CAMPUS COMMUNIQUÉ

A monthly news letter of National Institute of Technology Tiruchirappalli

Volume: 2 March 2007 Issue:3

From the Director's Desk

Dear Students, Faculty and Support Staff

I take this opportunity to emphasize the need of research components in academics. I appreciate that many proposals are sent to sponsoring agencies and encourage not deterring in this until you are able to get through one or two sponsored research projects. MS and Ph d research components have to be still more improved and culminate in more quality research papers. Interdepartmental research is most welcome. The Department of Chemistry and Department of Physics has initiated a MOU for collaborative research with National Institute for material science, Tsukuba, Japan. The Bharathidasan University has expressed interest in academic and research collaboration. It is been explored. The research scholars sponsored with institute scholarship and TEQIP scholarship are specially advised to evolve new methods and techniques to prove worthy of their research.

- *PROF M CHIDAMBARAM*

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TEQIP ACTIVITIES

- Mr.S.Jerome, Lecturer/MME had training on **Computational Modeling of Fusion Welding** 23rd to 25th February 2007 in IIT Bombay, Powai, Mumbai-400 076
- Prof.S.Raman Sankaranarayanan, Asst. Professor/MME had training on **Thermodynamic Modeling and Kinetic Calculation** 5th to 8th February 2007 in NFTDC, Hyderabad
- Department of Metallurgy **Conducted Theory and Demo of Scanning Electron Microscope"** for the pre final year metallurgy students of GCE Salem, on 14th & 15th February 2007
- Dr R Karvembu had undertaken research project along with NIT suratkal on the title"**Green Conversion of alcohols to carbonyl compounds in ionic liquids using nickel catalysts containing PPh3 and N-(2-pyridyl)-N-(Salicylidene) hydrazine ligands"**
- Dr. S. Velmathi, Lecturer, Department of Chemistry visited NIT, Surathkal on 16th & 17th February 2007

TEQIP Programmes under community services

- Workshop on Finite Element Methods for Engineers on 1st & 2nd February 2007 was organized by Civil Engineering
- Workshop on What Every Engineer should know about Telecommunication and Networking" for Engineers and Teachers on 3rd February 2007 by ECE
- Workshop on "Nanomaterials and its Applications" organized by Chemistry Department from 4th to 6th February 2007
- Emerging trends in Corrosion Control and Surface Engineering" for the engineering college faculty and practicing engineers on 9th & 10th February 2007 by Department of Metallurgy
- Workshop on "Fuzzy Systems" for teachers of engineering colleges on 24th & 25th February 2007 by Department of EEE
- Workshop on Testing of Construction Materials" on 26th & 27th February 2007 organized by Department of Civil Engineering

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Magnetically impelled arc butt (MIAB) welding – A Report

S.Arungalai vendan

BHEL-NITT Research scholar

Magnetically impelled arc butt (MIAB) welding is a one shot, forge welding process which is predominantly used in the European automotive industry for rapidly joining circular and non-circular thin wall (<5mm) steel tubes. This machine tool based process is attractive to the mass production industries because of the short cycle times and reproducible quality.

The first stage of a MIAB weld is to force the two tubulars together whilst applying a DC welding current. They are then moved apart to a distance of 1-3mm in order to strike an arc. This arc is rotated at high speed around the circumference of the weld interface using a static radial magnetic field which can be generated using permanent magnets or electromagnets. Arc rotation is sustained for a few seconds until the joint faces are heated to a high temperature or are molten, as shown in *Fig.1*.

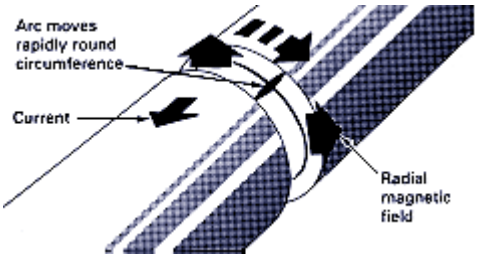

Fig.1. MIAB welding - heating

In the second stage of the process the tubulars are brought rapidly together under a pre-determined forging pressure and the arc is extinguished. The molten metal at the weld interface is expelled and a solid phase weld results from sustained forging pressure, which consolidates the joint as shown in *Fig.2*. Typically weld cycle times range from 1-6 seconds depending on tube diameter.

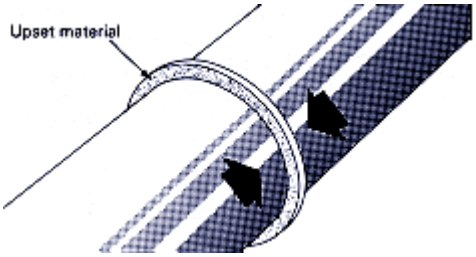

Fig.2. MIAB welding - forging

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Current status

The original MIAB patents and publications date from the 1940s but significant industrial exploitation of the technique did not start until the 1970s. Commercial application has been focused on joining mild steel and cast iron components in the automotive industry. Safety critical components are manufactured with short weld cycle times and high productivity such as:

- Drive shafts
- Propeller shafts
- Beam axles
- Axle casings
- Shock absorbers
- Gas filled struts

Other applications such as joining refrigerator condenser tubing and small diameter gas distribution pipes have also been reported.

Important current issues

To date there are no reported production applications of MIAB welding for non-ferrous materials. However, the automotive, electrical, aerospace and oil/gas industries have expressed interest in exploring the capabilities of MIAB welding in manufacture of aluminium space frames, titanium tubular structures and stainless steel tubes. This interest is driven by the desire to reduce fabrication costs but also the assurance that reproducible, one shot weld quality will result.

Gas shielding is not used in industrial applications of MIAB welding but development programmes have shown that it is necessary for successfully joining non-ferrous materials and stainless steel. Additionally, non-ferrous materials are difficult to weld in the horizontal position because of flow of molten material to the lower point on the circumference of a tube, which can extinguish the arc. Therefore, continued development with these materials must be undertaken before commercial exploitation can be considered.

Benefits

The advantages of using MIAB welding are:

- Autogenous - no filler material required
- No rotation of either component
- Low material loss
- Low power consumption
- Low fume emission
- Low distortion
- Ease of automation