Developing tomorrow's standards today

How pump manufacturers are shaping the future

There is more to life as a pump manufacturer than simply supplying pumps! This article demonstrates that while the humble pump manufacturer must obviously keep providing their products to their customers, there are occasions where they also fulfil other important roles which can sometimes have far-reaching consequences.

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Many people will be familiar with the Asset Management Period (AMP) framework which covers pricing, investment levels and water quality targets in the water and wastewater industry. Despite the fact that the current period – AMP 6 – is still in its early stages and will run until 2020, attention is already being paid to the next stage – AMP 7. With this in mind, one of the UK's most prominent utility providers turned to Verder for assistance in planning for the future. "We had previously been involved with helping United Utilities with phosphate removal during AMP 5 so we were delighted when they asked us to help them prepare for AMP 7," says Verder Project Manager, Philip Brown.

United Utilities and principal contractor Mott Macdonald Bentley's (MMB) approach for help centred on a £1.3 million project to research into chemical dosing for phosphate removal – the process of mixing chemical additives into foul water, sewage or sludge which forms a critical part of the sewage treatment process. When effluent enters a treatment works it will contain material which must be cleaned, filtered and processed. This can be done by passing the effluent through filter beds and other processes, but this leaves what is, in essence, dirty water which must still be disposed of. This water can't simply be discharged into rivers and watercourses where it would present a threat to fish and other forms of aquatic life, so chemical dosing is used to change its composition. This then allows the water to be returned to natural water courses without causing any damage to wildlife or the surrounding environment.

"The Environment Agency sets 'milligrams per litre' consent limits for the phosphate levels contained in water which is being discharged into streams and rivers," explains Philip Brown." To meet these levels, utility providers like United Utilities must dose certain chemicals to remove impurities like phosphates. Phosphates can cause the growth of algae which limits the levels of oxygen in the water and creates a threat to the wildlife in the river. Iron-based chemicals such as ferric chloride and ferric sulphate are dosed into the sewage to remove these phosphate levels. Dosing these chemicals also changes the pH level of the water and so sodium hydroxide or hydrated lime are then dosed in to restore the pH levels to meet consent level requirements."

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Even though AMP 7 is still several years away, United Utilities and MMB had been approached by the Environment Agency to help investigate the new consent levels which the new standard might eventually include. United Utilities provides water and sewerage services to some seven million people in the North West of England, so in addition to working with the Environment Agency, the company also needed to be fully confident that it will be able to meet any future consent limits. Although any new targets will need to be thoroughly researched to make sure that they are practicable, they are highly likely to be lower than those for AMP 6. This prompted United Utilities to ask for Verder's assistance in identifying the type of pumping and dosing equipment that they are likely to require in the future.

Recognising MMB and Verder's ability to provide a comprehensive service which covered all technical and practical aspects of the dosing process, United Utilities proposed that the three companies continue their relationship. "This allowed United Utilities to access proven products which were backed by a wealth of industry expertise," adds Philip.

"We began the project by examining the five United Utilities plants – in Grassmere, Chorley, Horwich, Hyde and Saddleworth – which were chosen to take part in the year-long testing programme. We carried out extremely detailed site surveys, each of which required us to analyse many different factors. Everything was considered, right from the basics of site access through to the location of the new dosing equipment which would be needed. Storage tank capacities had to be evaluated to ensure that sufficient quantities of the ferric dosing compounds could be kept on-site and this then required us to look at things such as the tanker fill areas which were available.

"We put together the required method and risk assessments, and performed all the groundwork, modelling everything in 3D CAD software so that every detail of the pipework, cabinets and pumps could be seen in advance. Deciding where best within the system to actually deliver the dosing was another key factor – whether that was into effluent chambers, filter beds or pipework. Each of the United Utilities plants had different conditions and specifications, and so they each presented different circumstances and challenges, which made the site survey work particularly complex.

"Our Project Teams have provided services to nearly every major water authority in the UK, and with this type of project the experience they've gained often allows us to use the existing equipment that's on site. As in the case of these test sites, we can refurbish and supplement what's already there rather than simply supplying a whole new system, and that has obvious cost benefits for the client."

Over 12 months of design, development and planning work were completed before Verder supplied bespoke equipment packages to each of the test plants. A key element of that work involved developing the control software systems which would regulate the dosing activities. "Our aim here was to provide United Utilities with as much flexibility as they needed in terms of control," adds Philip. "This type of dosing is all about achieving a balance to create the desired end result, so the dosing control systems had to be as flexible as possible. We were able to expand the range of dosing parameters which could be controlled and that now allows United Utilities to not only make constant adjustments, but also to evaluate the results with a high degree of accuracy."

