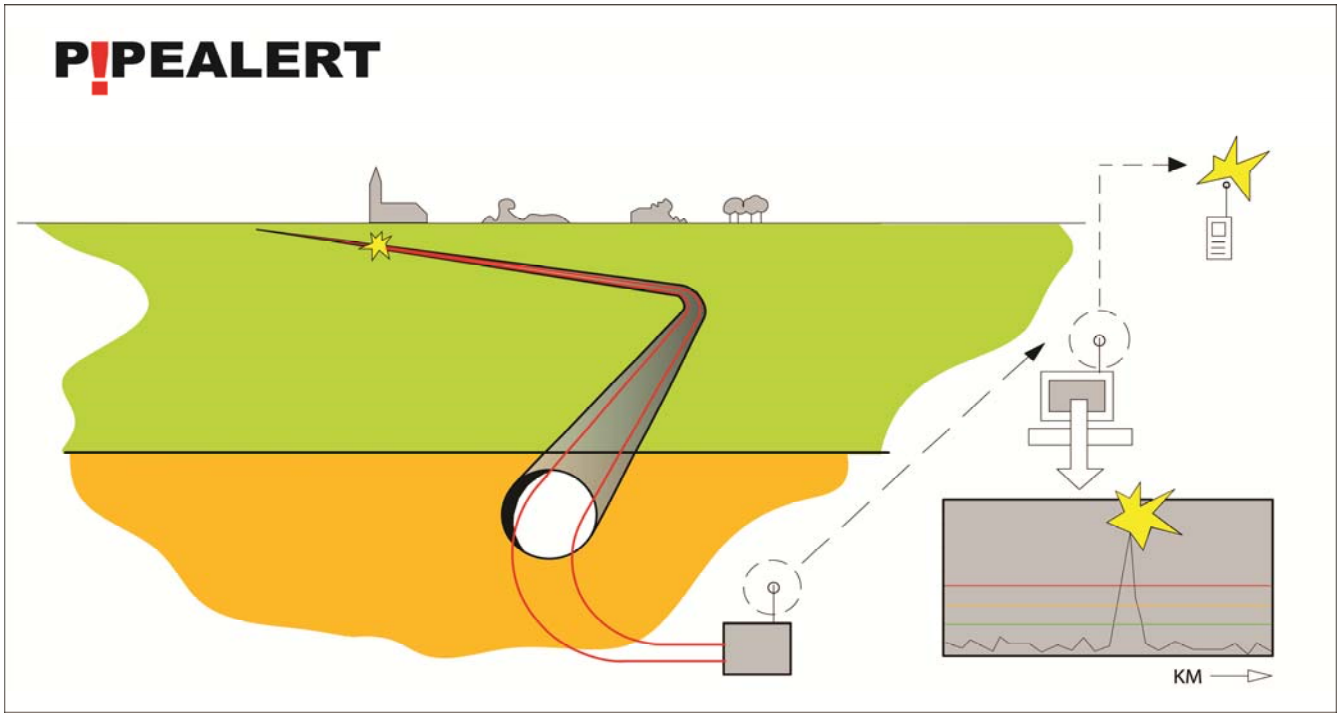
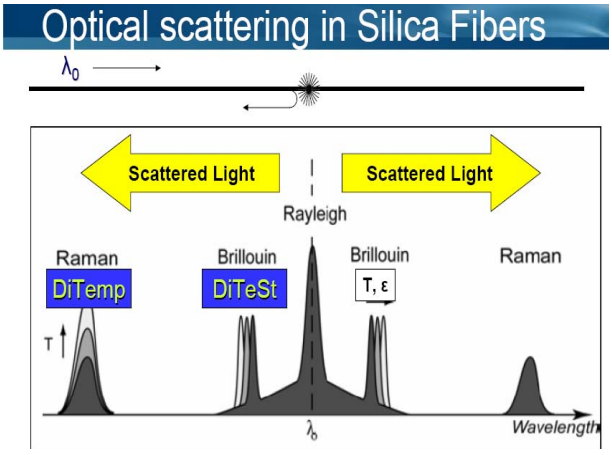
STRUCTURAL MONITORING – LEAK DETECTION

PIPEALERT

MONITORING PIPELINES

PIPEALERT is a fiber optic system to monitor the structural behaviour of long distance Pipelines and to act as an early warning system for possible leakages. A light pulse of a specific wavelength is constantly launched into the fibers that are connected to or running along the pipe. A reading unit analyses the backscattered light with a spacial resolution of 1,00m, resulting in the truly distributed picture of events along the full length of the pipeline.



