

*Pre-Conference Tutorial
on*

**WELDING METALLURGY, TECHNOLOGY AND
QUALITY ASSURANCE
(WELDPCT-2006)**

[for Welding Technologists, Welding Engineers and
Quality Assurance Engineers]

November 21-23, 2006

at

Hotel Radha Park Inn

171 Jawaharlal Nehru Salai CHENNAI, 600106

Tel: 044-24757788



Organised by

**TECHNICAL COMMITTEE
&
CHENNAI BRANCH**

of the

INDIAN INSTITUTE OF WELDING
3A, Dr. UN Brahmachari Street, Kolkata 700 017

In conjunction with the *National Welding Seminar 2006* and the *WELD INDIA 2006 Technical Exhibition* being held at Chennai Trade Centre, Nandambakkam during November 24-26, 2006, The Indian Institute of Welding is conducting a Pre-Conference Tutorial for engineers, Today's requirements of quality and competitiveness demand the very best use of materials, procedures and technology for effecting continual improvements in cost. This course is intended for welding technologists, welding engineers and quality assurance engineers as an update in the latest technological developments in welding. Welding professionals intending to attend this course should have a minimum of two to three years experience in the industry with knowledge of welding fundamentals.

- are you using the most appropriate materials to be fabricated into components?
- are your QA personnel aware of the latest inspection methods?
- are your procedures and technologies the most competitive?
- what are the permitted ways to correct misalignment in pressure vessel fabrication ? how much misalignment can be tolerated ?
- which is the best way to inspect a sophisticated reactor vessel ?
- how do you identify leaks in fabricating your vacuum system ?
- how do you select the right consumable to weld ferrous and non-ferrous alloys ?

The Indian Institute of Welding is a professional body devoted to the promotion and advancement of welding science and technology in India. Established in 1966, with its registered office at Kolkata, it has eleven branches located at Bangalore, Baroda, Bhilai, Chennai, Cochin, Delhi, Jamshedpur, Kolkata, Mumbai, Tiruchirapalli and Vishakapatnam. IIW has over 4000 welding professionals

and more than 300 industries as members. The objectives of IIW include dissemination of knowledge and the latest developments in the field of welding and allied technologies through seminars, workshops, training programmes etc.; provide technical guidance and consultation to industries in welding; conduct associate membership examination and award diploma and certificates to members, and publish technical journals and periodicals in the field of welding. *The Indian Institute of Welding will soon be accorded the status of an Authorised National Body (ANB) for training and certification of welding professionals by the International Institute of Welding.*

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- **Find out how to weld problem materials**
 - **Learn the latest in advanced NDT techniques**
 - **Get the edge on tackling quality problems on the shop floor**
 - **Qualify your personnel with advanced knowledge and skills**
 - **Develop consultancy contacts for long term benefit**
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The course covers the fundamentals of welding technology and welding metallurgy of steels, stainless steels and non-ferrous alloys. It gives an insight into the quality assurance during welding of coded vessels and equipment and evaluation of welds by various destructive and NDT techniques, quality control in production welding of different materials like carbon steel, stainless steels, low alloy ferritic steels, Ni-base alloys, Al alloys, Ti and its alloys.

The technical programme consists of a series of 15-20 lectures by eminent experts from leading research and educational institutions in India. The schedule of the course is so designed that there will be ample opportunity for the participants to discuss and interact with the faculty members and other participants. The participants are also encouraged to

present case studies of welding problems encountered by them during discussion sessions. Participants will also benefit by attending the **International Welding Exhibition WELD INDIA 2006** and **National Welding Seminar (NWS 2006)**. The latest in the field of welding ranging from equipments and consumables to welding robots and allied fields such as non-destructive evaluation and other testing equipments will be on display. WELD INDIA 2006 is expected to attract a large international participation.

COURSE FEE

Event	IIW Member	Non-Member
WELDPCT-06	Rs.5000/-	Rs.5500/-
WELDPCT + NWS 2006	Rs.7500/-	Rs.8500/-

(This includes lecture notes, course kit, coffee/tea, lunches etc.). The course fee should be remitted in advance in favour of "IIW CHENNAI NWS 2006" payable at Chennai.

