

Permanent Leakage Monitoring is the fastest way to reduce leakage!

The town of Eisingen in Southern Germany has practiced Active Leakage Control for many years with a team of two equipped with a ground microphone and correlator who drive around in a van searching for leaks. As many of the pipes are one hundred years they had a good success rate often finding leaks. With two hundred and forty kilometers in the network, there is a large area for one team to cover and the leak detection process is expensive, laborious and lacking strategy.

The engineers at Eisingen have been looking at different ways to improve the efficiency at finding leaks for several years. One option they considered was sectorising their network into many smaller zones to identify increases of flow, however they decided this method was going to take a long time to implement and would not tell them where the leaks were. They have wanted a fixed network to deliver the leakage results every day, however until now they had not found a system that met their expectations.

After trialing the ZoneScan permanent monitoring system from Gutermann they realized that this system could be installed within a few weeks and provide immediate results notifying them of the location of all the leaks.

The ZoneScan system comprises of correlating noise loggers, radio repeaters and ALPHA data collection modules. The noise loggers are deployed magnetically on valves and hydrants, the repeaters are installed on street lamps and the ALPHA were deployed on the top of a hill overlooking the town. The ALPHA collect the information from the loggers every day via the repeaters using radio communication and then send the data to the web host using GPRS.



Figure 1 shows LOGGER, set on a pipe



Figure 2 shows REPEATER set on a lamp post



Figure 3 shows ALPHA set on high point for long range radio transmission

On the first installation sixty loggers were deployed and forty four repeaters and two ALPHA were required to collect this information.

In this deployment area there are a number of busy roads with constant traffic that the leakage team at Eislingen have difficulties in surveying.

Analyzing the results after the first day of deployment we could see a lot of correlations that are automatically calculated showing a couple of leak positions. The map in figure 4 shows the area together with the GIS map showing pipe, valve and hydrant information layered on top of the Google map in the ZoneScan software. The orange fuzzy dots are the correlated leak positions and the arrows indicate correlated leak positions with pipe data between the two points. The loggers are represented by coloured dots and are colour coded green for no leak, orange for possible leak and red for probable leak.



Figure 4 Map from ZoneScan NET software (Red dots = High noise logger positions / Arrow = correlations / Fuzzy orange dot is leak position)

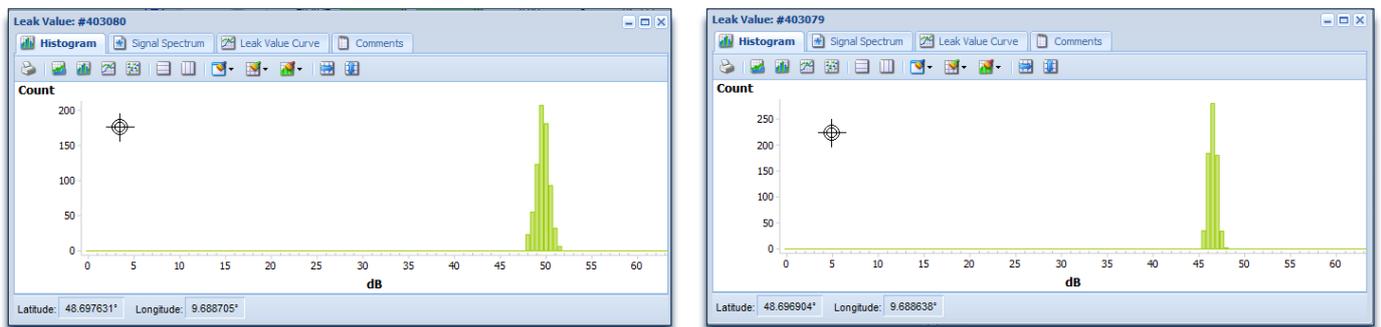


Figure 5 Amplitude distribution graph for loggers either side of the leak

When we look at the amplitude distribution graphs which show the noise level and number of samples recorded, we can see that the noise of forty five to fifty decibels is very loud and the narrow peaks mean the noise was very consistent.

