# Robotic system to inspect underground pipes

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EU-funded researchers developed a high-tech robotic imaging system for inspecting underground pipes. Commercialisation should facilitate use of corrosion-resistant materials for transport of hazardous chemicals.

Hazardous fluids such as oil and gas, both of which contain hydrocarbons, are transported throughout Europe via a network of over 10 million kilometres of stainless steel piping.

Metal such as stainless steel is subject to corrosion within pipes and as a result of external factors. Such corrosion is a major cause of catastrophic disasters.

Fibreglass, also known as glass-reinforced plastic (GRP), is a material composed of a polymer (plastic) together with reinforcing strands of

glass. GRP can provide excellent corrosion resistance to a wide variety of fluids and gases at ambient or environmental temperatures. In addition, it is generally a much less expensive material than stainless steel.

Widespread use of GRP in the underground network of European pipes has so far been limited. Encouraging its application requires the ability to inspect the integrity of pipe interconnections with confidence.

European researchers initiated the 'Quality assurance and structural evaluation of GRP pipes' (Sure2grip) project to develop non-destructive testing (NDT) technology for GRP to ensure secure pipe connections. To this end, scientists developed numerous NDT technologies carried on and controlled by a robotic scanner.

Thermographic NDT was used to produce a sort of thermal X-ray, a colour-coded map based on infrared detection capable of detecting non-uniformities.

Phased array ultrasonic technology (PAUT) was also included. It uses a multi-element array of ultrasound transducers enabling focusing at a variety of angles and depths over a large area with very little water.

Radiographic systems were also integrated. Low-energy digital radiography enabled an X-ray using digital sensors rather than film. Dual laser shearography was developed for the project to visualise two-dimensional strain.

The Sure2grip GRP pipe inspection system thus filled a technology gap until now prohibiting the widespread use of GRP pipes.

Europe's underground pipe network carrying hazardous materials could benefit directly due to the corrosion resistance of GRP. Use of GRP will

also likely be expanded to other applications now due to the excellent NDT technologies provided by the Sure2grip project consortium.

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