Fusion

Newsletter of the
Southern African Institute of Welding

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SAIW

Distance Learning

In Welding

New SAIW Technology Centre **PG4**

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The Executive Director

I wish everyone who worries about achieving racial integration and harmonisation could visit the Institute and take a look at both our staff complement and the student population. They would find the staff responsible for delivering our lecturing, consulting and certification services is well mixed in terms of race and gender. The teaching staff is imparting skills to a student population which is as, or even more, diverse in terms of race and gender.

While we probably do not meet anyone's ideal in terms of demographics, we must be well on the way and you know what? All this is happening without an overly prescriptive employment practice – we simply can't adamantly prescribe the nature of our staff. We have to take skills where we find them and a small training and consultancy service can't employ people who don't have the required skills. We are just not big enough to carry the costs of too many trainees who have potential but are not ready for frontline service.

It is fun and enjoyable working in a mixed environment and work should be enjoyable as we spend a high proportion of our lives at work. We can't pretend that there aren't occasional incidents of upset between staff and students or even amongst our staff. Given our background and the sensitivities which arise it is inevitable that on occasion we will have upsets, but this happens everywhere. We have many domestic and international visitors to the Institute and we often receive comments regarding our student mix. The young people we train move off into an industry which is short of skills so they find employment and this must mean that similar integration and harmonisation is happening throughout industry.

Recently we have been meeting with representatives of the South African Qualifications Authority (SAQA) about recognition as a professional registration body and we will have more news on this later in the year. It was interesting to learn that the SAQA view of professional recognition is that it can be applied to personnel with widely varying levels of educational background. In other words, in SAQA's eyes an individual can be professional in the sense that the individual is a skilled practitioner, be it at the education level of an engineer or the education level of an inspector, for example. This fits in very well with the approach that the Institute has taken to recognition for membership grades and many of the SAQA requirements are standard practice for our certification programmes.

Jim Guild

Executive Director
Southern African Institute of Welding

New models for welding training

Doug Luciani, president and CEO of the Canadian Welding Bureau and Chris Ahrens, GSI-Gesellschaft fur Schweißtechnik International mbH, Germany presented papers on distance learning in welding at the 2012 IIW Regional Congress.

In all areas of learning and development, technology has changed the way in which we teach and learn. Until recently distance learning could only be implemented for theoretical or academic subjects. Trades and more practical career choices such as dentistry and medicine had to be taught in a classroom or laboratory. Trade education used to be handled through apprenticeships with a master craftsman passing on his knowledge to a student, but moved away from the one-on-one scenario to a classroom situation in trade schools after the industrial revolution. The world is now once again moving towards a more individual form of teaching through e-learning.

The most important part of online learning is how the material is tied to the student and delivered in an online environment. As far as the theory is concerned, the model will work like any other theoretical e-learning scenario, but with regards to the practical experience required new techniques are being developed. According to Luciani there are various levels of online learning. The basic level where the online course mirrors the classroom, the hybrid level where only a portion of a course is presented online (typically the theory) and the practical is still done one-on-one or in a classroom, the augmented level where a course is based on an existing classroom course with an online version modified to allow more of the available online technology to be leveraged and the immersive level where a course is completely reconstructed for exclusive online delivery.

The line between practical and theoretical training is blurred and components such as Virtual Reality (VR), Augmented Reality (AR) and simulations are used. The welding simulator uses the Augmented Reality (AR) technology to simulate real welding that incorporates real welding guns. The user experiences the real connectors, adjustments and procedures as they would in the real working environment. While the AC reality simulator is not suited for e-learning due to cost it has class room advantages such as reduction of training time and saving running and consumable costs. There are other simulators within the engineering fields such as electrical, electronics, mechanical systems and automation that are suitable for distance education. These simulators are based on software packages that are accessible by distance computers.

Many of the new technologies are basic and have been around for awhile, such as distribution of pdf documents, placing information on web pages and live video chats, but these tools only provide the most rudimentary of solutions and are normally used for the theory part of the course. For practical training it is necessary to use more sophisticated tools and methods in order to simulate the hands-on time at the torch. The goal is to provide a solution that is as realistic as possible using technology close to gaming technology, such as Nintendo Wii. This method of training is obviously more suitable for the younger generation. Nothing is impossible in the new technological industry and the development of an affordable welding simulator that can be used for distance education may not be far off the charts.

Technology currently in use for online learning in welding includes welding simulators, personal computers and mobile devices. Welding simulators represent the high end of systems as they are customised free standing platforms that are designed to provide true hands-on simulation of welding using welding equipment without producing any actual arcs and sparks. These come with a high cost that greatly prohibits their use for an online learning environment where the student is accessing it from their home or other non-school location. With advances in computing technology and the low cost of dynamic input devices such as three axis pointing devices and motion capture cameras and software, their use in online learning and even in-class training is likely to be superseded in the near future by more economical systems delivered through or as an easy extension of the PC.

Ahrens warns that it is necessary to meet the requirements of industry and to develop new educational concepts such as education in the form of multi-media teaching. Computer based training enables the participant to gain knowledge on a PC. The training tool exists out of common explanations in the form of text and figures, as well as animations and video sequences, thus securing a high extent of audio visual aids. Every teaching unit is completed by a test on the knowledge showing the results of the studios. Together with the application to the training course the learner obtains the opportunity to participate in an internet chat and to exchange questions with tutors via e-mail.

