WELDING INSTITUTE OF MALAYSIA

Welding Institute of Malaysia

WIM is a non-profit membership organisation with a mission to provide a wide range of technical, networking and support services in the field of welding, joining and allied technologies.

Newsletter

Issue 10 August 2009

Welding Engineer development programme for technical staff of MMHE, Pasir Gudang, Johor

WIM recently began conducting the International Institute of Welding (IIW)/European Welding Federation (EWF) Diploma programme for technical staff of MMHE.

This programme consist of three levels; the first is the Diploma in Welding, followed by the Diploma in Welding Technology and culminating in the Diploma in Welding Engineering.

For the first level, the modules covered are welding process and equipment, materials

and their behaviour, design and construction, fabrication and application and practical welding technology. The other two levels cover consecutively more advanced versions of the above modules except practical welding. Altogether the three levels will be conducted over a period of about four months.

The trainers, both local and UK-based, are experts on each specific module. They are En Mohd Faisal Yusof, Mr Ian Partridge, Mr Mario Cordero-Cabrera and Mr Ray Fyfe.

Upon completion of these programmes, MMHE's technical staff will greatly enhance their knowledge, both theoretical and practical, in welding technology and applications. This training is part of MMHE's welding engineer development programme aimed at continuously upgrading its technical staff's skills to meet the stringent demand of its customers.

New appointment

WIM wishes to announce the appointment of Mr Desmond Yeap as Executive Director of the Welding Institute of Malaysia with effect from 15 May 2009.

Desmond Yeap graduated with a BSc (Hons) in Chemical Engineering from the University of Birmingham, UK and an MBA from Columbia University, New York , USA.

He has held senior management positions in several local and multinational companies for more than 20 years with functional responsibilities including strategic planning, business development, marketing, human resource and general management. During his tenure with a major industrial gas company, he was responsible for the overall performance of welding consumables, welding and cutting machines/ equipment and industrial gases.

Construction

Greener Empire State Building could be model for retrofits

Wein & Malkin, owners of the Empire State Building (ESB), are renovating the building and cutting overall energy use by 38% and energy costs by US$4.4 million (compared to $11.4 million). Skanska, which occupies part of the ESB, is reporting a 46% reduced energy bill compared to the smaller office it used to rent elsewhere. The retrofit means that 90% of the office has daylight and 99% of employees have outside views. There is a raised-floor air system allowing individuals to control their workstation temperature. Energy-saving measures include automatic light dimmers, waterless urinals, low-flush toilets and hand-sensor controlled taps. 6,500 windows are being replaced with insulated, double-glazed units; tenants will be required to monitor their energy use. Johnson Controls Inc. is carrying out the engineering for the project.

ENR - Engineering News Record, vol.262, no.19. 15 June 2009. p.15.

Equipment, Consumables and Materials

Worldwide demand for welding consumables

A diagram is presented showing estimated consumption of welding consumables in 2008 for countries around the world. Data distinguish between solid wire for gas shielded welding, flux cored wire, covered electrodes, and wire and flux for submerged arc welding.

Hitsaustekniikka, no.3. 2009. p.2.

Lincoln Electric dedicates new welding consumables facility in India

A 100,000 square foot welding consumables facility in Chennai, India has been opened to serve the Asia Pacific region market. Solid filler wire will be manufactured on site; offices are provided for the Lincoln Electric Indian headquarters and there are training and welding demonstration facilities.

Welding Journal, vol.88, no.7. July 2009. p.10.

New shielding gases for laser welding

Two new Lasgon H mixed shielding gases have been launched by Linde North America. The gas mixtures combine helium, hydrogen and argon for laser welding of stainless steels using carbon dioxide and solid state lasers; they can also be used with disc, diode and fibre lasers. Using gas mixtures lowers operating costs and increases welding speed and product quality.

Practical Metallography, vol. XLVI, no.5. 2009. p.264.

