



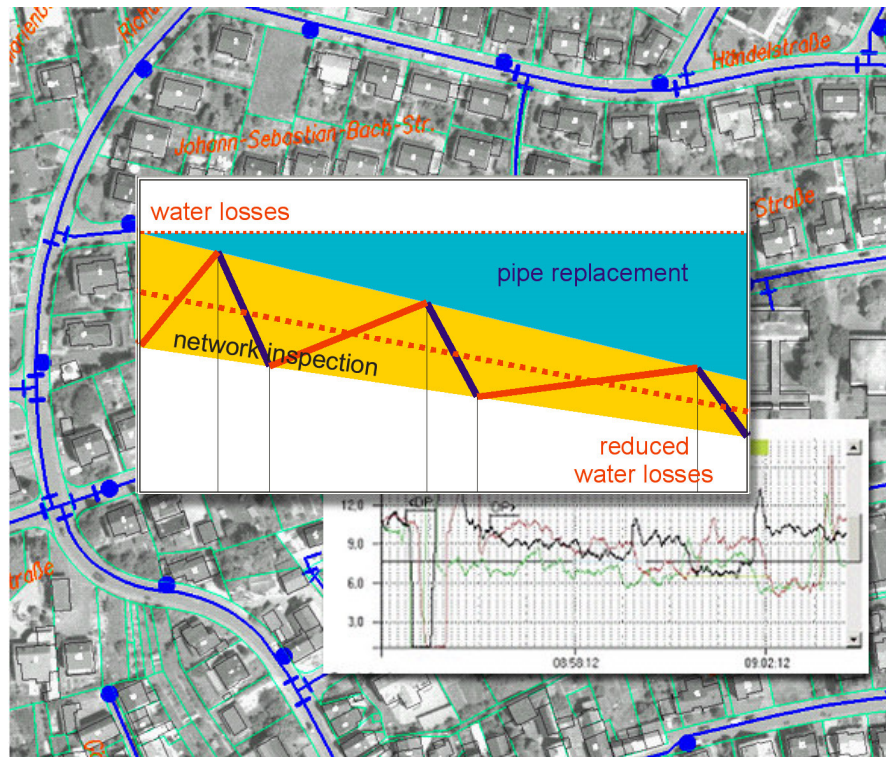
ingenieurberatung

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hammerer-system-messtechnik

Selective inspection of water networks computer aided

Failure dynamic - leakage dynamic - leakage inspection - documentation



Safety and Economy by documented inspection management

Successful with PROFI

Programme for Pipe Network Organisation, Operation and Maintenance



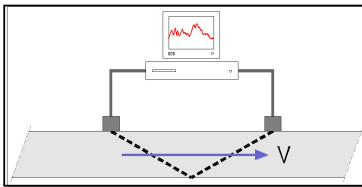
Selective inspection of water networks with PC

Water pipe networks must cope with loads which result in a certain number of failures and the amount of leakage. The number of failures and the amount of leakage are influenced by a variety of factors. The DVGW has published guiding values for the necessity and frequency of pipe inspections in guideline W392. Performance indicators are derived by analysing the amount of supplied water and the failure data. Thus, appropriate inspection strategies with certain methodologies and technologies can be established. Prerequisite is a long-term documentation and analysis of asset and operational data. Systematic analysis and selective inspection with state of the art methods and technologies reduce leakage economically and preserve and improve the network substance.

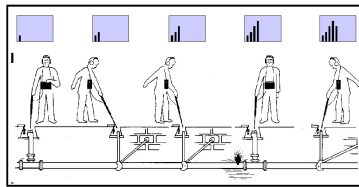
The following procedure is performed in practise:

- Systematic measuring and comparison of supplied water in the area, pressure zone or measurement zone with ongoing measurement locations or mobile measurement facilities
- Systematic leak detection, if required, with state of the art methods and equipment
- Repair and analysis of failure locations with support by failure statistics
- Estimation of performance indicators with respect to network condition and dynamic as the basis for selective leakage detection programmes and the rehabilitation of assets.