A shift to online course delivery should be seen as an opportunity to expand on the scope and quality of the courses being delivered. As the demand for online learning grows the demand for more online content will grow. This opportunity should be taken to consider how the course should be delivered as well as its content and the context in which it is presented. Moving to an online learning environment should not be considered a simple business decision however. There are many factors that should be evaluated to ensure that time and money spent developing an online learning environment provides good returns in both learner and bottom line revenue. Costs such as bandwidth, hosting services, content creation, license fees, redundancy of systems, backup power and IT support should be taken into consideration.

Costs aside, while the development and deployment of any online learning environment is an involved process that affords the opportunity to look beyond traditional teaching methods and material, it provides the opportunity to reimage and repurpose the teaching of welding and welding related skills to a wider, more connected market. The advantage of a blended training method mixing online learning and classroom practical work is that theory can be taught internationally at the time most convenient to the learner and at an individual speed of progress, while cutting travel and accommodation costs. For employers, it has the advantage of learners not being out of the office for long periods of time. Immersive learning models are made possible through the use of the virtual welding trainer. Using the virtual welding training, the basic capability of arc welding is trained without already striking the high performance arc.

The three dimensional guidance of the torch is electronically controlled and the welder will be asked by a signal and audio voice unit to carry out corrections. The pilot arc used in the process simulates the actual process and particularly trains the welder in striking the arc. With each weld a supervision of the parameters is performed which could be taught by welding training through individual training only. The range of parameters presented at the end of the welding summarises the consistency of the movements. Not before an intermediate result has been obtained, the training “in safety” is ended and the welder changes to high performance power sources. To this end he carries out the movements he is already capable of thus being able to concentrate on new focuses such as the high performance arc and formation of the weld pool. Through this procedure mistakes that might creep in during the movements and can later only be corrected at a large expense are avoided.

Since welding engineering is being embedded into more and more complex technology, entire processes in education in welding must also consider inter-disciplinary subjects and technological developments.

Profile: Christian Ahrens

Christian Ahrens graduated in 1975 as a Civil Engineer from the Aachen Technical University having had a keen interest in maths and natural sciences as a pupil and having grown up with a father working in the construction industry. Until 1984 he worked for various companies designing steel structures, bridges and space frames in Germany and some Arabic countries. During this period, he completed the DVS Welding Engineer course, finishing with a Diploma in Welding Engineering. His interest in welding happened by chance when the company asked three colleagues to do a welding engineering course and they convinced him to accompany them.

In 1984 he took over the position as the Head of the Department Education, Training and Quality Assurance of the German Welding Institute SLV Duisburg and became a member of the German Welding Society DVS. There he served as head of the local examination board and later became the head of the national examination board where he served for eight years. For more than 20 years he chaired the German committee for training and examination of Welding Engineers. During the 1980s and the 1990s he was the coordinator responsible for setting up a Welding Institute in China (WTI Harvin) and started the first Welding Engineer Courses in South Korea.

In 1992 he started his activities at International Institute of Welding (IIW) during the IIW conference in Madrid. Soon after joining C XIV and setting up C VII, he was elected chairman of C VII in 1995 and after completing that commission became chairman of the IAB Group A; "Educations, Training and Qualification". His chairmanship ended due to the IAB rules in 2011. During this time he was, and still is, active in Group B; "Implementation, Authorisation and Certification" and was a member of the International Authorisation Board (IAB) until 2011.

Christian Ahrens served the IIW from 1997 to 2009 as peer assessor and is still active as lead assessor. Since 2004 he has also been active as distance learning assessor.

In 2007 he received the iMove "German Training Export Award", in 2010 was awarded the AWS "International Meritorious Certification Award" and in 2012 he was selected for the IIW "Arthur Smith Award". When asked what he thinks contributed to his success, he says; "I was always willing to find new challenges, especially outside Germany."

Christian enjoys spending time with his family, playing golf, observing his fish pond and gardening. He is married and has three children, two of whom are married. His pride and joy is his grandchild, but his dream is to see nuclear fusion fulfil the world's greed for energy, but in a peaceful way of course. His advice to young engineers is to expand their horizons, be interested in other cultures and learn foreign languages, and then the whole world is waiting to be conquered. "I am nearing pension age and I would like to calm down slowly hoping that some people still need my advice", he says.

New Technology Centre being launched at SAIW

In its quest to provide industry with a turnkey solution towards improved quality and knowledge in the welding industry, SAIW is launching a new Metallurgical testing laboratory during the month of June 2013. The laboratory is based at the SAIW head office in Johannesburg and is already operational. It will provide a service to industry as a whole. All testing and evaluation of welds can now be done in-house. Whilst the technology centre will have a focus on improving quality of welds throughout industry, it will also be used for Research and Development. Previously tests were outsourced to private laboratories.

"There are two aspects to the centre," says Sean Blake, technical services manager at SAIW. "The laboratory will now be used for the in-house testing of welds where SAIW undertakes the testing and qualification of weld procedures and welders. SAIW will also offer the service to other qualification organisations and manufacturers for testing of welds. We will also use the laboratory to demonstrate testing of materials where this forms a part of the teaching curriculum".

Equipment is state of the art and the newest technology is available. The tensile testing machine is a 300KN machine, the machine can also do bend testing. Tensile testing is a fundamental materials science test in which a sample is subjected to a tensile force until failure. The test is commonly used to select a material for an application, for quality control or to predict how a material will react under other types of forces. Properties that are directly measured via a tensile test are ultimate tensile strength, yield strength, maximum elongation and reduction in area. The former two are measures of the strength of the material whilst the latter two measurements are measures of the ductility of the material.

