"Mildly sour" environment project saves half million pounds

Results of a major TWI(UK) project are already helping the oil and gas industry to cut costs. One operator has saved about 1/2M by demonstrating fitness-for-purpose using current data.

This project, sponsored by a group of companies, evaluated safe hardness levels for welded C-Mn and low alloy steels exposed to "mildly sour" environments.

The work showed that hardness levels above 22 HRC equivalent can be tolerated in many environments up to at least ten times the NACE MR0175 limit of 0.05psi partial pressure H_2S, depending on other environmental variables, most important of these being pH.

The results are in general agreement with recent EFC guidelines, but there are important differences in specific hardness limits recommended.

For further information contact Richard Pargeter : TWI (UK)

Conductive adhesive for ultrasound catheter

Intravascular Research Ltd has been working with TWI's Centre for Adhesive Technology (CAT) to assess the use of electrically conductive adhesive to join two components of a catheter tip.

The tip is part of an ultrasound imaging device for quantitative and diagnostic analysis of coronary arteries.

Piezoelectric (PZT) transducer rings were bonded to tungsten carbide (WC) tubes using silver-loaded epoxy adhesives.

Adhesive dispensing and curing have been optimised to provide a void-free, 80mm conducting layer with required acoustic properties.

Catheter tips assembled using conducting adhesive have been taken through mechanical testing to clinical trials.

Further information is available from Medhi Tavakoli TWI (UK)

New Advances in ferrite measurement

The Ferrite Detector available from Cambridge Advanced Technologies Ltd has an extended range. The unit will now measure ferrite numbers in the range 0 to 90. This effectively covers the ferrite content of all austenitic and duplex stainless steels.

Ferrite Detector provides an immediate digital read out of the ferrite number when the handheld probe is positioned on the surface of the metal. The unit is calibrated using IIW standards and is issued with a calibrated certificate.

Further details are available from Simon Brown at Cambridge Advanced Technologies Ltd. on +44 (0) 1223 891270

Corrosion resistant steels

Bjorn Holmberg of Avesta Welding, Sweden, gave a talk on High molybdenum corrosion resistant stainless steels to a well attended joint meeting with the Leeds Metals and Materials Seciety, U.K.

There is an increasing demand for these higher alloyed materials and Bjorn started by discussing the properties of good pitting resistance - on a par with 625 and 276 alloys-excellent corrosion resistance, good intergranular corrosion resistance due to low carbon content, and high strength and good ductility with minimal risk of stress corrosion cracking. There is some decrease in machinability with added strength; test have shown high speed steel tools to give the best results. Discussing weldability he outlined a controlled heat input, the avoidance of Cu and Zn contamination and possible problems of molybdenum segregation, use of the lowest operating currents, and joint preparation to give minimum dilution.

Discussing processes, he noted that the TIG method is much in evidence, in the case of MIG, spray transfer mode is recommended, the 654 base having a greater tendency to overheat. MMA is quite straightforward, but submerged arc is not favoured because of problems with greater fusion and dilution.

Post-weld treatment includes brushing as a passivating method, the application of pickling paste, polishing, and high pressure water jets.

Typical applications for the alloy include the following areas : sea water environments, heat exchanger tube, paper pulp industry and gas cleaning systems. The 654 alloy is favoured when plate is used in heat exchanger work.

In conclusion, these base materials give excellent corrosion resistance and are ideally welded with over-alloyed nickel based fillers, avoiding too much fusion and dilution and with correct preparation of testpieces. They can be readily welded to 300 series bases and C-Mn steels but duplex may present a greater challenge.

Reporter : Bob Sheldon
TWI - Connect, U.K.