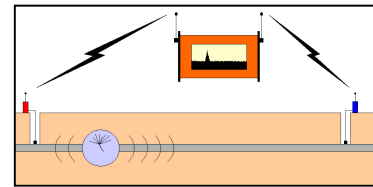
Methods of leakage control



Quantitative pre-locating



Acoustic pre-locating

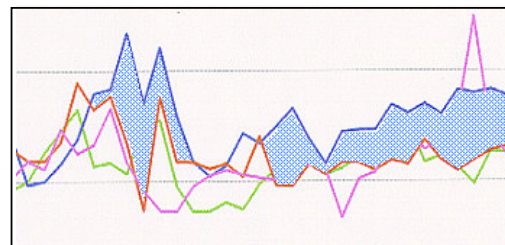
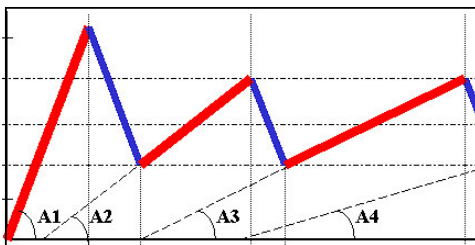


Acoustic point locating

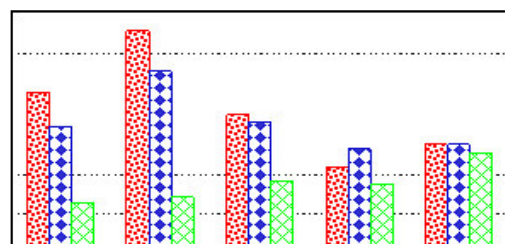
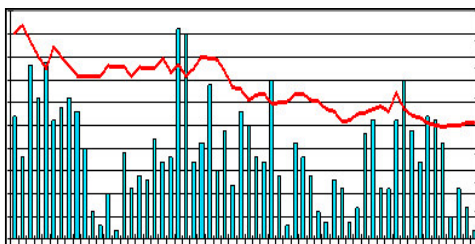


Selective analysis of asset data with PC

Leakage dynamics: In every specified network area an indicator of the supplied water is determined, such as daily amount, hourly amount, and minimum during the nights, which refer to the pipe length, the number of service connections or apartments. Upward deviations from these indicators indicate the occurrence of losses. The level of the deviation determines the priority for leakage detection actions. The total number of deviations is an indicator for the condition of the network and thus, further evaluation, e.g. failure data analysis, is needed to set up decisions for inspection or rehabilitation. Downward deviations cause a correction of the indicator.



Failure dynamic: The accurate description of failures in a failure protocol the course of repairs allows a qualitative analysis of failures and their assignment to assets to determine the failure dynamic. The indicators refer to network areas, material groups and pipes in single streets and are specified by failures per km and time unit. With these results the utility can determine technical and economical threshold failure rates. Thus, a risk-saving potential could be estimated. The joint consideration of leakage dynamic and failure dynamic in the same network area allows the identification of the relation between failures and supplied water. This is the basis for predicting the future network condition.





Selective inspection of water networks with PC

The long-term comparison of asset data is the basis for an economical and efficient leakage reduction. The amount of inflow in a network zone is based essentially on the number of customers, whereas the daily consumption behaviour is reproducible. The measurement of inflow in a defined area with a mobile unit allows the synchronization with measurement data from the past and thus, after short measurement times the deviations for the definition of losses can be estimated. Data from a reference analysis is compared and presented with the current measurement results. The level of deviations of the supplied water in the synchronized period provides the amount of losses. After this very short measuring time the inspection team can concentrate on the localisation of the leakage. In the database, where the measured and reference data is stored, a selective analysis of current losses and their respective developments is done over the period where measure data is available. From this database in conjunction with the failure data analysis, the leakage and failure dynamic of the measurement zone can be evaluated.