Other equipment includes a 450 Joule Charpy impact machine for impact strength of materials, a spectrometer for chemical analysis, an XRF analyser for material sorting and chemical analysis as well as a micro hardness tester for hardness testing and hardness traverses. There is also a hydrogen analyser for testing diffusible hydrogen in weld metal and a Nikon optical microscope, together with various sample preparation and machining equipment for preparation of test specimens, including an impact specimen preparation machine, completing this destructive testing centre, which will be managed by Sean Blake and Confidence Lakoane, both qualified metallurgists.

The project was started at the beginning of 2011 when the SAIW council realised the need for such a service in the market. During installation, a civil problem cropped up resulting in the floor of the laboratory having to be reconstructed. The launch of the centre was therefore delayed by a year, but the equipment was installed early 2013 and the laboratory is already in use.

Industry members in need of the service can contact Sean Blake at blakes@saiw.co.za. Blake will provide a quotation for the required services. "We have already conducted some failure analyses at the centre," says Blake. "It works well as the process is much simpler when the work is done in-house. There is more control and results can be analysed in order to establish the root cause of the problems, allowing accurate solutions to be sought. Industry members can now have tests done by welding specialists rather than testing specialists, leading to far superior results for the evaluation of welds".

Damian Kotecki Seminars

The Damian Kotecki Seminars, presented by SAIW in partnership with Sassda, were a huge success. Dr Damian Kotecki, an internationally recognised expert in the welding industry, presented four seminars at Birchwoods in Johannesburg on the 13th of May 2013, at the Durban Country Club on the 14th of May 2013, at Encore in Cape Town on the 16th of May 2013 and at Kelway in Port Elizabeth on the 20th of May 2013.

The seminars were well attended by industry members with 122 delegates in Johannesburg, 19 in Durban, 19 in Cape Town and 23 in Port Elizabeth. Much knowledge was shared by the experienced presenter.

Dr Kotecki's areas of expertise include stainless steels and hard facing, dissimilar metal welding, filler metal selection, filler metals for cryogenic service, welding procedure development, welding metallurgy training and lecturing and professional engineer services. He has won many awards over the years and co-authored the book Welding Metallurgy and Weldability of Stainless Steels in 2005.

The theme of the seminar was Stainless Steel in Perspective. Dr Kotecki explained the timeline throughout history from stone to copper, to iron, to the first Stainless Steel being used in 1913 and how the use of Stainless Steel has grown throughout the world, especially in the last ten years to a point where today 18 million tons are consumed globally. He also explained the composition of Stainless Steel and the behaviour of stainless steel versus iron under heat treatment at various temperatures.

The different types of Stainless Steel was explained and the differences in characteristics between the various types were unpacked which then led into the variances in welding techniques and what to expect from each type of Stainless Steel when welding, such as the fact that higher chromium in ferritic stainless steel will make the avoidance of embrittlement more difficult. The course was intense and packed with valuable facts regarding the processes used for welding stainless steel, joint preparation, cladding, coating and what to do to avoid bad welds.

All who attended the seminar will definitely be better equipped to work with Stainless Steel in future, benefitting from its many advantages such as high corrosion and heat and fire resistance.

UPCOMING EVENTS

Durban Golf Day

The Durban Golf Day will be held at the Royal Durban golf course on the 23rd of July 2013. Cost is R350.00 per player, totalling R1400 per four ball. Judging by the Cape Town golf day, participants will be treated to a wonderful day of golf, ending in a fun filled prize giving dinner. Bookings are still open. Please book now with Kim Stevens at stevensk@saiw.co.za or visit the SAIW website for more information and to book.

SANS 347 Workshops

SANS 347 Workshops will be held in Durban on Thursday the 25th of July 2013 at Westville Country Club, in Johannesburg on Tuesday the 6th of August 2013 at the SAIW auditorium, in Cape Town on Thursday the 22nd of August 2013 at The Riverclub, Observatory and in Port Elizabeth on the 29th of August 2013 at The Kelway Hotel in Port Elizabeth. The workshop will be presented by Jim Guild and will provide a high level overview of recent changes to regulations covering pressure equipment. Workshops will be restricted to 30 delegates, therefore interested parties should book early by contacting Kim Stevens at stevensk@saiw.co.za. Should there be a lot of demand for the workshops extra dates will be added to the schedule. The cost of the workshops is R1200 including VAT per person for SAIW and Sassda members, or R1500 including VAT per person for non-members.

Annual Dinner

The SAIW Annual Dinner will be held at Gold Reef City on the 16th of August 2013. From previous experience SAIW members will know that the SAIW Annual Dinner is always a memorable event. This year sponsorship is available at a cost of R5000 which will include logos displayed on the invitations, logos displayed in the venue, on menus and on banners to be displayed in the venue area. This year guests will be entertained by MC and comedian Mark Lottering and back by popular demand are the Nubia Girls. The cost of the dinner is R600 per person excluding VAT and bookings can be made by e-mailing Rencia Grundlingh at grundlinghr@saiw.co.za.

Thermal Spray Association (TSA)

Over the past decade the local thermal spray industry stagnated and has not grown as it has in other countries. After attending the annual International Thermal Spray Conference and Exposition in Houston in 2012, which was organised by the American Society for Metals (ASM) Thermal Spray Society, Dr Jan Lourens from Thermaspray and Adam Wintle from Weartech both realised that the local industry could benefit greatly from a local thermal spray association to promote the technology and provide quality control services to regulate the industry and improve the reputation and quality of the product. Following the conference they approached SAIW to lead this initiative. Timing was opportune as SAIW plans to offer services for the evaluation and quality control of thermal spray coatings as part of the new materials testing laboratory.