There is a high probability this noise source is a leak and we confirm this by looking at the frequency of the sound in figure 6. Noises below one hundred and fifty Hertz can be mechanical noises and higher frequency noises like this one are more likely to be a leak.

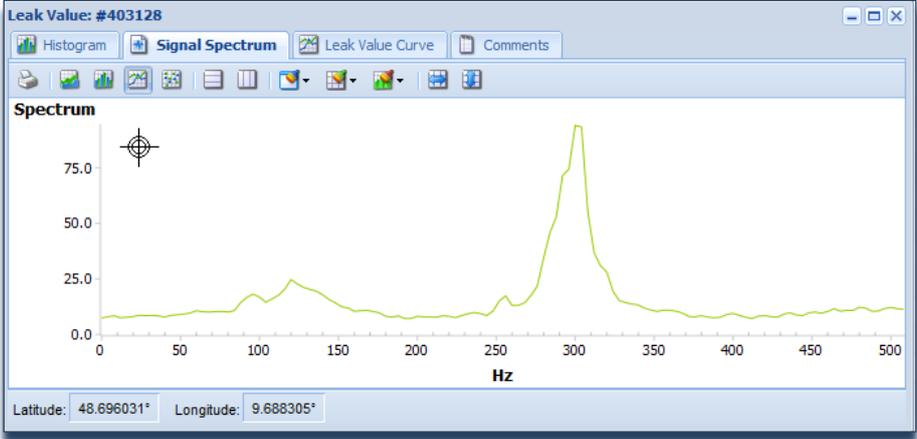


Figure 6 Frequency spectrum recorded

When we click on the orange fuzzy dot on the map, the corresponding automatic correlation graph opens enabling the operator to determine the quality of the correlation. This graph is shown in figure 7 where the high quality correlation is generated on the first day of deployment.

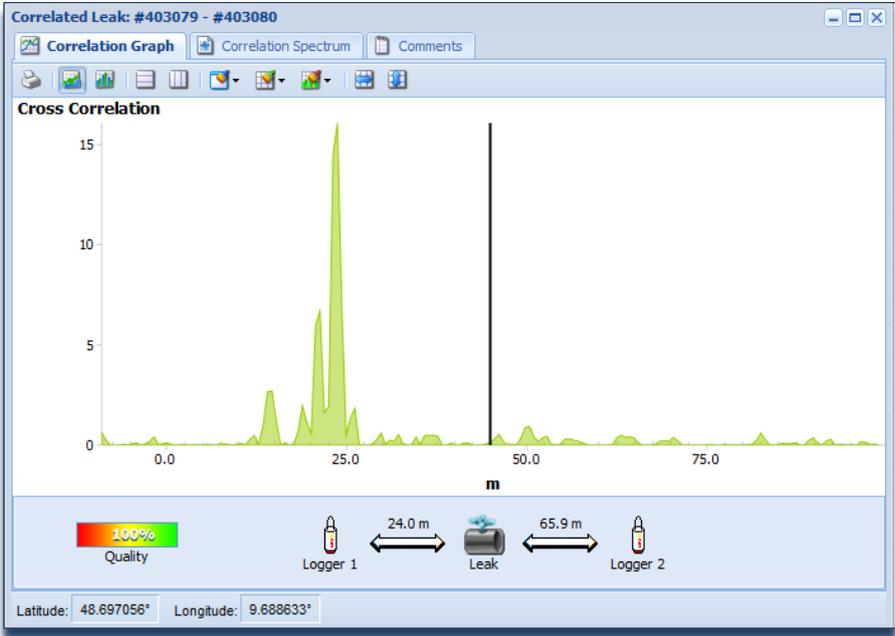


Figure 7 Correlation graph

After confirming the noise is leak with a ground microphone and finding the position indicated by the ZoneScan system to be exact, the repair process began.

