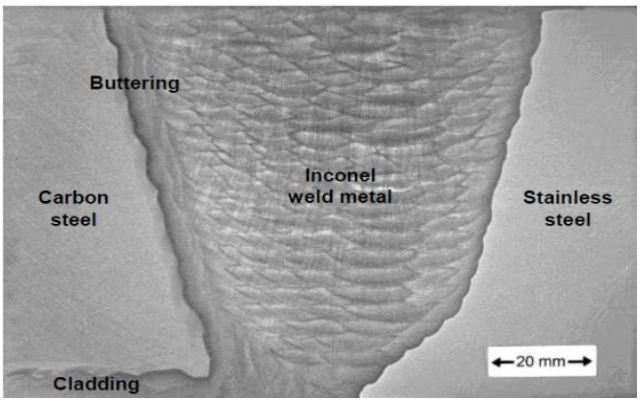
DISSIMILAR - Phased array ultrasonic inspection of dissimilar metal joints

Efficient energy generation is a key component of meeting the low CO_2 emission goals outlined by the government and is reflected in the present technology priority. The dissimilar metal joints project has two primary aims that will address specific technological goals defined by the utilities who have numerous dissimilar metal joints in operation:

- To position and size defects accurately, compensating for the distortive effects of the anisotropic, inhomogeneous austenitic/ferritic weld.
- Improve the overall inspection quality through the use of phased array technology such that the inspections provide vastly better signal to noise quality (compared to present probes), are faster (by orders of magnitude) and provide accurate, quantifiable and digitally recordable data.

Project objective

The project will deliver a revolutionary new technique for the inspection of dissimilar joints; two advanced phased array probes (TRL and annular) and a model based approach to compensate for metallurgical hurdles, which previously degraded inspection quality.



Thick wall austenitic dissimilar weld used in the primary circuit of a pressurised water reactor

The ultimate aim of this project is to allow designers to specify high performance dissimilar metal joints confident in the ability of inspection to accurately detect, position and size the smallest possible crack like flaws. It will also incorporate novel and innovative materials for phased array probe manufacture, quantification of microstructural data and validation of advanced modelling. Dissimilar metal joints have a variety of flaws but crack-like flaws pose the greatest threat to integrity, with catastrophic consequences due to failure of these joints.

The present project primarily targets the safe-end weld configuration of current and future nuclear power plants and the clad pipelines of the oil/gas industry. Hence, given the corrosive, irradiating, high temperature environment within which a dissimilar metal joint may be installed in a nuclear utility, the quality of their inspection has a direct bearing upon the safety of personnel as well as the general public at large.

This project will overcome the difficulties of inspecting inhomogeneous and anisotropic austenitic welds by fully accounting for the propagation of the ultrasound through the weld metal as well as implementing advanced phased array based focusing techniques to improve the signal to noise ratio.

For further information, please visit the project website at **www.dissimilarweld.co.uk**.

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