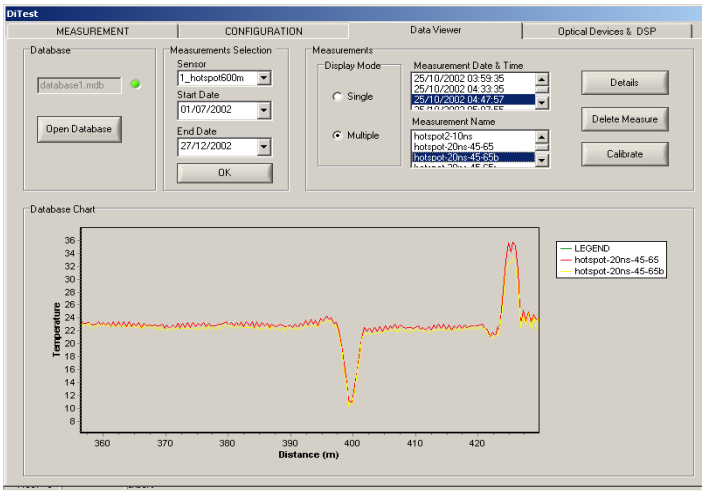


LEAKAGE DETECTION

For this purpose one or two multimode fibers are buried parallel to the pipeline. The system operates on the difference in temperature between the medium inside the pipe and the surrounding soil. Whenever a small leak occurs the reading unit detects this by measuring a variation in the intensity of the Raman frequency in the backscattered spectrum. The degree of increase or decrease of the intensity determines the absolute temperature difference. Due to the spatial resolution of only 1,00m over distances of up to 50kms it is very easy to find the location of the leak. For liquid pipes the fibers will generally be installed under or next to the pipe, for gas above the pipeline.

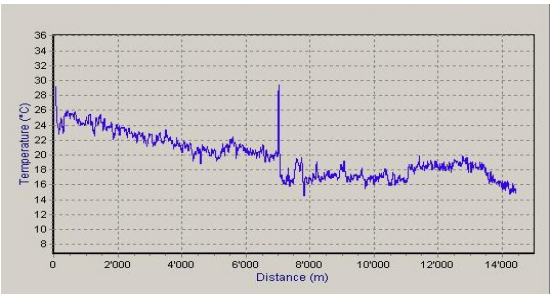
STRUCTURAL MONITORING

A minimum of 2 but preferably 3 single mode optical fibers, divided over the cross-sectional circumference, are bounded to the pipe over its full length. When anywhere along its length the pipe is subjected to bending or axial stress, the fibers are strained equally. The strain is measured by the reading unit from the shift of the Brillouin frequency of the backscattered light at that particular location. By measuring the strain with 1,00m intervals, the distributed structural behaviour of the pipeline over its full length is quantified and visualized on a continuous and real-time basis.



MAIN PROPERTIES

- Maximum length : 50km (100km with booster)
- Accuracy : Strain : 20με
  Temperature : 0,1-0,5°C
- Spatial resolution : 1,00m



OTHER APPLICATIONS

The system also serves to monitor the temperature profile of pipelines for the purpose of adequate process control. Furthermore it can be applied as a warning system against intrusion or damage such as can be caused by digging operations. In this case the fibers can be integrated in a geotextiel in order to enlarge the detection zone.

A RELIABLE AND LASTING SOLUTION

Fibre optic technology has a number of advantages that make them ideally suited for permanent structural monitoring:

- Unrivalled reliability and accuracy.
- Measurements are not influenced by electromechanical induction.
- Unaffected by humidity, water, vibrations.
- No drift, not even over periods of many tens of years.
- Measurements fully compensated for variations in temperature.
- Very small size.
- Sensors can be put in series, limiting the amount of cabling.
- Resistant against the most demanding and hostile environments.
- Intrinsically safe, so ideal for application in hazardous areas.

inventec b.v.
P.O. Box 497 Tel. +31-341-274470
8070 AL Nunspeet Fax.+31-341-274471
The Netherlands
E-mail: info@inventec.nl
Website: www.inventec.nl