The International Thermal Spray Association is a professional industrial association dedicated to expanding the use of thermal spray technologies for the benefit of industry. The association has been closely tied to major advances in thermal spray technology, equipment and materials, industry events, education, standards and market development. The association is beginning to obtain traction in developing the objectives. A conference planned for later this year will also serve as a springboard to promote the objectives of the association in developing the technology in the local market and ensure all service providers adhere to the highest standards possible for the positive re-enforcement of these technologies.

The use of thermal spray coatings is diverse; from the printing industry to the chemical processing industry with applications which include wear resistant coatings, corrosion protection coatings, hard chromium plating replacements, di-electric coatings, electrically conductive coatings, thermal barrier coatings, food processing equipment coatings, medical instrument device coatings, EMI/RFI shielding, traction control coatings and non-stick coatings. The applications are widespread and extremely exciting and will have a positive impact on industry as these products are utilised more widely across sub-Saharan Africa.

The stagnant position of the industry is evident in the lack of new applications and inadequate investment of both capital equipment and technology updates. SAIW will offer its services to the Association in general, including evaluation services to ensure that thermal spraying is of good quality and marketing of the technology. “Poor quality products do exist in the market, but the majority of the products are working to required standards,” says Sean Blake, technical services manager at SAIW. “One of the directives of the Thermal Spray Association is to improve the image of the industry and enforce quality standards”.

As is the case in America, the TSA will be a subcommittee within the SAIW. The committee has already begun a working relationship with other TSAs and organisations, such as; ASM/TSS, GTS, AWS, SABS, ITSA and educational institutions. It is hoping to persuade large organisations that thermal spray coatings and other appropriate advanced surface coatings are the preferred coatings in many applications and should be used in order to extend component lifecycles.

Other objectives of the Association include to:

- Develop an organisation that will ensure that the Southern African thermal spray offering and usage is on par with that of the rest of the world
- Ensure that the members of the organisation receive tangible benefits

- Engage with research and development organisations in South Africa
- Provide education and training of all stakeholders in, and promotion of, the Thermal Spray process, materials and applications as well as the adoption of existing international standards
- Ensure continuous education of all stakeholders through local conferences, workshops and exhibitions
- Focus on safety improvements for both operators and the environment
- Develop a certification program and enforce standardisation of approvals/standards (for those who need and use them for local and/or international markets)
- Develop integrated advisory programme applications within every industry sector, aiming at the following to begin with; mining, power generation, petrochemical, oil and gas, paper and pulp, printing, metal processing, aircraft and infrastructure (anti-corrosion)

Stakeholders to be approached are thermal spray contractors and OEM’s, thermal spray supply companies, welding and other engineering supply companies, welding and other surface engineering jobbing companies, gas suppliers, extraction suppliers and robotic suppliers. Further affiliation with organisations such as the Thermal Spray society and Gemeinschaft Thermische Spritzen e.V will be sought simultaneously. Blake advises that “a balance needs to be created as soon as possible in terms of representation on the management committee of the organisation between academia and industry as users and suppliers of both services and products”.

Newly certified companies

Since February 2013 the following companies were certified as ISO3834 Part 2 compliant; ARMINCO Projects, Elinem Construction, Elinem ITS (Richards Bay), KISME and Eduardo Construction. Introchem Services and Engineering and Hydro Precision Engineering were certified for ISO 3834 Part 3.

ARMINCO Projects (Pty) Ltd is a manufacturer and supplier of piping products, piping systems, pressure vessels, pipe supports systems and expansion joints to the power generation, petrochemical, oil and gas, steel and alloys production and paper and pulp industries. ARMINCO operates from Chamdor, Johannesburg where they own 23 735 hectares of land sporting a maintenance workshop of 112m², a fabrication area of 6200m² and an office area of 1350m².

Elinem Construction specialises in high pressure parts fabrication and maintenance, for example boiler tubings. The company strives to create a safe and healthy environment for its employees and adheres to the regulations stipulated in the OHSA Act. The company also strives to train unskilled and semi-skilled employees to a higher level of skill and to adjust remuneration accordingly. The company supports SMME and BEE companies as far as possible and the main objective is to render professional, cost effective services to clients, free from any faulty workmanship.

KISME, or Kinross Industrial Supplies Manufacturing Engineering, is a steel fabrication company in Kinross, Mpumalanga, South Africa. The company prides itself on the fact that it is customer focussed, supplying a wide variety of products and services to address any customer needs. The management team comprises skilled professionals with vast experience and knowledge of the Petro chemical, Mining and Power Generation Industries. Core values include a zero tolerance on Safety, Health and Environmental aspects of all operations and a quality focus to comply with international standards.

Eduardo Construction was established in 1989 as a labour supply company of specialised welders. Since 1992 the company has focussed on boiler plant maintenance, currently executing projects in fabrication, mechanical erection and maintenance in power generation, steel and petrochemical plants. Eduardo further specialises in welding of boiler pressure parts and main steam pipes, as well as fabrication of piping spool pieces and fabrication of structural and steel plate work.

Another speciality field is testing of coded welders, training of welding supervisors and steel industry furnaces and pipework. Eduardo was also certified as ASME compliant on 23 April 2013.

