

# ABOUT TWI

TWI is a world leading research and technology organisation. Bases in the UK, North America, South East Asia, China, Australia, Central Asia, India and the Middle East see 800 staff provide technical support in joining and technologies such as material science, structural integrity, NDT, surfacing, electronic packaging and cutting. Services include generic research, contract R&D, technical information, consultancy, standards drafting, training and qualification. TWI offers a single, impartial source of service for joining engineering materials.

TWI is internationally renowned for its multidisciplinary teams that implement established or advanced joining technology solving problems at any stage – from initial design, materials selection, production and quality assurance, through service performance and repair.

[www.twi-global.com](http://www.twi-global.com)



## MATERIALS IN AGGRESSIVE ENVIRONMENTS

### FIND OUT MORE ABOUT MATERIALS IN AGGRESSIVE ENVIRONMENTS

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- Failure investigation
- Forensic microanalysis
- Permeation testing
- Corrosion management
- Surface engineering

## Failure analysis and characterisation

TWI carries out hundreds of failure investigations every year, analysing components ranging in size up to full-scale pipeline sections. In order to conduct a failure analysis, we assemble a team of engineers tailored to the problem.

Our methodology involves:

- Interpretation of the failure location and service data, including on-site review
- Examination of the parts to determine the failure mechanism(s)
- Root cause analysis, including design, fabrication, transportation, installation and service
- Simulation of service conditions to establish critical parameters at which failure will occur
- Definition of safe conditions for remaining intact components
- Establishment of a non-destructive evaluation strategy for remaining components
- Remedial advice for the avoidance of further failures, including design and fabrication reviews for replacement components and mitigation strategies for existing components.



## Aggressive environment testing

Seven decades of experience and expansion has equipped us with considerable engineering capacity, enabling us to set the standard in failure investigation and materials testing in aggressive environments.

Many companies offer testing services, but we go far beyond simply carrying out tests. We work closely with our Members to interpret results and deliver genuine insight that can be easily translated to operational decisions, providing actionable remedial advice that directly impacts the bottom line.

If your business operates in environments in which very high or low temperatures or pressures are a factor, or involves working with hazardous substances, our dedicated environmental testing facilities can give you confidence in your components.

We test the performance of materials and joints in aggressive environments, measuring the effect of the conditions on a part's mechanical properties or flaw tolerance.



## Bespoke testing in extreme environments

Forming a significant part of our 6000m<sup>2</sup> of workshop and laboratory space, our high-pressure, high-temperature (HPHT) testing facility enables mechanical tests to be carried out on components in environments that replicate the service conditions of applications in sectors including oil and gas, aerospace and nuclear. Our materials scientists are constantly working on a diverse range of market-driven projects.



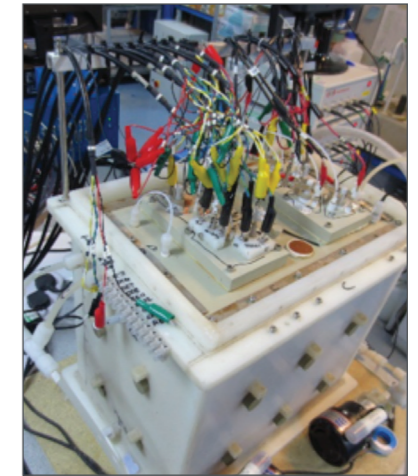
## Large, specialised testing rigs and pioneering work

TWI has constructed several bespoke testing facilities that mean we are uniquely placed to carry out highly specialised tests that can be precisely tailored to your requirements:

- Permeation testing facility designed especially to test polymers in a range of gas mixtures at temperatures up to 250°C and pressures up to 650 bar
- Full-scale sour testing rig built to overcome excessive conservatism in the oil and gas sector
- Enhanced HPHT testing facility comprising multiple test vessels that can accommodate the full spectrum of environmental test types at temperatures up to 300°C, at pressures up to 1400 bar

Some recent examples of our pioneering work include:

- Fatigue crack growth, tensile and fracture tests in environments with pressures up to 1000 bar, at temperatures between -50°C and +80°C
- New analytical methods for permeated water vapour, hydrogen and hydrogen sulphide
- Materials performance in 500bar supercritical carbon dioxide
- Hydrogen embrittlement of dissimilar joints in subsea applications
- Unique insights into the integrity of steel-to-nickel dissimilar joints
- Hydrogen-assisted cracking of high-strength nickel-based alloys
- Corrosion performance and weld metallurgy of duplex stainless steels
- Corrosion testing in oxygen and chlorine at up to 80°C
- Mitigation of corrosion using thermal spraying and cold spray coatings
- Performance of thermally sprayed aluminium at elevated temperature



## Research and consultancy projects

TWI is able to apply its knowledge to both Industrial Member and non-member requirements through various project structures:

- Collaborative research and technology transfer projects – generally undertaken in response to calls for proposals issued by public sector funding agencies.
- Core research programme – a three year rolling programme designed to meet the needs of TWI's Industrial Members funded from Membership income.
- Group sponsored projects – work programme of mutual interest to a number of organisations. Industrial Members gain access to results of substantial programmes at a lower cost and have the opportunity to steer research into areas of specific interest.
- Single client projects – R&D carried out for TWI Industrial Member companies in areas of specific interest and to develop customised solutions.