Increase welding productivity

Reports on the Kemppi Arc System, welding data analysis software that increases welding productivity by using precise data analysis in the same way as F1 teams get their cars to run faster and more reliably. All the company's MIG/MAG, TIG and MMA welding machines are digitally controlled and internal signals within each machine can be monitored using a dedicated data collection device attached to the machine.

Industrial Technology, Apr.2009. p.16.

Events Calendar

7th PETROMIN Deepwater Technology Asia 2009
Date: 26-27 October 2009
Venue: Hotel Istana, Kuala Lumpur, Malaysia
Theme: Regional Centre for Deepwater Development - an update
Tel: (65) 6222 3422 E-mail: siva@safan.com or zaman@safan.com

ASCOPE 2009—International Oil & Gas Event
18-20 Nov 2009 , Bangkok, Thailand
Venue: IMPACT Exhibition & Conference Center
Organiser: Bangkok Exhibition Services Ltd
Tel: +66 (0) 2615 1255 Fax: +66 (0) 2615 2993
Email: ascope@besallworld.com
Website: www.besall.com

2nd NACE East Asia & Pacific Regional Conference & Exhibition 2009
23–25 November 2009
Venue: Prince Hotel, Kuala Lumpur, Malaysia
Contact : zaman@safan.com siva@safan.cm nacemalaysia@gmail.com

WIM welcomes new Members

Fellow - FWIM
Dr Shahrum Abdullah

Member - MWIM
Abd Rahim Md Said
Koh Wah Fatt
Sadacharamani a/l Govindasamy
Mohd Khir b Abdul Samad

Associate Member – AMWIM
Prabakaran a/l Vallyutham
Rosnani bt Rasadi

Affiliate Member – AWIM
Muhamad Khairul Azam Hassim
Ahmad Safuan b A Hali
Mohd Hafiz b Rahamat
Mohd Taisir b Mohamad
Ahmad Sayuti b Hj Che Azis
Hayrul Nizam b Dahalan
Hafiuzl b Eidan
Wiralela b Mohd
Zakarno b Ismail
Mohd Jhazuly Hisham b Hashim
Kamarul Fauzal b Kamaruddin
Mohd Arif b Hj Abdullah
Azrul Hisam b Abdul Aziz
Isnazir bin Ismail
Mohd Hafiz b Abd Latif
Nasir b Salleh
Wan Mohd Fadzlee b Wan Mustaf
Zoolkarnain bin Paiman
Mohd Faudzan b Zinal
AMica bin Mapparasa
Ishak b Melan
Mohd Faiza bin Zakaria
Darmawan b Ariffin
Hairul Anuar b Hashim
Shahrulzaidi b Abu Shah
Mohd Syukri b Ismail
Mohd Aziyan b Abd Malek
Nor Akram b Abd Karim
Shamsudin b Hamzah
Samian b Kadiron
Ahmad Bakri b Abu Bakar
Md Rawi b Mat Isa
Mohd Fairuz bin Talib
Mohd Sabri b Abu Bakar
Muhamad Fazli bin Harun
Rohaizan b Mohamed Samsi
Mohd Rasli b Che Sulaiman
Mohd Nizam b Mahamood
Ong Teng Siang
Norazli bin Sukari

Student Member - StudWIM

Ahmad Asyraf Mohd Roslan
Mohd Faizal bin Marta @ Mustafha
Wan Aswari bin Wan Abdullah
Abdul Hakim b Osman
Tg Mohamad Zulkifli Iskandar Jumat
Zulkifli b Sabu
Muhamad Azmil bin Ali
Mohd Amin bin Rosli
Wan Mohd Alif b Wan Kamarudin
Mohd Azhar b Ismail
Mohamad Ibrahim bin Tengah
Abdul Hakim b Ali
Nur Syazwani bt Johari
Khairul Shahri b Abdul Rokib

IIW/EWF Welding Diploma Courses

WIM invites all technical personnel who wish to enhance their knowledge and skills in welding and related technologies to register now for the International Institute of Welding (IIW)/European Welding Federation (EWF) Diploma in Welding courses.

This is the opportunity for you to embark on a successful technical professional career!

