

Gas analysers play crucial CEM role in sludge treatment plant.



Installed analysers at Daldowie

The Daldowie Fuel Plant at Daldowie, near Glasgow, is operated by SMW Limited, a wholly owned subsidiary of Scottish Power Generation Limited. The plant includes one of Europe's largest sludge drying plant, which processes the sewage sludge from Greater Glasgow's population of approximately one million.

The plant represents the very latest in sophisticated control, thermal drying and effluent treatment practice, and produces up to 65,000 tonnes a year of low odour granule. It consists of six dryers whose emissions feed three Regenerative Thermal Oxidisers (RTOs) which each have their own emission stack. In order to comply with strict emissions regulations set by the Environment Agency, and also to ensure that the RTOs were operating correctly, it became necessary to install a CEM (Continuous Emission Monitoring) system on each exhaust gas stack. Three such systems were installed, incorporating Servomex 4900 series gas analysers, Servomex 2700 series gas analysers, Servomex 4995 series sample conditioning systems and ancillary equipment.

Emissions regulations in Scotland are stricter than in England - and, indeed, many other countries – and oblige plants such as Daldowie to deliver monthly reports to demonstrate that emissions limits have not been exceeded. Due to the unusual nature of the Daldowie plant, it was required to meet newly introduced and strictly enforced regulations for the emission of gases and odours, as laid down by the Scottish Environment Protection Agency, SEPA.

The main area of concern was exhaust gases from the three Regenerative Thermal Oxidisers. These pieces of equipment heat the gases released during the drying process so that the volatile organic compounds (VOCs) are broken down and burnt. This was a particularly challenging application in terms of gas analysis, because of the moist nature of the gases, the continually varying mix of gases and emissions, the elevated temperature (around 120 degrees C), and the fact that several gases had to be monitored. The new emissions regulations imposed on the plant required the measurement not only of VOCs but also CO and O₂. Furthermore, accuracy was essential because if the emissions limits are exceeded, the plant must be shut down; any false alarms due to inaccurate readings could therefore be extremely costly in terms of downtime and lost production.

It was already known that similar sludge treatment plants had suffered through unreliable CEM systems that had failed after being used to monitor production runs for as little as 10 hours. SMW wanted to avoid this problem with the Daldowie plant, so the company wrote a tight specification. Compliance with MCERTS (the monitoring certification scheme) requirements was also necessary, yet the equipment had to be reasonably priced.

Servomex was able to meet the specification with a bespoke walk-in cabinet housing three CEM systems, one per stack. Each system comprises a Servomex 4900 series gas analyser, Servomex 2700 series gas analyser, TOC (Total Organic Carbon) analyser and a Servomex 4995 series sample conditioning system. Because of the moisture content in the flue gases, the sensor probes and sample lines are heated to prevent the formation of condensation.

The Servomex 4900 gas analyser is designed specifically for CEM applications and is capable of measuring O₂, CO, CO₂, NO and SO₂, though in the Daldowie plant only CO and O₂ are being monitored. Benefits provided by the 4900 analyser include a low cost of ownership, low maintenance requirement and easy integration with other systems. While oxygen is measured using a paramagnetic sensor cell, infrared technology is used for carbon monoxide.

A second O₂ reading is obtained using a Servomex 2700 series analyser. The benefits provided by the 2700 include a continuous measurement of O₂ and/or combustibles, high temperature operation up to 1750 °C, low operating/maintenance costs and is fully field maintainable. The reason for taking two O₂ readings is that the Servomex 4900 measures O₂ on a dry basis and the Servomex 2700 measures O₂ on a wet basis using a zirconium oxide sensor. The O₂ measurements are used in order to derive the moisture content of the gas which is used to correct the TOC measurement from a wet to dry basis, and also to convert the measured gas concentrations to reference conditions of 11% O₂ as required by SEPA.

Bryan England, a consultant to SMW, comments: "Considering the complexity of the analysis being undertaken, the Servomex equipment has performed very well: as the sampled gas is both hot and wet, it is important to have a system that can handle it in such a form. The system provided by Servomex has proved to be reliable and we have a high degree of confidence in the results it produces. Without the Servomex CEM system SMW would find it much more difficult to comply with the stringent emissions regulations here in Scotland."

He continues: "We enjoyed excellent service from Servomex, right from the initial enquiry through installation and commissioning. The engineers are extremely knowledgeable and are clearly capable of addressing even the most out-of-the-ordinary gas analysis problems, developing complete CEM systems around the company's standard gas analysers plus equipment from third-party suppliers."

More information about the Servomex 4900, 4995 and 2700 series gas analysers, as well as other Servomex gas analysers, all of which are available and fully supported worldwide, can be obtained from Servomex Group by calling +44 (0)1892 652181, faxing +44 (0)1892 662253, emailing info@servomex.com or visiting the website at www.servomex.com.

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