Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Jan 2014

Project Reference Number

NIA_NGGT0028

Project Registration

Project Title

P9 Semi-Mechanised Hot Tap Welding

Project Reference Number

NIA_NGGT0028

Project Licensee(s)

National Gas Transmission PLC

Project Start

March 2013

Project Duration

0 years and 9 months

Nominated Project Contact(s)

Richard Wilkinson (box.GT.innovation@nationalgrid.com)

Project Budget

£110,000.00

Summary

It is proposed to introduce a semi-mechanised welding process to complete the split-tee longitudinal seam welds in thick wall tees. A suite of welding procedures will be developed for the welding and repair of these welds in the specified materials and in all necessary welding positions.

The programme will also assess a new primary method of weld inspection ultrasonic manual phased array testing. This method will be employed and compared in conjunction with the existing methods (visual and magnetic particle) to inspect the finished welds. This will give a higher probability of the detection of weld defects and will provide enhanced confidence in weld quality.

From a safety and environmental point of view longer working hours increases the risk of occupational health hazards to the work crew due to arc radiation, fatigue, exposure to atmospheric pollutants, noise, etc. The longer the welding operation continues increases the risk of accidental damage to the in-service pipeline and increases operational constraints to the gas network.

Third Party Collaborators

ROSEN

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

Current methods used by National Grid (NG) to weld thick wall minimum hot tap or stopping off connections to a pipeline can result in extended continuous welding times in excess of 24 hours. This is undesirable from the key aspects of human factors (extended

working hours), environmental (increases in atmospheric pollutants) and safety (accidental damage to pipework).

Method(s)

The specific programme methods are:

- Identify suitable welding system & consumables, obtain all materials, develop trial programme, appoint welding & non destructive examination (NDE) sub-contractors and produce a Welding Procedure
- Specification (WPS) & Magnetic Particle Assessment (MPA) technique sheets, method statements and risk assessments.
- Produce test welds, examine by NDE and carry out mechanical testing of test welds.
- Assess results of all testing, produce Welding Procedure Qualification or Record (WPQR) sheets and project report.
- Produce new or revised text for inclusion in NG's specifications T/SP/P9 & T/SP/NDT/2.

Scope

It is proposed to introduce a semi-mechanised welding process to complete the split-tee longitudinal seam welds in thick wall tees. A suite of welding procedures will be developed for the welding and repair of these welds in the specified materials and in all necessary welding positions.

The programme will also assess a new primary method of weld inspection ultrasonic manual phased array testing. This method will be employed and compared in conjunction with the existing methods (visual and magnetic particle) to inspect the finished welds. This will give a higher probability of the detection of weld defects and will provide enhanced confidence in weld quality.

From a safety and environmental point of view longer working hours increases the risk of occupational health hazards to the work crew due to arc radiation, fatigue, exposure to atmospheric pollutants, noise, etc. The longer the welding operation continues increases the risk of accidental damage to the in-service pipeline and increases operational constraints to the gas network.

Objective(s)

If successful, the introduction of a semi-mechanised welding process, coupled with improved NDE weld assessment has considerable potential as it offers an innovative solution increasing the efficiency of network modifications and new customer connections.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

A successful outcome to this research and development project will be the adoption of the welding and NDE techniques within National Grid's specifications. This will allow National Grid to specify a unified welding and post weld NDE for the installation of thick wall 'hot-tap' tees in future projects requiring these techniques.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

To ensure that the full implication of the proposed techniques can be assessed, it is necessary to carry out a full scale trial programme in order to develop confidence in the new technique.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

These standards documents provide the safety, legislative and operational framework for the National Transmission System (NTS) in the UK.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

IFI - £25k
NIA - £85k

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

Estimated savings will be dependent on number of instances where these welding techniques are required. A typical operation employing the proposed welding technique is estimated to save £100k per annum.

Please provide a calculation of the expected benefits the Solution

Base Cost of welding technique: 70k @ 6 instances per annum = £420k
Method Cost of welding technique: 53k @ 6 instances per annum = £320k
Saving 24%

Please provide an estimate of how replicable the Method is across GB

The proposed adoption of the welding and NDE techniques is generic. However, the NDE techniques may have wider adoption potential further enhancing programme value.

Please provide an outline of the costs of rolling out the Method across GB.

No additional implementation costs are envisaged as the welding and NDE techniques will be adopted and proscribed by National Grid for all subsequent suitable applications.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☑ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

The learning will allow for a unified welding and post weld methodology and use of non-destructive examination (NDE) for the installation of thick wall 'hot-tap' tees in future steel pipeline projects requiring these techniques.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

This project aligns with the Reliability theme, as well as safe working practices under the Safety theme and system access within the Customer Connections theme.

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

n/a

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

n/a

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

n/a

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

n/a

This project has been approved by a senior member of staff

☑ Yes