DEADLINE FOR REGISTRATION

The last date for registration is **October 30, 2006**. Requests for registration should be accompanied by the course fee, for registrations to be confirmed.

All correspondence with regard to the course should be addressed to:

Dr. SHAJU.K. ALBERT
 Director, WELDPCT-2006
 Materials Joining Section
 Materials Technology Division
 Indira Gandhi Centre for Atomic Research
 Kalpakkam 603 102, TAMILNADU

email: shaju@igcar.gov.in
 Tel: 044-27480118 FAX: 27480075

SYLLABUS

I. BASIC CONCEPTS

Welding arc characteristics - physical properties, temperature distribution, effect of shielding gas and magnetic fields, different modes of metal transfer, effect of polarity, arc efficiency, heat input and interaction of welding arc with metals, fluxes and shielding gases.

II. WELD METAL AND HEAT AFFECTED ZONE

Weld metal - temperature profiles, fundamentals of solidification and grain structure, elemental segregation, weld puddle convection and fluid flow. Modelling.

Heat affected zone - various regions in heat affected zone, temperature distribution, cooling rates and dependence on heat input, effect of preheat, plate thickness and joint geometry. Modelling.

III WELDING METALLURGY

Ferrous materials - TTT and CCT diagrams and concepts of hardenability and carbon equivalent. Welding of cast irons, mild steels, C-Mn steels, microalloyed steels, TMCP steels and low alloy steels. Hot cracking, hydrogen-assisted cracking, reheat cracking, lamellar tearing and methods of prevention. Weldability of austenitic, martensitic, ferritic, PH and duplex stainless relief cracking and remedial measures, high temperature stability, sigma formation and sensitisation.

Non-ferrous materials - welding of Al and Al-alloys, Ti and Ti-alloys, Cu-base and Ni-base alloys. Selection of welding process and technique, shielding gas, consumables and heat treatments.

Dissimilar welding - basic considerations, welding process and consumable selection, preheating and post weld heat treatment and code requirements.

Surfacing and cladding

IV WELDING TECHNOLOGY

Welding processes - arc welding, resistance welding, flash welding, solid state welding and high energy density welding. Power sources and automation.

Welding consumables - consumable types, nomenclature, selection of consumables for welding similar and dissimilar materials, and various applicable standards.

Joint design - terminology, types of joints, design approach, and design formulae.

V. QUALITY ASSURANCE - TESTING, EVALUATION, QUALIFICATION AND INSPECTION

Discontinuities - types, identification, classification, location, causes, significance, acceptance limits and remedies.

Destructive testing and evaluation - mechanical properties - testing methods and acceptance criteria for bend, tensile, impact, hardness (micro and macro), creep, fatigue (LCF and HCF). corrosion properties - general, galvanic, sensitisation, SCC, pitting and crevice corrosion.

Nondestructive testing and evaluation - testing and evaluation by visual, dye penetrant, magnetic particle, radiography, eddy current and ultrasonic testing, leak testing. Field related experiences on NDT of welds. Life management of welded structures.

Qualification and inspection - concept of QA related to welded structures, welding consumable, procedure and welder performance qualification. Validity norms, essential variables. Quality control in production welding of carbon steels, stainless steels, low alloy ferritic steels, Ni alloys, Al alloys and Ti and its alloys. Quality control during PWHT of welds and NDT after PWHT. QC in hydrostatic testing or load testing of welded structures, leak testing of welds and documentation.



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REGISTRATION FORM

1. Name of Participant : _____
2. Age : _____
3. Affiliation : _____
4. Designation : _____
5. Address for correspondence: _____

6. Telephone : _____
7. Fax/Telex : _____
8. Email : _____
8. Registration fee enclosed : Yes / No

DD/Chq. No. _____ Date: _____ Drawn
on: _____
(Bank & Branch)

Signature

Please return before October 30, 2006 to:

Dr. Shaju K. Albert
Director, WELDPCT-2006
Materials Joining Section, MTD/IGCAR
Kalpakkam 603 102
TAMILNADU

email: shaju@igcar.gov.in
Tel: 044-27480118 FAX: 27480075



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