operating range suitable for use in aeration systems and may be used to monitor mixed liquor suspended solids (MLSS) and returned activated sludge (RAS). Both versions of the Turbi-Tech 2000 feature a self-cleaning system, which means that the sensor's optical surfaces cannot be contaminated causing performance to be adversely affected.

"The self-cleaning capability is essential for dairy plants," says Angus Fosten, "as there are always a high proportion of fatty milk materials contained within manufacturing residues. Apart from enhancing the instrument's performance, it means that maintenance is minimised resulting in low ownership costs."

"Employing turbidity monitoring systems that operate 24/7 means that plant operatives are able to watch over the performance of the treatment process and be warned of any problem immediately it occurs," says Angus Fosten. "Breaching discharge consent levels can be very expensive in terms of fines levied. Equally as expensive can be accidental discharge of products into the effluent treatment process. By measuring turbidity, plant management can achieve savings in terms of reducing product wastage and ensure that consent levels are not inadvertently breached."

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