Kindly contact Noor Azidah at 03-6157 3526/27/28 Ext 129 or email inquiry@wim.org.my to register.

Weldability of materials - stainless steel

job knowledge

Stainless steels are chosen because of their enhanced corrosion resistance, high temperature oxidation resistance or their strength. The various types of stainless steel are identified and guidance given on welding processes and techniques which can be employed in fabricating stainless steel components without impairing the corrosion, oxidation and mechanical properties of the material or introducing defects into the weld.

Material types

The unique properties of the stainless steels are derived from the addition of alloying elements, principally chromium and nickel, to steel. Typically, more than 10% chromium is required to produce a stainless iron. The four grades of stainless steel have been classified according to their material properties and welding requirements:

- Austenitic
- Ferritic
- Martensitic
- Austenitic-ferritic (duplex)

The alloy groups are designated largely according to their microstructure. The first three consist of a single phase but the fourth group contains both ferrite and austenite in the microstructure.

As nickel (plus carbon, manganese and nitrogen) promotes austenite and chromium (plus silicon, molybdenum and niobium) encourages ferrite formation, the structure of welds in commercially available stainless steels can be largely predicted on the basis of their chemical composition. The predicted weld metal structure is shown in the Schaeffler diagram in which austenite and ferrite promoting elements are plotted in terms of the nickel and chromium equivalents.

Because of the different microstructures, the alloy groups have both different welding characteristics and susceptibility to defects.

Austenitic stainless steel

Austenitic stainless steels typically have a composition within the range 16-26% chromium (Cr) and 8-22% nickel (Ni).

A commonly used alloy for welded fabrications is Type 304 which contains approximately 18%Cr and 10%Ni. These alloys can be readily welded using any of the arc welding processes (TIG, MIG, MMA and SA). As they are non-hardenable on cooling, they exhibit good toughness and there is no need for pre- or post-weld heat treatment.

Avoiding weld imperfections

Although austenitic stainless steel is readily welded, weld metal and HAZ cracking can occur. Weld metal solidification cracking is more likely in fully austenitic structures which are more crack sensitive than those containing a small amount of ferrite. The beneficial effect of ferrite has been attributed largely to its capacity to dissolve harmful impurities which would otherwise form low melting point segregates and interdendritic cracks.

As the presence of 5-10% ferrite in the microstructure is extremely beneficial, the choice of filler material composition is crucial in suppressing the risk of cracking. An indication of the ferrite-austenite balance for different compositions is provided by the Schaeffler diagram. For example, when welding Type 304 stainless steel, a Type 308 filler material which has a slightly different alloy content, is used.

Ferritic stainless steel

Ferritic stainless steels have a Cr content typically within the range 11-28%. Commonly used alloys include the 430 grade, having 16-18% Cr and 407 grade having 10-12% Cr. As these alloys can be considered to be predominantly single phase and non-hardenable, they can be readily fusion welded.

However, a coarse grained HAZ will have poor toughness.

Avoiding weld imperfections

The main problem when welding this type of stainless steel is poor HAZ toughness. Excessive grain coarsening can lead to cracking in highly restrained joints and thick section material. When welding thin section material, (less than 6mm) no special precautions are necessary.

In thicker material, it is necessary to employ a low heat input to minimise the width of the grain coarsened zone and an austenitic filler to produce a tougher weld metal. Although preheating will not reduce the grain size, it will reduce the HAZ cooling rate, maintain the weld metal above the ductile-brittle transition temperature and may reduce residual stresses. Preheat temperature should be within the range 50-250 deg.C depending on material composition.

Martensitic stainless steel

The most common martensitic alloys e.g. type 410, have a moderate chromium content, 12-18% Cr, with low Ni but more importantly have a relatively high carbon content. The principal difference compared with welding the austenitic and ferritic grades of stainless steel is the potentially hard HAZ martensitic structure and the matching composition weld metal. The material can be successfully welded providing precautions are taken to avoid cracking in the HAZ, especially in thick section components and highly restrained joints.

