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## **LEAKAGE DETECTION IN PIPELINES - THE CONCEPT OF SMART WATER SUPPLY SYSTEM**

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**Summary:** Leaking pipes occur in every, even in well maintained, water pipeline network. It is estimated, that average water loss in public water network range from about 5% in well maintained, to even 30% in older pipelines networks. Taking into consideration the large quantities of transported water, those losses have considerable economic and environmental impact.

Among variety of existing leak localisation techniques, majority is based on laborious, manual detection by an operator. As an effect, there is a growing need for reliable method, based on a permanently mounted network of sensors. In the article, the investigation on a novel leak detection system for Krakow Municipal Waterworks and Sewer Enterprise is presented. The system is based on transient leak detection methods. Transient waves in a pipeline were excited by traditional methods, i.e. sudden closing and opening of a valve, as well as with sonar. Thanks to sonar, the excitation of more complex signals than single transient wave was possible. Several, from among existing, processing methods were tested in a dedicated laboratory stand. The overall length of pipeline in a stand is about 80 metres. Pipes made of different materials and with different diameter are available. Behaviour of transient wave were tested for different scenarios – leakages, bends and shifts of material and diameter of a pipe. The finally chosen method was then applied at the dedicated test stand at Krakow waterworks system. The test stand is designed as accurate representation of a water pipeline system, where artificial leakages might be tested.

The leak detection system is developed in parallel with dedicated plugin, created in QuantumGIS software platform. The plugin enables visualisation of obtained results in a system currently used in Krakow Municipal Waterworks and Sewer Enterprise.