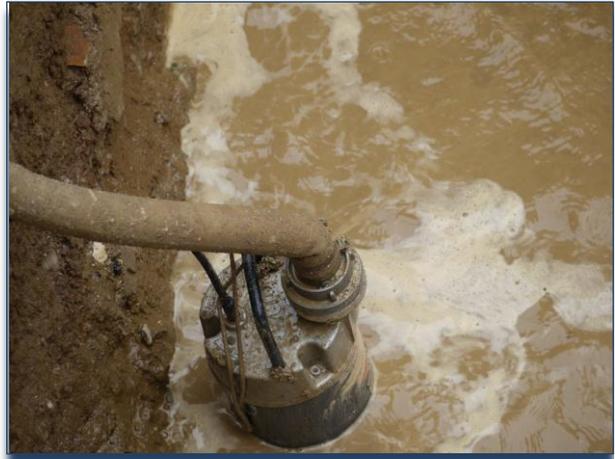


Figure 8 shows the repair process and two leaks found

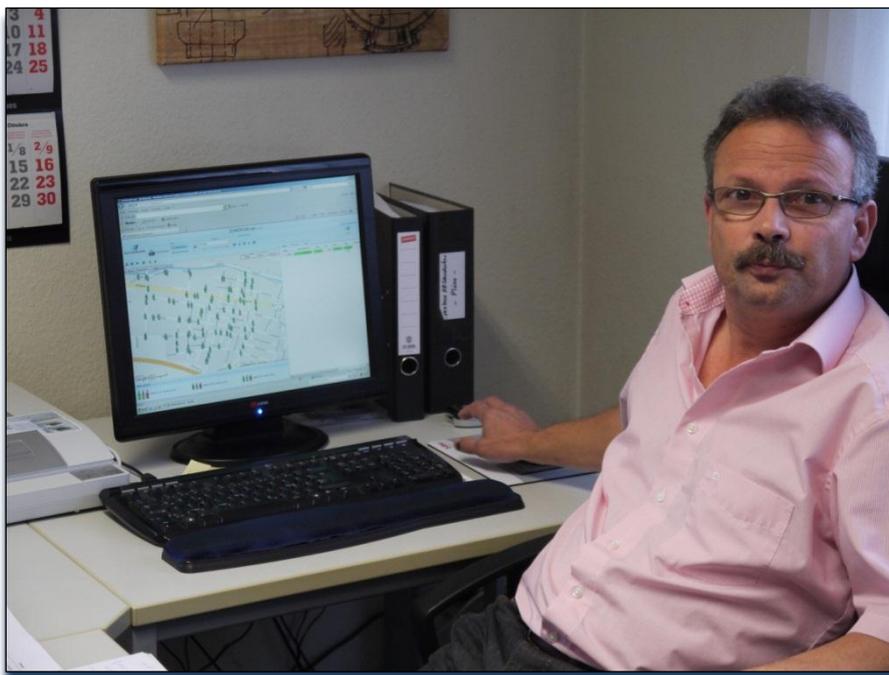


Figure 9 – Leakage monitoring from a PC in the office!

Conclusions

The engineers at Eislingen believe this leak has been running for a long time generating a water loss of 4 liters every second !

The ZoneScan ALPHA fixed network system found the leak and pinpointed the final position with an accuracy of half a meter!

The ZoneScan ALPHA system is a perfect way to locate leaks with a rapid installation time, immediate results and a reduction in staff costs.

Water utilities do not need to sectorise their network to reduce water loss and the automatic correlation feature with the ZoneScan is an effective way to find more leaks!

Within a few months the waterloss in this area had been reduced by 30% and Eislingen placed an order to cover their entire network with the impressive ZoneScan ALPHA system.

By Karl-Heinz Beißwänger / Zweckverband Eislinger Waserversorgung