

Inspection of Corrosion under Pipe Supports



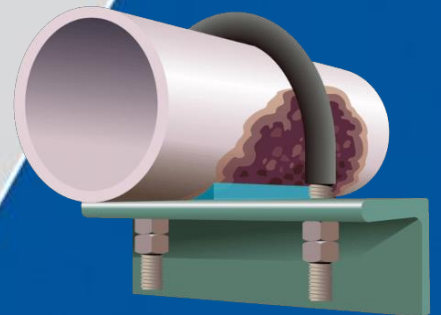
**JOINT INDUSTRY
PROJECT OUTLINE**

PROP310715

Summary

Corrosion under pipe supports (CUPS) is one of the leading causes of pipeline failure. Saddle clamps and beam supports have historically caused the majority of the problems. Each have the following in common:

1. **Crevice forming** – The formation of crevices at the pipe supports.
2. **Water trapping** – Water is trapped and held in contact with the pipe surface.
3. **Restricted access** – These supports make it almost impossible to paint, or perform other types of maintenance at the support locations. Non-Destructive Testing (NDT) techniques such as visual inspection are often challenging, due to restricted access and it is also problematic to inspect using other NDT methods.



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Project Concept

Poor pipework life management often leads to incidents that impact safety and production across the Oil and Gas industry. Such events can result in costly shutdown of production facilities, or have a tragic effect on the environment or the safety of personnel.

One of the major concerns is corrosion in areas that are difficult to inspect (such as pipe supports), which if undetected may lead to a catastrophic incident.

The presence of pipe supports usually makes the areas prone to corrosion and inaccessible to standard NDT techniques, which significantly limits the reliability of data obtained from NDT inspections. In particular, accurate through-wall sizing is very challenging, due to the obstruction caused by the support and the variable nature of the corrosion itself, which can be highly non-uniform. Furthermore, many of the available NDT techniques have limitations in terms of the types of pipe support they can accommodate, pipe diameters and wall thicknesses to which they can be applied.

TWI pioneered long-range ultrasonic testing (LRUT) in the mid-1990s, developing methods for detection of corrosion in covered pipes and inspection of complex pipe geometries, such as pipe spools. TWI is well placed to provide impartial advice and independently assess and recommend inspection techniques, or combinations of techniques to address CUPS. It's well-equipped NDE team is accomplished in development and application of the following ultrasonic techniques:

- LRUT / Guided Wave testing (GWT)
- Phased Array (PA-CAT)
- Electromagnetic Acoustic Transducers (EMAT)
- M-Skip ultrasonic testing



TWI and the sponsor group will work with facility operators to trial and evaluate a number of candidate NDT techniques that have been developed specifically to inspect pipe supports. This activity will identify and rank the available inspection techniques designed to detect and quantify corrosion located in inaccessible areas. Upon completion of the evaluations, information and data concerning the best performing inspection method(s) will be shared with the sponsors. This will then be used to develop equipment/system specific procedures, as required by the sponsors. Cooperation with relevant / key equipment manufacturers, suppliers and/or service providers will be sought for these activities, in preparation for the validation/qualification process. During this process, TWI will draw heavily on its expertise in development and qualification of novel NDT techniques, its extensive links with the Oil and Gas industry and its equipment supplier contacts.



Objectives

The key objectives of this project are to:

- Assess a series of candidate NDE methods for inspection of CUPS, via modelling, blind and open testing, round-robin trials and Probability of Detection (POD) studies.
- Recommend successful inspection methods (or combinations of methods) for this challenging application.
- Qualify/Validate the successful NDE methods.
- Produce a best practice guide for the qualified/validated inspection methods.
- Determine the reasons why any candidate NDT methods did not reach the required level of accuracy or reliability during the trials.

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Approach

A detailed work programme comprising a small number of work packages will be developed in collaboration with the sponsor group. It is likely to include (but not necessarily be limited to) the following:

- A literature study and desktop assessment of the NDE technologies that may be suitable for inspection of CUPS.
- Long and shortlisting of technologies and techniques, based upon TWI/sponsors expert knowledge and discussions with technology providers.
- Formal partnering with technology providers identified through the shortlisting process.
- Design and manufacture/acquisition of pipe/support samples for laboratory trials, based upon the sponsors' requirements (samples to include artificial pipe wall thickness reduction and genuine pipe corrosion).
- Identification of end-user sites and specific locations for on-site trials.
- Design of specific trials and parametric studies (encompassing modelling, qualification processes and evaluation of competing technologies on the basis of inspection accuracy and reliability).
- Laboratory and on-site inspection/monitoring trials.
- Interpretation and assessment of the laboratory and on-site inspection results, with full reporting to the sponsor group.
- Monitoring for any emerging NDE technologies that could improve upon the state-of-the-art.

The sponsor group will tailor the work programme to suit their specific needs and will take account of TWI's insight into industry's shared issues. It will thereby be in a strong position to benefit from the outputs of the project.

Benefits

- Independent assessment of CUPS inspection techniques.
- Greater choice and increased confidence when selecting NDT techniques for assessing CUPS.
- Improved plant reliability and safety through reduced risk of pipework failure.
- Potential long-term cost benefits through effective pipeline maintenance.
- Possible plant life extension through accurate condition monitoring.

Deliverables

The project deliverables will be dependent upon the specific interests of the sponsor group and the relevant Code and Regulatory requirements, but are likely to include:

- Validated/qualified NDE techniques for detection of CUPS.
- Recommendations for NDE techniques (and combinations of techniques, if required) for detection of CUPS.
- Results and data from blind, open round-robin trials (including Probability of detection, flaw sizing and flaw sizing tolerances).
- Comprehensive best practice guidance covering aspects such as equipment recommendations, working practices and inspection procedures for particular configurations and conditions.

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Price and Duration

The total estimated price for the project is £600,000 (excluding VAT). Five sponsors are sought, each contributing £40,000 per annum, over a three-year project duration. It is anticipated that the project will commence with an agreed scope of work and a minimum of three sponsors.

Further Information

For further information on how TWI JIPs are run please visit:

<https://www.twi-global.com/what-we-do/research-and-technology/current-research-programmes/joint-industry-projects#/>

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