

Network Innovation Allowance Closedown Report

Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form.

Network Licensees must publish the required Project Progress information on the Smarter Networks Portal by 31st July 2014 and each year thereafter. The Network Licensee(s) must publish Project Progress information for each NIA Project that has developed new learning in the preceding relevant year.

Project Closedown

Project Title

Assessment of hydrophobic treatment for gas compressor air intake values & screens

Project Reference

NIA_NGGT0029

Project Licensee(s)

National Grid Gas Transmission

Project Start Date

Dec 2012

Project Duration

12 Months

Nominated Project Contact(s)

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Scope

Under certain climatic conditions it is possible for unacceptable levels of ice to build up on gas turbine air intakes. Ice build up on the air intake structures reduces the available cooling and combustion air for the gas turbine, reducing efficiency and the integrity of the unit if the ice should become ingested within the engine. This would have serious consequences for the integrity of the gas turbine unit and network supply capability due to unit failure.

There is considerable worldwide experience of operation gas turbine based infrastructure in low ambient temperatures and a number of ice treatment technologies are well defined. Dovetailing the most cost effective available ice treatments with the existing air intake structures. This and also employing any fortuitous effects such as surface roughness, will improve the overall effectiveness of water repulsion and ice management of gas turbine air intakes across the National Grid fleet.

Objective(s)

If successful, the project will provide valuable information as to the effectiveness of conventional hydrophobic coatings for gas turbine air intakes. This will increase unit availability, improve unit reliability, reduce operating costs associated with unit overhaul, maintenance and offers potential improvements in long term unit efficiency.

Success Criteria

This programme of work should be seen as one component to improve the overall husbandry of the compressor fleet, although use of hydrophobic coatings may have universal applicability across National Grid.

Performance Compared to the Original Project Aims, Objectives and Success Criteria

The programme to the assess use of hydrophobic coatings on National Grid's fleet of compressors provided the following results:

- ▮ For the metal parts, all the anti-icing coatings that were tested were shown to reduce the formation of ice. However, the impact was generally quite low, potentiality translating into a minimal delay before an affected compressor unit would trip in icing conditions
- ▮ The metal parts that were pre-coated with PTFE appeared to behave in a similar way to the metal parts with anti-icing coatings

- 1 The plastic bird screen experienced about a tenth of the ice formation compared to an equivalent metal bird screen
- 1 The OEM filter samples both experienced icing.

Required Modifications to the Planned Approach During the Course of the Project

Having completed the agreed scope of evaluating various base materials, hydrophobic solution, filter oil, liquid PTFE and bird screens it was decided that the purposed built evaluation rig could also be used to evaluate some OEM filter elements at minimal additional cost and time to the project. The extended scope was agreed and completed and the results and conclusions included in the final report.

Lessons Learnt for Future Projects

As part of the extended scope it became apparent that ice formation on part of the filter elements may not always be a negative outcome. The OEM would contend that filters are designed to cope with the formation of ice without major decline in performance. This means that the mass increase testing (undertaken as part of the extended scope) is unlikely to provide a true representation of filter performance under icing conditions. A more accurate test for consideration for any future project would involve completely filling the cross section of the test rig with the filter element and then monitoring the pressure across and air velocity through the sample. This would allow the true performance under icing conditions to be examined and correctly evaluated.

Note: The following sections are only required for those projects which have been completed since 1st April 2013, or since the previous Project Progress information was reported.

The Outcomes of the Project

The project demonstrated that pre treating air intakes with hydrophobic solutions, PTFE coatings or filter oil only offered a marginal delay (compared to equivalent non treated components) before the on set of icing conditions. This combined with some of the potential health and safety issues associated when applying these solutions (working at height) means that that the evaluation confirmed that this project will not be progressed further at this stage.

The recommended use of plastic bird screens as alternative to metal was confirmed by the rig tests and should be implemented where feasible and safe to do so at compressor stations.

Planned Implementation

Based on the findings of this assessment project, the replacement of metal birdscreens with plastics will be reviewed internally and if deemed appropriate will be managed through the Compressor Reliability and Availability Challenge group (CRAC).

Other Comments

n/a