INFORMATION

LEADING EDGE TECHNOLOGY

Lasers

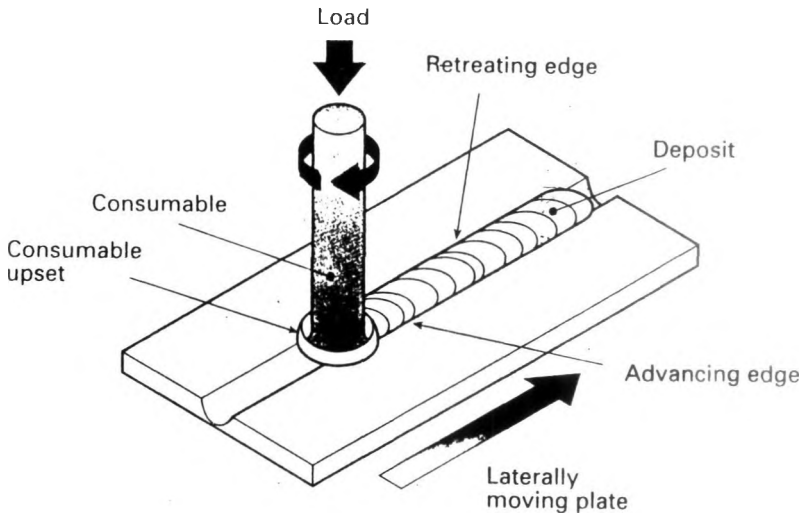
EFFICIENCY IN PRODUCTION

TWI has been investigating the potential of high power CO_2 lasers for production of automotive parts using new and coated materials. Lasers are ideal for mass production of consumer goods.

Laser welding is faster than tradional welding processes. It gives good mechanical weld properties for many sheet steel materials, with lower distortion rates. Manufacturers are now introducing coated steels to improve corrosion resistance, and higher tensile strength steels to reduce weight/improve performance.

Using commercially-standard laser equipment-CO_2 lasers up to 5kW and Nd:YAG lasers up to 1kW-a range of materials was joined using different procedures.

Results show that use of lasers in production is advantageous. The process saves manufacturing time, money and scrap, and yields cost savings both up and down stream.



FRICTION SEAM WELDING

Technique shows potential for joining austenitic stainless steel and other difficult-to-weld materials.

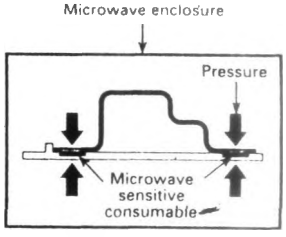
The development of friction seam welding is proving advantageous for butt joining difficult-to-weld sheet materials.

Like other friction welding techniques, it joins workpieces in the solid phase without reaching the melting point of the materials. Heat is generated by friction between the workpieces and a rotating consumable bar, which is axially pressed into a concave prepared butt joint. A deposit is laid into the usually a U-shaped groove while moving the workpieces underneath the rotating consumable. A recent feasibility study on austenitic stainless steel was sponsored by BNFL (British Nuclear Fuels plc). There is a potential for joining materials which cannot be welded with conventional arc welding trechniques. Possible applications are joining boronated steel, as its chemical composition could be retained, or welding dissimilar materials.

Plastics

JOINTS TAKE 10 SECONDS IN THE MICROWAVE

TWI has developed a high productivity plastics joining process for welding large or complex assemblies in one operation. The new process uses microwave energy and a microwave-sensitive consumable. Multiple joints can be welded simultaneously in around 10 seconds.



Inspection

Studies into fracture mechanics of plant suffering corrosion in service and the success of non-destructive testing for detection of sigficant areas are key elements in a new project on reliability assessment of containers of hazardous materials (RACH). It aims to enable operators of process plant to maintain both safety standards and cost-effective inspection regimes.

As operating pressure plant age, corrosion of components is increasingly likely. The recent Pressure Systems Regulaions issued by the UK Health and Safety Executive acknowledge this and require that operators are aware of the condition of their plant. As mechanisms such as corrosion progress, the possibility of corrosion cracks emanating from corroded areas increases owing to stress concentration efforts. This raises the poossibility of earlier failure than predicted by either corrosion of faitgue alone. These factors increase the risk of dangerous leaks or breaks in the pressure envelope.

The project will examine the fracture mechanics of this type of occurance, the effectiveness of non-desturctive testing for detecting and measuring it, and the use of inspection scheduling tools based on the NDT results and fracture mechanics.

This work is being carried out by Bureau Veritas, Technical Software Consultants, University College London and TWI. with financial support from the CEC. Thermie programme. If you are interested in participation please call Peter Mudge at TWI or Raymond Kare at TSC on +44(0) 1980 220255.