Avoiding weld imperfections

High hardness in the HAZ makes this type of stainless steel very prone to hydrogen cracking. The risk of cracking generally increases with the carbon content. Precautions which must be taken to minimise the risk, include:

- using low hydrogen process (TIG or MIG) and ensure the flux or flux coated consumable are dried (MMA and SAW) according to the manufacturer's instructions
- preheating to around 200 to 300 deg.C. Actual temperature will depend on welding procedure, chemical composition (especially Cr and C content), section thickness and the amount of hydrogen entering the weld metal
- maintaining the recommended minimum interpass temperature
- carrying out post-weld heat treatment, e.g. at 650-750 deg.C. The time and temperature will be determined by chemical composition

Thin section, low carbon material, typically less than 3mm, can often be welded without preheat, providing that a low hydrogen process is used, the joints have low restraint and attention is paid to cleaning the joint area. Thicker section and higher carbon (> 0.1%) material will probably need preheat and post-weld heat treatment. The post-weld heat treatment should be carried out immediately after welding not only to temper (toughen) the structure but also to enable the hydrogen to diffuse away from the weld metal and HAZ.

Duplex stainless steels

Duplex stainless steels have a two phase structure of almost equal proportions of austenite and ferrite. The composition of the most common duplex steels lies within the range 22-26% Cr, 4-7% Ni and 0-3% Mo normally with a small amount of nitrogen (0.1-0.3%) to stabilise the austenite. Modern duplex steels are readily weldable but the procedure, especially maintaining the heat input range, must be strictly followed to obtain the correct weld metal structure.

Avoiding weld imperfections

Although most welding processes can be used, low heat input welding procedures are usually avoided. Preheat is not normally required and the maximum interpass temperature must be controlled. Choice of filler is important as it is designed to produce a weld metal structure with a ferrite-austenite balance to match the parent metal. To compensate for nitrogen loss, the filler may be overalloyed with nitrogen or the shielding gas itself may contain a small amount of nitrogen.

IEM/ILSAS/WIM collaboration programme for 2009

WIM, in collaboration with The Institution of Engineers Malaysia (IEM) and Institut Latihan Sultan Ahmad Shah (ILSAS), a training institute of Tenaga Nasional Bhd, is organising six two-day courses on welding and related technology this year. These courses are approved by the Board of Engineers Malaysia (BEM) and are accepted in the mandatory Continuing Professional Development (CPD) programme for professional engineers.

Two courses have been conducted; the first was 'Welding Process and Equipment' on 8-9 June 2009 by En Mohamad Darus Taib, followed by 'Fabrication Practices and Quality Assurance in Engineering' by En Mohd Faisal Yusof on 13-14 July 2009.

The remaining four courses will be 'Design Considerations in Static Applications', 'Advanced Non Destructive Testing (NDT) in Engineering Applications', 'Risk Based Inspection (RBI)' and 'Fitness for Service (FFS)'.

At the end of each course, participants are presented with Certificates of Attendance. En Faisal presenting certificate to Pn Rosnani Rasadi. Looking on is En. Hafiz of ILSAS

New Courses

WIM will soon conduct the following **new** courses to meet the demand for a basic knowledge of welding and related technologies amongst personnel who are not directly involved in these activities but would like to have some knowledge and understanding which could assist them in decision-making or exercising judgement.

Safety in Welding and Cutting Processes
This course is designed to create better awareness of safety regulations and practices, general hazards and health/safety aspects in welding and cutting processes.

Appreciation of Welding and Cutting Processes
This course is aimed at creating better knowledge and understanding of basic welding and cutting processes including the usage of welding equipment and consumables.

Appreciation of Non Destructive Testing (NDT)
This course is to assist those in industries which carry out welding to have basic knowledge of NDT methods including magnetic particle, penetrant, ultrasonic and radiographic testing.

Quality Assurance in Welding and Cutting Processes
This course will help understand the need to have quality welds in all welding and cutting processes and the welding-related standards being developed to meet industry demand.