Introchem Services and Engineering provides various services such as non-destructive testing, ultrasonic testing, chemical analysis, on site welding and machining and specialised welding, machining and fabrication to industry.

Hydro Precision Engineering was initially established in 1980 to serve the industrial sectors in the Vaal Triangle. During 31 years of rapid growth, the company has expanded three fold and specialities include hydraulics, engineering, fabrication and construction.

The company works throughout South Africa and neighbouring countries and can undertake complete turnkey projects from the design stage of hydraulic cylinders, power packs, systems, specialised machinery, engineering equipment and fabrication. Hydro Precision Engineering has dedicated site personnel that can install and commission all the equipment manufactured in its workshops. The company is an approved Original Equipment Manufacturer (OEM) for the Parker range of products which enables the company to offer a full range of associated hydraulic equipment to add to the range of cylinders and power packs.

Steel Construction Conference and Exhibition

The Southern African Institute of Steel Construction (SAISC) organised the Steel Future Conference 2013 which was held on the 5th and 6th of March at the Sandton Sun Conference Centre. SAIW participated in the exhibition and conference with Sean Blake, technology manager, attending the conference, which had a focus on green issues concerning the use of structural steel as a building material.

One section of the conference dealt with design standardisation. In South Africa the SANS 10162-1:2011 standard for steel construction forms the design basis of steel structures. Europe has recently implemented the Eurocode 3 (EN1993) which forms the basis of structural steel in Europe. Some European countries have made some local amendments to this standard to comply with local requirements and norms. This detailed standard is based on limit state design philosophy but also considers consequence classes, reliability classes and design supervision.

On the contrary the American basis is also based on limit state design but is greatly simplified and easier to implement. SANS 10162 which is used locally is based on an Australian standard derived from the American code.

During these sessions there was debate as to the advantages and disadvantages of the American and European design codes. Many countries have adopted either the American or European approach. Whilst South Africa has generally adopted many European standards (e.g. EN 10025 for structural steel), our steel construction industry widely uses American standards such as AWS D1.1 for fabrication of steel structures.

Different design standards and fabrication standards are increasingly being encountered in the local industry, especially for process plant and power generation plant structures. The differences between these standards were addressed in conference papers and discussions.

The SAIW exhibition stand was well received and visited by many delegates to the conference. The opportunity was taken to introduce the various SAIW offerings and training courses to the steel construction industry. “It was great to have an opportunity to network with associated industries and peer professional bodies,” says Blake, “especially when the event also provided the opportunity to present the SAIW offerings to the market”.

SA Industry & Technology Fair 2013

SAIW recently exhibited at the South African Industry and Technology Fair (INDUTEC) where hundreds of international exhibitors and thousands of visitors from more than 25 countries converged at Gallagher Convention Centre in Midrand, Johannesburg from the 14th to the 16th of May.

The event was well attended with exhibitors coming from all over Europe and the East, including Portugal, Austria, the Czech Republic, China, Hong Kong, India, Iran, Italy, France, Malaysia, Taiwan and Turkey.

SAIW took the opportunity to promote its training and consultancy services but also promoted the skills and expertise of companies certified in the Welding Fabricator ISO 3834 SAIW / IIW manufacturer certification scheme.

Cape Town Certification Dinner

A Certification Dinner was held in Cape Town on the 20th of March 2013 at the Cassia Restaurant at Nitida, to present new graduates with their certificates. Thirty four graduates of the 2012 Cape Town based Welding & Fabrication Inspectors Level 1 & 2 training received their certificates.

"These graduates are now set for a new phase in their lives," says Liz Berry, area representative of the SAIW in the Western Cape. "It is a privilege to be part of a team equipping and empowering people to reach higher levels in their education and careers. The skills they have learned and the qualification they have received provide them with a variety of opportunities in various fields, such as power generation, petrochemical and fabrication."

Graduation ceremony – first quarter 2013

Another prestigious graduation ceremony was held by SAIW at Goldreef City Casino Hotel on the 8th of March 2013. SAIW President, Professor Madeleine du Toit, welcomed and congratulated graduates and their spouses and partners. She also welcomed and acknowledged the vice president of the Institute and chairman of SAIW Certification governing board, Mr Morris Maroga, other members of council and the SAIW Certification governing board who were in attendance. She commended them for making the Institute what it is and thanked them for the work done, especially as these are voluntary positions.

Mr Gert Joubert delivered the keynote address and thanked SAIW for the opportunity. He congratulated the graduates on their achievements. Mr Joubert quoted Margaret Thatcher who said that "you may have to fight a battle more than once." Therefore, you sometimes have to repeat an exam, or a practical and you might have doubted what you are doing as it is not an easy road to follow, but it is worth it in the long run. He thanked the spouses who stood by their husbands or wives so that they could complete the certification and mentioned that the spouses deserve congratulations as well. "The group of graduates are of mixed ages, but age doesn't matter, it is passion that matters and it is important also to have fun and enjoy the work, no matter how taxing or dangerous it is. The job can be dangerous, challenging, exciting or it could be boring, but either way, do it with passion," said Joubert.

Mr Herman Potgieter, assisted by Mr Morris Maroga, handed out the certificates to a variety of learners. Every learner received his or her certificate with a big smile, knowing that they are a step closer to a good career and a prosperous future.

