

## Industrial Member Report Summary – Key Findings for Industry

### Characterisation of Dissimilar Metal Interfaces and Evaluation of Resistance to Subsea Hydrogen Cracking

TWI Core Research Programme

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#### Industrial need

Following a number of in-service failures, there is significant interest in understanding the microstructures and environmental conditions that contribute to hydrogen cracking of subsea dissimilar metal welds. Through a programme of environmental performance tests under cathodic protection, the environmental performance of F22 and 8630M-Alloy 625 interfaces has been evaluated.

High resolution electron microscopy (SEM and TEM) was used to determine the microstructures responsible for the observed environmental performance.

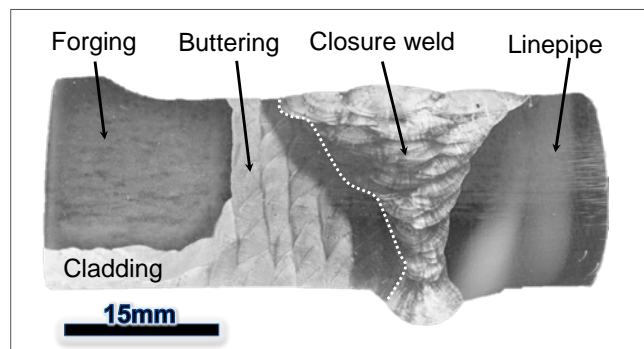
#### Key Findings

Following a programme of characterisation and environmental testing the key findings were as follows:

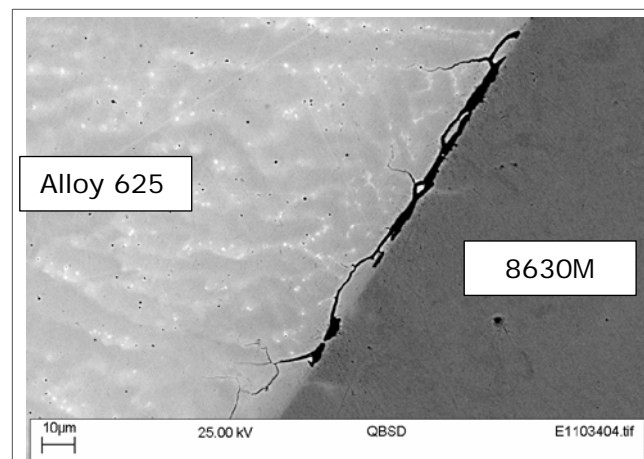
- The resistance to hydrogen cracking of dissimilar metals welds may be optimised by balancing competition between HAZ tempering and new phase formation.
- Optimal PWHT times were found to be below those which led to the precipitation of carbides within a narrow band adjacent to the fusion line.
- Cracks found in a retrieved dissimilar joint indicate subsurface initiation, secondary crack coalescence and progressive propagation.

#### How to benefit from this work:

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- If you are not an Industrial Member of TWI, find out how your company could benefit from Membership [www.twi-global.com/membership](http://www.twi-global.com/membership)
- Contact [michael.dodge@twi.co.uk](mailto:michael.dodge@twi.co.uk) to learn more



An etched cross-section showing a typical, commercially produced 8630M-Alloy 625 dissimilar joint



Scanning electron microscope image of cracking in a retrieved 8630M-Alloy 625 subsea joint.