

TWI Services to the New & Renewable Energy Industry



WORLD CENTRE
FOR MATERIALS
JOINING TECHNOLOGY

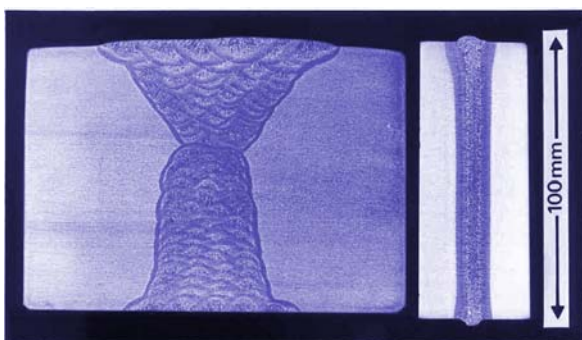
Our aim

TWI, with its innovative developments, can help companies by lowering fabrication costs, increasing production rates, enhancing durability and reducing maintenance. This is achieved through projects involving research and technology development, prototyping, demonstration and technology transfer services.



Offshore wind and marine

- Reduced Pressure Electron Beam Welding (RPEBW)
 - Non-vacuum process ideal for use on large structures
 - RPEBW halves production costs and increases production speed by 5 to 10 times
- Advanced narrow-gap arc welding techniques
- Structural integrity of offshore wind, wave and tidal stream installations using TWI's renowned expertise in integrity standards for the oil and gas industry
 - Structural monitoring
 - Corrosion control/protection
 - Risk-based maintenance and life cycle risk-cost optimisation
- TWI's NDT Centre offers innovative techniques for integrity management of blades, towers and sub-sea structures and foundations



- TWI's joint design skills and expertise in fatigue testing of large structures and associated modelling capability, provide strong support to solve design problems associated with the stress, fatigue and hub loading of ever larger blades

- TWI's Composites Centre offers expertise in:
 - Composite materials design, manufacture and performance
 - New composite blade designs and innovative composite-metal joining (COMELD™)





Hydrogen and fuel cells

Electron beam, advanced laser and hybrid laser and friction stir welding as well as TWI's new composite materials technologies can all be used in the production of:

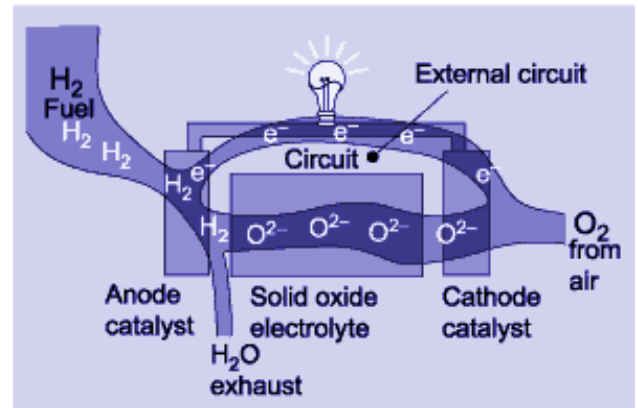
- cryogenic storage tanks
- pressurised containers for local power supplies
- lightweight hybrid composite high pressure cylinders for transport applications

TWI can cover all relevant fabrication, lining and coating techniques and has expertise in materials performance in hydrogen environments including high pressure hydrogen testing facilities.

Joining and coating technologies also impact on fuel cells manufacture. Whether glass-ceramic bonds in solid oxide fuel cells (SOFC) or reliable polymer joints in proton exchange membrane (PEM) fuel cells, TWI can help meet production targets. Such expertise has also been used in advanced battery technologies.

- low cost fabrication techniques can give an order of magnitude reduction in fuel cell costs

For direct fuel cells integrating reforming of natural gas, TWI has particular expertise using ceramic-based materials in ultra-high performance reformers.



Photovoltaics and solar

TWI's expertise in coating and sealing can help ensure the longevity and sustained performance of PV systems. And, while plastic substrates would be cheaper and lighter, they are too permeable and too soft. A TWI-developed hard coating, VITRESYN[®], offers a route to make such substrates commercially viable.



TWI has a number of innovative approaches such as friction stir welding, low stress low distortion welding techniques and fabrication using adhesives. TWI's coating technologies can be used to ensure the longevity of both internal and external elements of solar panels.



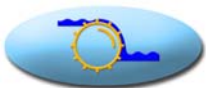
Carbon dioxide sequestration

TWI's metallurgical expertise in CO₂ transportation pipelines together with associated corrosion protection and inspection technologies are relevant to this area. The use of CO₂ for enhanced oil recovery using maturing oil and gas assets is a particular challenge which falls within TWI's experience.



Biomass and gasification

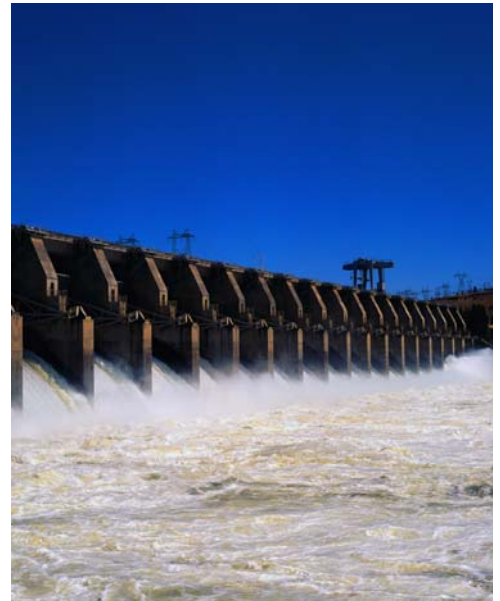
The increasing use of processes employing biomass combustion, waste incineration and coal gasification with corrosive by-products presents major materials engineering issues. TWI is working to demonstrate the suitability of HVOF-sprayed iron aluminide coatings to prevent corrosion and wear in combustion environments.



Hydropower

Component life studies and fitness-for-service assessments can be used to justify refurbishment rather than costly replacement to keep plant in service longer.

If repair or failure investigation is required, TWI's multi-disciplinary team can guide operators on how to return plant to service in the quickest possible time and advise on measures to mitigate against repeat failure.



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