In the SPOTLIGHT

Hennie van Rhyn - Afrox

Hennie van Rhyn, the Application Development Manager - Heating, Cutting and Safety at Afrox, has national responsibility which affords him the opportunity to travel and see what he calls "our beautiful country". On the heating side of things, Van Rhyn is responsible for developing special solutions for manufacturing processes to design the optimal solution obtained with special "Lindoflamm" acetylene burners and torches; the equipment's' shapes, sizes and capabilities are tailored to the application. The important task of pre-weld heating is gaining more and more significance since high strength steels are increasingly being applied. Preheating is recommended as well as being specified in numerous Codes of Practice and welding procedures.

On the cutting side of things, Van Rhyn is responsible for placing a high focus on growing the Laser and Plasma market share which has been growing significantly over the past two years. He is also driving to improve relationships with all of the laser OEM'S in South Africa, a task which he is excited about. "There is a boom in the plasma cutting market where we can offer any potential customer a very competitive solution together with all the added value that Afrox can offer," states Van Rhyn.

According to Van Rhyn, risk and safety is a prime function at all key customers and there is a need to comply with all South African National Standards. "In this regard, all customers using gas equipment and oxy/fuel processes must comply with these standards. Afrox can assist in rolling out the safety Solutions Offer regarding all oxy/fuel processes which is very successful in the industry today. We can also offer to re-scope or rewrite Standard Operating Procedures in line with the Code of Practice to assist all customers in the industry".

Van Rhyn has been with Afrox for 16 years and sees Afrox as the best company to work for. He has 22 years' experience in the gas industry and appreciates the opportunities that have been offered to him by Afrox. He is grateful to have gained so much knowledge in the industry. He started out as a Gas Equipment and Safety Specialist for Afrox 16 years ago and has never regretted the decision to join Afrox for a moment of his life.

He grew up in the far east of South Africa in a small little town called Fishershill, Primrose and matriculated from High School Vryburger. He started working immediately and gained a lot of knowledge by attending as many courses as possible, studying training materials regarding certain processes and staying actively involved in the industry. He was fortunate to attend intensive training overseas at the Afrox parent company, Linde, and the knowledge gained from his German Colleagues was extremely valuable. Van Rhyn's global status as Sales Engineer was gained under the Linde Group and he was tasked with developing and growing certain markets that he has been trained for. He would like to continue to make a difference in the sub-Saharan welding industry by continuing to support the introduction of new technologies to make South Africa globally competitive in manufacturing, a major contributor to our economy.

His life philosophy is always to achieve the maximum results in everything he does and to strive towards success continuously. Van Rhyn was brought up to have high morals and always to respect others, not just in your private life, but professionally as well. He accepts targets and budgets as part of the job and ensures that he meets them, although he always makes sure that his family comes first. He tries to be the best husband to his lovely wife Eulande, and the best dad to his daughter Veande and son Rujean, as possible. He is proud of the fact that his family stand by each other and that Eulande supports him in everything he does.

When Van Rhyn was approached by the SAIW to conduct "Gas Equipment and Safety" training to all the Level 1 Inspectors, his relationship with the management team of SAIW rose to a higher level. He gained a lot of respect for the SAIW team, experiencing what is being done for the community as far as professional training is concerned. "I'm surely proud to associate myself with the SAIW and especially liked to lecture on Fridays where my favourite dish of Fish and Chips was served during lunch," holds Van Rhyn. He urges the younger generation to pursue their studies, focus and carefully plan their future. "Never give up and be successful in everything you attempt. If not the first time, the second time you will. Have respect for yourself and for others".

"When I'm not working, lecturing or spending time with the family, I like to spend time with my friends playing golf or pursue my other hobby of building and doing improvements to our new home in Benoni," says Van Rhyn. He believes that to persevere and never give up is what leads to success. "You have to set yourself long and short term goals and make sure you achieve those goals no matter what".

ANNOUNCEMENT

Job shop announcement

Members are reminded of the "Job shop" on the SAIW website where vacancies and positions wanted can be advertised. The facility is available to all members for industry related positions.

Requests can be sent to Rencia Grundlingh at grundlinghr@saiw.co.za.

All adverts will remain on the website for two months before being removed, unless we are advised that the position has been filled. Adverts should not exceed 150 words or be bigger than 10 x 16cm.

WELDING TIMES - Your community page

What should we expect from a Welding Engineer?

By Tony Paterson

Welding is a craft. Facets of both art and science are evident. Whilst we like the concept of science for its apparent predictability, the reality of welding cannot be modelled exactly. With a wide scope of applications and, in many cases, a significant cost of failure, a competent professional welding engineer is required.

Structures, large or small, are intended to achieve a purpose under certain operating conditions. The requirements may be described in terms of externally applied loads, (dead and live, static and dynamic) and load effects (effects that result in stresses in the structure), the latter mainly related to operating circumstances. In most cases the safety of many people depends on the integrity of the weld. While welding is not the structure, it is a vital and enabling component.

If one considers the history of failures, joints are high on the list. Who takes responsibility for such failures? The structural engineer signs drawings, taking legal responsibility for the integrity of the structure. So where does the Welding Engineer, fit in?

The Engineering Council of South Africa (ECSA) sets the standards for and registers professional engineers and technologists but does not recognise sub-specialities; groups that are recognised and registered in other fraternities such as the medical fraternity. Furthermore, the word "engineer" is not a protected term, which makes it subject to abuse and confusion. Many countries have introduced terms that differentiate between levels of training and competence such as Professional (USA, RSA) and Chartered (UK). There also appears to be confusion between the roles of welding inspector, welding technologist and welding engineer. While the roles are complementary and represent a continuum, they are not the same.

