CARBON CONNECTIONS CO_2

case study

Carbon reduction in water transmission

Monitoring and modelling the dynamic behaviour of water transmission mains to enable pump management for energy use reduction.

Project Summary

Problem: Water companies consume large amounts of electricity in pump operations that run continuously or for extended periods of time. Greater efficiency could be achieved by optimising operational patterns that allow for periodic pump switch off. However, frequent changes in the operation of pumps cause significant pressure changes that can weaken the pipes, increasing the risk of bursts and failures.
Solution: The project will develop novel data acquisition tools that can capture and communicate high frequency hydraulic data from water mains. Modelling techniques allow these pressure changes. This enables optimal pump scheduling to be used in a low-risk manner leading to a reduction in energy consumption.

Partnership

- Imperial College, Dept. of Civil and Environmental, Environmental & Water Resource Engineering Section.
- Syrinix Ltd, specialising in complex signal processing systems for the detection of trunk water main leaks.

Aims

Even small reductions in the use of water pumps represent significant carbon savings. This project will provide an integrated solution which continuously monitors and analyses the dynamic hydraulic conditions in large diameter water transmission pipelines. The data will be used to classify and track the pressure changes in the pipes and produce a model for optimal pump scheduling thus minimising energy consumption.

Innovation

This multidisciplinary project integrates and implements a number of innovative techniques. The key innovation is to offer an integrated, automatic, solution for data capturing, analysis and visualisation, giving near real-time information about the dynamic performance of the infrastructure.

Development

Syrinix Ltd already manufacture and supply a sophisticated leak monitoring system for trunk mains called TrunkMinder. This system senses vibro-acoustic signals from the water and pipe skin and analyses these signals by automated signal processing methods leading to leaks being identified at an early stage so that the pipeline can be repaired before it fails catastrophically. The Infrasense Lab at Imperial College London specialises in the integration of sensing technologies with application domain expertise and research in intricate numerical challenges. The Infrasense Lab has recently completed a large scale survey of the occurrence of hydraulic transients in operational water transmission mains.

The Imperial College team and Syrinix have developed a preliminary feasibility prototype for a sensing solution for dynamic hydraulic monitoring. The Carbon Connections project will facilitate further development of the design to field testing, refinement and certification. The sensing platform and telemetry will be matched by a robust, automated analysis package delivering information to the pipeline operator allowing the pipeline operator to quickly and reliably analyse pressure transient events in near real-time.

Carbon Connections is a HEIF-funded investment project utilising £3 million for carbon reduction activities. Based at the UEA, Carbon Connections supports innovative projects in carbon reduction using a partnership model. The aim is to facilitate knowledge transfer between universities and research laboratories and the business community to speed commercial development of carbon-saving projects, whether technological or behavioural in focus.

UEA University of East Anglia

For further information please contact:

Matt Dolan
Marketing Manager
01603 591358
email:
m.dolan@uea.ac.uk