

We have achieved

Water utilities

United Utilities.
Accrington, UK



JD7 Investigator+ pipe inspection and leak-detection system

Survey reveals tuberculation at water treatment works



Mitchells House Water Treatment Works (WTW) was experiencing a drop in flow leading to speculation that a valve might have stuck or something was lodged in the main. The WTW, owned by United Utilities, asked JD7, an Aquam group company, to test pipework within the waterworks to determine what was preventing full operation

The site of the suspected blockage was in the filtration area. The client wanted not only the 400mm diameter pipework from three open-top filter tanks inspected but also the faces of three associated butterfly valves, which would be isolated. Access to the pipework was provided through filter inlet bell-mouths.

Any CCTV camera would have to negotiate the bends in the 400mm pipework, and the client also required camera insertion through a flash mixer with a 400mm bend at the base, to check the condition of the bend and the following pipework. The treated water main would be full during the inspection with a velocity of about 0.22m/s.

Asset condition examination

Derby-based JD7 opted to use its Investigator+ pressurised pipe inspection and leak-detection system to carry out the task. The system's camera and hydrophobic technology is matched for 300 mm diameter pipes and above for complete asset condition examination.

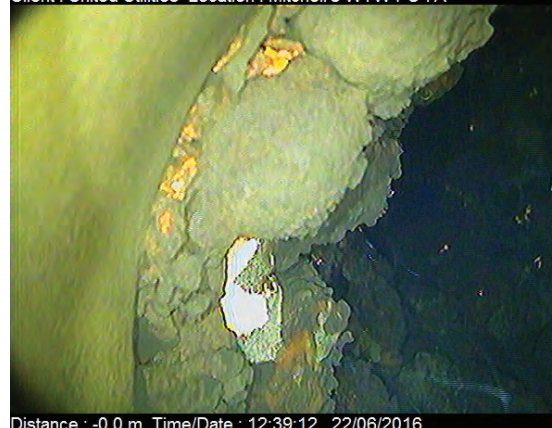
With a head larger than that of the normal Investigator, the Investigator+ ensures high levels of illumination within larger pipes. The system uses an electronic drive mechanism to feed and retract the sensor head within the water main. This ensures a consistent feed rate and increases control of the position of the sensor.

To insert the CCTV into the filter inlet bell-mouths, the JD7 operator had to work safely at height, standing on a ladder and feeding the camera into the pipework by hand.

- Drop in flow at water treatment works investigated
- Pipework and associated butterfly valves surveyed
- CCTV camera negotiates the bends and insertion through a flash mixer



Client : United Utilities Location : Mitchell's WTW PU 7/A



Distance : -0.0 m Time/Date : 12:39:12, 22/06/2016



Although only a limited distance was achievable towards the bottom of the section, it was enough to reveal the situation.

Throughout the area investigated on the joints and pipe sections, tuberculation was clearly visible. Tuberculation consists of small reddish brown mounds of corrosion - $\text{Fe}(\text{OH})_3$ - on the inside of iron pipes. It makes the interior of pipes rough, which can increase pumping costs and reduce pressure in the distribution system. In severe cases, tuberculation can cause pipelines to leak. It can be prevented by chemical treatment or the use of cement mortar lining.

In addition, the JD7 inspection found that there was no issue with the opening and closing of the butterfly valves, which appeared to be in good condition.

Inspection of the interstage mixer revealed a similar picture of tuberculation, with a trapped air bubble in the joint increasing corrosion through oxidization, the final stage of tuberculation.

Successful outcome

John Cooper, JD7 implementation engineer summed up the project,



Having analysed the client's feedback about what the job entailed, the Investigator+ system was used because it could navigate and operate in small spaces. This technology was able to video all three butterfly valves and playback live, showing the client that they were all operating fully and correctly, eliminating this as a problem with the flow.

Further inspection using the Investigator+ showed that the lack of flow was down to large build-ups of tuberculation.

Investigator+ technology

Investigator+, which was developed by JD7's innovation team, is a tethered condition monitoring system that can carry out inspections and locate leaks in pressurised water pipelines.

The system comprises a hydrophone operated simultaneously with a real-time camera system, providing visual and acoustic data in a single operation.

The device can be launched through pressurised fittings, air valves and gate valves and can travel against the flow of water for distances up to 100m and up to 16-bar pressure. The use of an electronic drive mechanism to feed and retract the unit head within the pipe ensures a consistent feed rate and increases control in positioning the sensor.

With the largest head in the Investigator range, Investigator+ ensures high levels of illumination within larger pipes. The system is extremely robust, allowing reliable results to be achieved within harsh environments.

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