Structural engineers are well trained to identify loads and load effects that affect structures and to determine models to characterise members of structures, but are not well trained to manage joints, particularly welded joints. Whilst the assumption of structural models is material homogeneity, welded joints transcend material model groupings, integrating the continuum and discrete material models. Welding engineers are trained to manage this interface between the cast joint and the wrought structural elements together with the effects of local geometric change.

Welding Engineering is a relatively new post graduate specialist qualification. It is the senior of three associated disciplines, the Welding Engineer, the Welding Technologist and Welding Specialist. New procedures, such as ISO 3834, require that fabricators employ or have access to welding engineers, the duty requirements increasing as the impact of failure increases.

The best time for involvement of a joining specialist is as early as possible, at concept, before development and design. By the time the project development reaches fabricate (construct), the area targeted by ISO 3834, the risk of failure and the cost of change increases significantly.

By its very nature welding science and technology is multidisciplinary. It embraces the discrete theories of material chemistry and heat behaviour with the continuum theory used by structural engineers. Therefore both a welding engineer and a welding technologist are needed. The welding engineers should be concerned with "why" questions whilst the welding technologist should be concerned with "how" questions. Currently, according to the limitations anticipated by training administrators such as the AWS and the role anticipated by ISO, the roles of the Welding Engineers and the Welding Technologists overlaps directly as both are intended to assist fabricators build in quality. Within this grouping falls the Welding inspector/NDT specialist, who should be concerned with "what" has been done, the intent being to reject poor quality, the mirror image of technologists whose role is to build in quality.

Welding Engineering is a post graduate qualification. Candidates are drawn from graduate mechanical and metallurgical engineers with some experience. In this country the qualifying authority is the International Institute of Welding (IIW).

The IIW differentiates between the International Welding Engineer and the Certified International Welding Engineer. The welding knowledge qualification required is the International Welding Engineer qualification. The Certification of the IWE is similar to a CPD system and has a period of validity of three years. Every three years the IWE needs to document two recent years of experience through relevant job content and demonstrate how technical knowledge has been maintained and developed.

In order to build a body of Welding Engineers in South Africa, both recognition of prior learning and a willingness to train graduate engineers and scientists without prior experience is required. Training without relevant opportunity to practice is training. Training with opportunity to practice leads to competence. Competence is based in principles not rules – first learn to question, to doubt. Maintaining competence is a life time endeavour to pursue understanding. Competence is what enables the professional Welding Engineer to take legal responsibility for decisions.

The Certificated IWE qualification is awarded to those who have passed the theory exam, have kept up with current theory and practice and who can document relevant experience. If the academic qualification and certification system cannot be administered by ECSA (as for other Professional Engineers), the local ANB, SAIW could take the lead.

Five new employees at SAIW

SAIW has recently appointed five new employees, showing the growth in the Institute despite a very difficult market.

Maureen Khuzwayo has been appointed as receptionist due to Rebeca Motlaung's move to the administration department. Khuzwayo says that her experience at SAIW so far has been phenomenal. "I have come across people who have high standards, are caring, supportive and who motivate me. They take time to get to know you," says Khuzwayo. "The first day I got here I was greeted by friendly faces and with a warm welcome. As the day went by I grew fond of the people and the environment. I am very grateful to be involved in a company/institute that accommodates my requirements and would like to build a long-term relationship with SAIW. I enjoy dealing with the students and I wake up every morning with a smile, knowing I'm going to learn something new".

Khuzwayo was recruited through an employment agency and says she would like to achieve growth in her current positions, while always working with integrity. She studied Business Administration through Damelin before she started working in the aviation industry. Her future goal is to finish her Human Resource Management qualification, which she is currently doing through Wits. She is married and has three children. In between caring for her family, working and studying, Khuzwayo still makes time for reading and singing.

It seems as if SAIW will be able to provide entertainment at functions from their own staff complement as **Gideon Harris**, newly appointed welding instructor, is also a keen singer and entertainer. Harris was asked by a friend, Willie Williams, to help out at SAIW as a temporary worker. Frans Voster quickly realised that he has superior welding skills and employed Harris on a permanent basis. "I want to reach out to the communities and transfer my skills to them, because we are short of artisans in our country. I am a coded welder by trade with 39 years of practical welding experience. I started welding in Secunda," says Harris. After completion of that project he moved to Pretoria before working on an oil rig in Durban for about one year. He then moved to Sasolburg for eight years.

Harris is married with four children, two boys and two girls. All his children are grown up and happily married. Apart from his singing, Harris regularly acts as master of ceremony and loves soccer and playing pool. "My future is in the hands of the Lord," says Harris who hopes to produce quality students for the SAIW.

Errol Anderson has joined the Institute's lecturing team. His dream is to assist in the development of young people in the fabrication and engineering field. Anderson holds a National Diploma Mechanical Engineering, Welding and Fabrication Level 1. He has worked in various fields, such as; petrochemical, marine, power generation and manufacturing. Anderson is married and he has three daughters. While working hard to achieve senior lecturer position at SAIW he has no time for hobbies, but relaxes by watching sports.

Valencia Hendriks, another new lecturer at SAIW, heard from a friend that there were vacancies advertised on the SAIW website and applied for the post. "I would like to develop myself and improve my lecturing skills", says Hendriks. "SAIW is the place to gain that knowledge". She is a qualified Welding Inspector with 13 years' experience as a welding lecturer at an FET college. Hendriks is married and has a six year old little boy in grade one. She loves to spend time with her family going on hiking trips or camping. Hendriks hopes to be working at the SAIW as a welding lecturer for a long time to come and would like to become a Qualified Welding Specialist.

