



## Serline PU pipelining systems and Overland Supply Vehicle

In situ pipelining



In a first for the water industry, Aquam has undertaken a programme of lead pipe lining works for Yorkshire Water that goes right up to the point of entry to customers' homes. The trial project in Rotherham, which involved 1,000 properties and 3,000 linings, was carried out in 14 weeks starting in late October 2016 and finishing in early February 2017.

There is a requirement for water companies to reduce the levels of lead found in drinking water to below 10µg/l, in accordance with European water quality legislation. However, while utilities have responsibility for communication pipes up to the boundary of the customer's land, service pipes on the customer side are privately owned.

The trial was supported by industry regulator Ofwat and the local authority. Morrison Utility Services contracted Aquam to undertake relining service pipes in 1,000 council-owned properties supplied by Yorkshire Water. Aquam was identified as the ideal partner, due to its combined package of the Overland Supply Vehicle (OSV) and Serline advanced pipelining system.

The patented Serline system has a key role to play in helping water companies reduce the levels of lead found in drinking water. Ensuring water quality targets are met reduces both risk of fines and substantial reputational risk.

The Serline System of which various aspects are patented, provides an automated and auditable process for lining lead services lines, an essential benefit for water companies.

### DWI approved

Serline uses 3M's Skotchkote 166L Rapid Setting Polyurethane/Polyurea Hybrid Lining resin, which is DWI 31(4)(a) approved and can help utilities meet quality standards for allowable concentrations of lead.

Aquam was required to clean and line both the water company's lead communication pipes from the water main up to the boundary box and customers' lead service pipes up to the point of entry to their homes.

Once the temporary supply was established using the OSV, Aquam technicians were able to clean the lead pipes. Granite crumble was blown through each pipe using the patented Serline air vortex process, abrading any corrosive deposits to provide a suitable surface for the resin to be applied.

- A first for the water industry - pipes lined to point of entry
- Rapid restoration of lead pipes to 1,000 properties
- Customers switched seamlessly to temporary overland supply



The lining resin was mixed and blown through the pipe in liquid form using the same vehicle and air vortex system. Each cleaning and lining only took approximately 20 minutes to complete using the Serline system.

## Rapid cure

The lining cured rapidly and was ready to return to service in four hours. Using the OSV meant customers were never off supply. A seamless service for the rapid refurbishment of lead pipes was delivered while customers and the community remained largely unaffected.

The Overland Service Vehicle was originally developed to provide cover during emergency bursts, but can also be used to cover scheduled repair and maintenance work. It carries everything needed to set up a temporary water supply, allowing up to 24 houses to be connected swiftly and easily, including hoses, adaptors and pressure reducing valves.

At the heart of the service is an innovative new technology. The Overland Supply Manifold (OSM) is a solid machine-cut nylon device developed by Aquam trade partner Aquacheck Engineering. Each OSM becomes the hub of a temporary but stable potable water network.

## Budgetary impact

Any loss of supply of more than three hours can affect water company Outcome Delivery Incentives, a key component of customer Service Incentive Mechanism (SIM) scores.

“As well as inconveniencing householders and customers, the financial penalties for utilities failing to achieve their targets on the Reliable Water Index can be immense. Each second over target can attract £85k of penalty.

Aquam consultant Roman Boryslawskyj

Based on an earlier initial lining contract with Yorkshire Water for 2,000 communication pipes, the system has proved to be around 80% more efficient than open-cutting trenches on busy main roads, resulting in a dramatic reduction of open excavations outside customers' houses and reducing traffic hold-ups in built-up areas during works.

## Operational efficiencies

The combined lead lining and overland supply package offered by Aquam delivers major operational efficiencies. A two-person crew can carry out 12-20 linings per day. Traditional rip-out-replace techniques involve major excavation and movement of materials and spoil. They involve significant disruption to customers and the wider community and carry a greater carbon footprint.

The Rotherham trial project would have taken a year - rather than under four months - to deliver using traditional open-cut and moling techniques.

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## Environmental Benefits

Yorkshire Water has identified multiple environmental and sustainability benefits of Serline lead pipe lining over traditional rip-out-replace techniques:

- ✓ Reduction of 1,876m<sup>3</sup> (188 lorry loads) of excavated material going to landfill and the equivalent in backfill material
- ✓ Size of each excavation reduced by an average of 80%, cutting carbon footprint
- ✓ Noise pollution reduced dramatically as the time spent outside customers' properties with plant was cut by 80%
- ✓ Construction method much less intrusive than traditional methods, vastly reducing pollution risk
- ✓ PU coating applied to the lead pipe has proved to repair small holes in the pipes, impacting on water leakage in addition to lead leaching
- ✓ Reduced need to dose certain chemicals during the treatment process
- ✓ As the current pipe is refurbished there is no longer a requirement to use plastic pipe, which has resulted in fewer plastic pipes being produced and less pipe being wasted

Aquam consultant Roman Boryslawskyj said, "It is always challenging when you use two technologies for the first time, but these two systems worked exceptionally well together."

Combining Serline with the Overland Supply Vehicle and Manifold meant the utility could make a step-change in delivering best practice in lead supply pipe refurbishment, maximising the benefit to the customer, community and environment while achieving major cost and time efficiencies.

“The Serline lead pipe lining at Rotherham was very successful. In collaboration with Aquam and MUS, we met targets and the regulatory compliance date for the project and we couldn't have done that without lining the pipes.

We had three lining rigs deployed in Rotherham and by using the Aquam Overland Supply Vehicle we were able to work onsite all day with minimal disruption to customers' supplies.

We lined right into the main without excavation on the ferrules, though the stop tap and from the stop tap to the property. This has reduced the number of excavations and made the civils works safer."

Steve Taylor, innovation technician at Yorkshire Water

