Development and validation of an automated NDE approach for testing welded joints in plastic pipes

- **Project budget: £3.2 m**
- **End Users: British Energy**
  E.ON Ruhrgas

Plastic pipes have many advantages over pipes made from metals or concrete, such as good chemical resistance, low weight, low cost, and longer predicted service life, and are already used extensively for the transport of gas, water and chemicals. However, their use in more safety critical applications is limited by the fact that there is currently no validated inspection system available to evaluate the joints. Pipeline leakage does not only cause high repair costs but can also result in disastrous environmental consequences and even in loss of life.

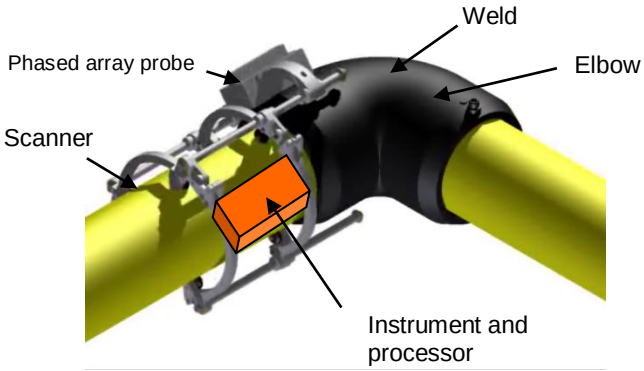
The TestPEP project is now in its third and final year of operations to identify and test an automated non-destructive evaluation (NDE) approach for testing welded joints in plastics pipes. The project team, involving 17 organisations from seven countries, is currently developing and validating inspection equipment and techniques for both butt fusion (BF) and electrofusion (EF) joints in polyethylene (PE) pipes.

For BF joints, the team has designed and manufactured angled water wedges, choosing water as the coupling medium due to its good acoustic properties in relation to the plastic material. The angle of the wedge is optimised to reduce the electronic steering with the probe elements while still covering the weld fusion zone.

The approach for inspecting BF joints covers four different techniques: sector pulse-echo, tandem, creeping wave and time-of-flight diffraction (TOFD). The techniques are complimentary both in terms of coverage area and types of defect that can be detected. The capabilities of the techniques were evaluated initially using pipe test samples containing holes and notches of known size and location.

For inspecting EF joints, the TestPEP project team is using 0° water wedges, with bespoke phased array probes and, as with BF joints, carrying out validation procedures in PE pipe joints containing known flaws with diameters up to 710mm. These joints are also being mechanically tested to determine critical flaw sizes.

TestPEP will complete early in 2013, when the team will specify a complete approach to the automated non-destructive evaluation of welded joints in plastics pipes.



Schematic of proposed TestPEP ultrasonic inspection system

www.testpep.eu

TWI Ltd
Granta Park, Gt Abington, Cambridge CB21 6AL
T: +44 (0) 1223 899000 **F:** +44 (0) 1223 890952
NDTinfo@twi.co.uk
www.twi.co.uk

SEVENTH FRAMEWORK PROGRAMME