

Hydro International successfully tested their Hydro-Brake® Drop flow control in Scotland at Bo'ness wastewater treatment works, one of the Development Centres operated by Scottish Water Horizons.

The work involved installing the Hydro-Brake® Drop on site to allow testing under real flow conditions within a safe environment.

The result of the trial has allowed Hydro International to expand the equipment's design range and demonstrate its effectiveness at managing hydrogen sulfide concentrations in the flow.

Hydro International engaged with the Hydro Nation Water Innovation Service to provide support and guidance.

The Hydro Nation Water Innovation Service also works closely with Scottish Water Horizons to introduce companies requiring facilities to test their technologies.

THE CHALLENGE

Hydro International needed to validate existing design assumptions and to extend the design range of the Hydro-Brake® Drop.

The study had three main objectives:

1. To assess the rate of air entrainment over the various operating modes, in order to accurately predict system pneumatics
2. To quantify oxygenation potential of the system and its impact on hydrogen sulfide levels
3. To evaluate new inlet configurations in order to expand the range of scenarios in which the Hydro-Brake® Drop flow control may be applied

In order to answer these questions the best option was to test the Hydro-Brake® Drop flow control under real conditions in a safe and controllable environment.

The Bo'ness Development Centre met these criteria. Early investigations showed that the quality and quantity of the inflow to site was suitable to be able to test the Hydro-Brake® Drop flow control and deliver industrially relevant results.

In order to be able to demonstrate and investigate the attributes of the Hydro-Brake® Drop flow control the system needed to be run for a for extended durations over a wide range of flows, up to and exceeding the design flow of the system. The system also needed to be continually monitored over the testing period to provide the data to substantiate performance claims and design revisions.



THE SOLUTION

Scottish Water Horizons

Scottish Water Horizons provided access to Bo'ness Development Centre for Hydro International to trial the Hydro-Brake® Drop flow control.

In order to obtain the flows required for the trial, Scottish Water Horizons liaised with site operatives to ensure the equipment could be trialled in a suitable location on site.

Prior to arrival at site, Scottish Water Horizons assisted Hydro International with all pre-trial requirements and conducted a thorough Health and Safety review to ensure all risks were mitigated or managed appropriately.

Once operational, Scottish Water Horizons regularly engaged with Hydro International to ensure that the trial requirements were being met on site.

Bo'ness Development Centre

Bo'ness Development Centre is situated within the live Bo'ness wastewater treatment works and offers a dynamic testing environment for new products and processes.

Using dedicated areas of the site, external users can access the Development Centre in order to test and demonstrate their product under live conditions.

In order to meet the trial requirements, Hydro International situated their trial at the Bo'ness wastewater inlet works in

order to draw off the required volume of wastewater to pass through the product.

The trial included the requirement for a scaffold at the inlet works in order to obtain the requirement to drop wastewater from height through the product.

By engaging with site operations and Scottish Water Horizons, the most optimal location on site was agreed to ensure the success of the trial.



TEST RESULTS

The Hydro-Brake® Drop flow control system was set up and tested at Bo'ness during June 2016.

Two instrumentation systems attached to the test rig monitored its performance for over 70 hours of testing and provided data validation for the readings collected.

For the configurations and flow rates tested the Hydro-Brake® Drop flow control was shown to significantly aerate the flow passing through it.

Dissolved oxygen concentration in the flow was increased by between 200-400%.

The rate of air entrainment was shown to be predictable and consistent over the whole range of configurations and flow conditions tested.

This confirmed that the different configurations performed as predicted and allowed further extension of the applications for which the Hydro-Brake® Drop flow control can be designed.

"Hydrogen sulfide and odour are a concern cited by many of our customers. With the help of Scottish Water and the Hydro Nation Water Innovation Service we have been able to conduct real-world testing that confirms that the Hydro-Brake® Drop consistently increases dissolved oxygen concentrations by up to 400% - which will counteract hydrogen sulfide and reduce associated odour issues. In addition, this testing has allowed us to expand the working range of the product, meaning that we can apply it to a broader range of water management applications."

Dr Daniel Jarman
Hydro International Technology Manager



FURTHER INFORMATION

Scottish Water Horizons Development Centres

Scottish Water Horizons, a wholly owned commercial subsidiary of the publicly owned water utility, has created Scotland's first ever full-scale water and wastewater test facilities. Funded by a £1.6m grant from the Scottish Government, the company has developed two facilities that enable users to test technologies in a safe and dedicated environment. Gorthleck Development Centre, near Inverness, provides users the opportunity to trial equipment and processes on a Water treatment asset.

The site is no longer on the distribution network and therefore offers a low risk environment for trialling new products and processes for water treatment.

Bo'ness Development Centre is a wastewater treatment works which Scottish Water Horizons have adapted to enable testing of a wide range of technologies. The centre provides a flexible environment for trialling new equipment on an operational scale. Users of Bo'ness Development Centre can benefit from having access to feeds of live wastewater from three different stages in the treatment process as well as having access to a further dedicated test area at the inlet to the treatment works.

Bo'ness Development Centre holds a Waste Management Licence, which increases the flexibility of the centre.

Learn more: scottishwater.co.uk

The Hydro Nation Water Innovation Service

The Hydro Nation Water Innovation Service (HNWIS), established by the Scottish Government through Scottish Enterprise and Highlands and Islands Enterprise, identifies innovative companies, particularly SMEs, and supports them along the innovation path from concept to commercialisation. The partnership, HNWIS, of AECOM, WRc and UK Water Ltd are delivering a three-year programme.

Learn more: hnwis.scot

Hydro International

Hydro International Ltd is a global company that provides advanced products, services and expertise to help municipal, industrial and construction customers to improve their water management processes, increase operational performance and reduce environmental impact.

With over 30 years of experience and a reputation for engineering excellence, businesses and public organisations all over the world rely on Hydro International products and services to reduce flood risk, improve water treatment and protect the environment from water pollution.

Headquartered in Clevedon, UK, Hydro International has a network of over 80 distribution partners and serves customers in more than 40 countries.

Learn more: hydro-int.com