This type of flexibility of the control system and the dosing equipment is essential in a system of this nature, especially as the required dosing level can be gauged in different ways. Dosing levels can be controlled according to the volume of water arriving at the input stage of the treatment process. Alternatively, phosphate analysers can be sited at different locations onsite to measure the condition of the discharge water and regulate the dosing levels accordingly.

A packaged dosing system from the Verder UK Project Team ready for shipping. The kiosk features a dosing cabinet, chemical storage, control panel, filling ports and booster set

Verder was even able to develop the dosing system control software to accommodate other factors such as the effects of the prevailing weather. Heavy rainfall can obviously affect both the volume and composition of the water and effluent arriving at a treatment plant, and so the systems Verder provided had to be able to accommodate these changes and not allow them to affect the results of the testing. Even the 'tourist effect' was taken into account. A plant in a tourist area such as Grassmere will have to cope with significant changes in the demands placed on it when large numbers of visitors arrive in summer, and the Verder packages had to be designed to accommodate these seasonal changes in the local population.

Verderflex Dura D15 peristaltic pumps were used for the pH correction, dosing hydrated lime at strengths of 47%. "These are ideal for this type of dosing application as they can handle the required solids content without any effect on operating efficiency," adds Philip Brown. That makes them inexpensive to maintain, with the hose or tube being the only component that is likely to require replacing with any sort of regularity. They're also impervious to the sort of highly aggressive liquids involved."

Each of the packages provided to the treatment works was designed as a self-contained pumping and dosing unit built in to a bespoke GRP housing, and this helped simplify the installation and commissioning operations which Verder completed. Now that testing has begun, Verder is on hand to handle any service and maintenance requirements which arise, and MMB are pleased with the early results of their efforts. "The current allowable level of phosphate content can be between 1 and 1.5 mg per litre, but the Verder packages are currently achieving levels as low as 0.5 mg per litre," Philp concludes. "It's still early days for the project and there is much more testing and analysis work to be done, but we anticipate that these early results will prove to be sustainable, and that will be an enormous benefit to United Utilities when new limits are set in the future."

The Verderflex Dura 15 is an excellent choice for handling chemicals in water and wastewater treatment. It performs especially well with abrasive slurry such as milk of lime.

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The Verder Service Centre is located at the Head Office in West Yorkshire

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Verder Projects

Verder UK offer a full range of system and project management services for chemical dosing in clean and wastewater treatment.

Led by the Project Team, Verder have supplied the design, build and installation of chemical dosing solutions to many of the UK's water companies.

Based at the Verder Service Centre in West Yorkshire, a range of chemical dosing solutions and turnkey projects are available.

- Package plant systems
- Small-scale mobile dosing and mixer systems
- Chemical storage solutions
- Poly make-up
- Lime mixing and circulation
- Slurry and sludge handling
- Trolley and trailer-mounted pumping systems
- Installation and commissioning
- Contract maintenance and repair

The Verder Project Team are qualified and experienced with training in several industry-based schemes and standards.

- Achilles UVDB registered and audited
- CHAS
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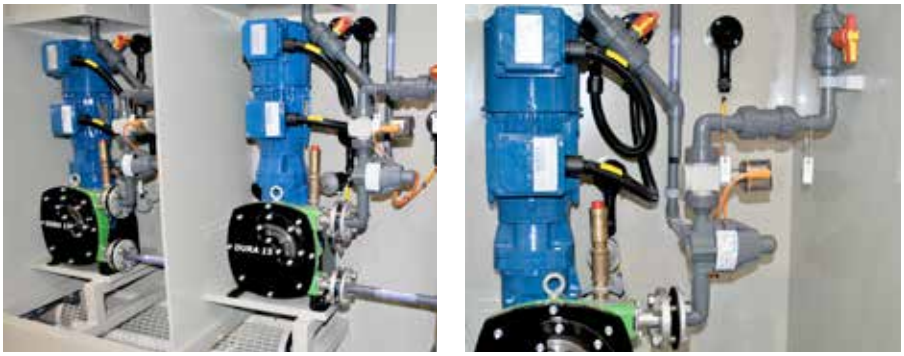
- CSCS
- Site safety supervisor trained SSSTS
- ISO9001, 14001 and 18001
- Clean water cards

Contact our Project manager, Philip Brown for Chemical Dosing and System Enquiries on 01924 221 005/Philip.brown@verder.co.uk

A dosing cabinet ready to be installed in a kiosk. All assembly and testing is conducted at our Service Centre



Our dosing skids feature a range of ancillary components, chosen and approved from reputable suppliers

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