More details on these courses will be announced soon!

A two day course on welding technology for staff of Malaysia Marine And Heavy Engineering (MMHE) , Pasir Gudang, Johor

A two day course on Welding Technology was specially tailored and conducted for MMHE's staff who are not directly involved in welding operations.

The objective of the course was to give these staff basic knowledge and understanding of welding terminologies and applications. Amongst the topics covered were welding processes, welding consumables, weld defects, welding procedures, mechanical testing and various methods of weld inspections.

MMHE expects the staff trained to gain a basic understanding of welding processes and appreciation of the importance and necessity to have quality welds in all their products.

Five sessions of this course have been scheduled for this year. The first two sessions were successfully conducted on 22-23 June 2009 by En Mohamad Darus Taib and on 6-7 July 2009 by En Sulaiman Abas respectively.

Benefits of WIM Membership

- Technical information and guidance on welding, joining, inspection and allied technologies through the quarterly WIM newsletter, a dedicated WIM website and other media
- Guidance and advice on how to plan, record and receive recognition for professional and career development
- Professional status - a recognized mark of attainment for engineers, technicians and others involved in welding, joining and related activities
- A Certificate of Membership confirming status
- Free Technical Seminars and access to 'JoinIT' through the TWI website
- Special discounts for conferences, seminars and training courses
- Dissemination of best practice management of welding and associated joining processes through membership meetings and discussion
- Networking with companies and individuals in the field of welding, joining, inspection and many other technologies
- For Corporate Members – allocation of free advertising on the WIM website
- Receive TWI's bi-monthly magazine called *Connect*
- Access to the 'Members Only' part of the website of TWI's Professional Division
- WIM Members applying for Professional Membership of The Welding Institute (TWI) United Kingdom will be exempted from the TWI entrance fee, worth about £100 (100 British Pounds Sterling)
- Opportunity to purchase the TWI Journal *Welding and Cutting* at a minimal fee.

Categories of WIM Membership

Individual Member

Fellow of Welding Institute (Malaysia) Bhd (FWIM)

- 15 years experience in welding, joining, or related technologies, including three years in a management role

or

- In possession of a qualification/certification in welding, joining or related technology plus 10 years experience, including three years in a management role

or

- Fellow (FWeldI) of The Welding Institute (United Kingdom)

Entrance fee: RM20.00 Annual fee: RM250.00

Member of Welding Institute (Malaysia) Bhd (MWIM)

- 10 years experience in welding, joining or related technologies

or

- In possession of a qualification/certification in welding, joining or related technology with five years experience

or

- Senior Member (SenMWeldI), Member (MWeldI) or Incorporated Member (IncMWeldI) of The Welding Institute (United Kingdom)

Entrance fee: RM20.00 Annual fee: RM200.00

Associate Member of Welding Institute (Malaysia) Bhd (AMWIM)

- Five years experience in welding, joining or related technologies

or

- In possession of a qualification/certification in welding, joining or related technology plus two years experience

or

- Technician Member(TechWeldI) of The Welding Institute (United Kingdom)

- Entrance fee: RM20.00 Annual fee: RM150.00

Affiliate Member of Welding Institute (Malaysia) Bhd (AWIM)

- No qualification requirements other than an interest in welding, joining and allied technologies, industry and services.

Entrance fee:RM20.00 Annual fee: RM100.00

Student Member of Welding Institute (Malaysia) Bhd (StudWIM)

- Open to persons undergoing full or part time education in welding, joining or related technologies subject to a limit of five years membership.

Entrance fee: RM20.00 Annual fee: RM50.00

Corporate Member

- Open to all corporations, organizations and partnerships involved in welding, joining and allied technologies.

Entrance fee: RM550.00 Annual fee: RM550.00

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No 8, Jalan TSB 10
Sg. Buloh Industrial Park
47000 SUNGAI BULOH
SELANGOR
Tel : 03-6157 0542
Fax : 03-6157 2378
Email : inquiry@wim.org.my
Website: www.wim.org.my