The fifth new employee is **Iliske Joubert** who has a degree in Consumer Sciences from North West University. Joubert is interested in systems management and auditing and recently enrolled for certain of the IRCA modules, such as ISO 9001. She is experienced in the ISO 3834 Weld Quality Management System. When she was offered the quality system coordinator position at SAIW, she jumped at the opportunity. Her goals are to learn as much about this environment as possible and to understand and relate to the principles of internal auditing fully. She is thankful that SAIW provides this opportunity and hopes to make the best of it. She would also like to be able to participate in external ISO 3834 audits of certified companies later in her career.

Joubert also holds an ISO 9001:2008 certificate, a Health and Safety Representative certificate, a certificate in Advanced Wedding Planning and a Creative Entertainment certificate. She loves shopping, working out at the gym, watching a good series on TV, reading books and socialising with friends or family. She sees herself growing in the quality systems auditing or even quality control environments. ISO 3834 holds her interest and she has set herself a goal to improve her technical knowledge in this regard. "SAIW has given me the opportunity to start, grow and specialise in this environment, for which I am really thankful," says Joubert. The good news for the younger male members of SAIW is that Joubert is unmarried and a professional at planning weddings. She has no children, but loves kids.

Qualification and Certification

CONGRATULATIONS TO THE PEOPLE BELOW WHO RECENTLY ACHIEVED QUALIFICATION AND CERTIFICATION

SAQCC-NDT CERTIFICATES

Liquid Penetrant Testing Level 1
T Van Schalkwyk
B van der Merwe
JS Grobler
JL Ceronie
G Zulu
KG Clarke
BE Mokgomong

Liquid Penetrant Testing Level 2
C Smith
IP van der Merwe

Liquid Penetrant Testing Level 3
None

Magnetic Particle Testing Level 1
WI Meadows
MS Maile
B van der Merwe
LN Zwane
D Dube
KG Clarke
TM Mbatha
JL Ceronie

Magnetic Particle Testing Level 2
G Fortuin
R Booysen
PJ van der Berg
PF Brits
IP van der Merwe
JP Petersen

Magnetic Particle Testing Level 3
SAS Alwawad

Ultrasonic Testing Level 1
T Ndlovu
JL Ceronie
Z Patel

Ultrasonic Testing Level 2
LS Motha
A Siddig

Ultrasonic Testing Level 3
None

Ultrasonic Testing Wall Thickness
None

Radiographic Testing Level 1
None

Radiographic Testing Level 2
JA Grobler

Radiographic Testing Level 3
None

Radiographic Interpreters
PH van Staden
AL Murray
D Brits

STUDENTS THAT PASSED THE WELDING INSPECTORS LEVEL ONE & TWO

Welding Inspectors Level 1
ML Isaacs, S Finlay
D Strydom, JP van Jaarsveld
S Dick, B Mangale
PJ Pienaar, CN Nontenja
AP de Villiers, QD Woest
KRJ Bartleson, G Makhomu
JJ van der Merwe, SR Phoswa
RR Mulovhedzi, I Kotze
W Swart, JD de Villiers
LT Liphuko, NS Mzangwa
TL Mafongozi, JC Victor
J Dawood, AM Wade
W Alufayi, V Naidoo
A Dames, N Mzinzili
D de Oliveira, S Mutasa
MN Konza, P le Hanie
NW Christophers, P Mathebula
MS Lehungwane, JM Marques
M Mathee, JI Igwe
C Joubert, AKY Makuwa
ME Sebopela, SB Chuene
MV Mathaba, MN Rangata
PP Tsotets, RW Naidoo
WJR Schoeman, SW Lopez
TA Mgiba, M Scheepers
JD Gill, R Ferreira
PJ Fouche, SG Simelane
K Govender, CP Boonzaaier
TL Britz, T Maligana
M van Zijl, LD Martin
PKH Montigoe, JR Leach
W McMillan, A Labuschagne
LK Mngomezulu, UF Thenga
TI Mahlangu, M Smith
EJ Jensen, P Lamola
E Peters, SS Siguca
TR Khuzwayo, EA Thys
T Madlala, J Mbele
B Petzer, L Els
CJ Nair, VE Sithole
T Moodley, PL Makhurupetji
NP Els, JR Bernardo
NJ Gericke, TA Sheasby
C Hennings, CK Phillips
MS Mashaba, CJ Sibiya
LS Jean-Pierre, SL Trigo
ML de Klerk, NK Ntombela
S Yapi, JD White
WM Mapurunyane, AJ Lapacz
II Skosana, PS Mthombeni
L Leluma, PH Fourie
JS Fourie, J Scholtz
P Manxeba, GWG McMillan
JJ Pretorius, R Coetzee
L Blake-Zwartz, PJ de Beer
CEL Steynberg, R Mavhunga
L Makoeng, A Nyamande
RP le Roux, PS Mabena
NB Gama, N Dangale
JB Sishange,
G van der Westhuizen, T Gouws
KD Morck, W Viljoen
D Mthethwa, AA Masilela
IE Globe, E Doyle
T Roode, JF Carstens
D Kahts, K Kalaba

Welding Inspectors Level 2
N Balram, J Haarhoff JNR
JP Logan, T Molefe
D Westley, SA Hutchinson
LT Nsigwane, CB Saunders
K Sabapathy, SV Mbele
QR le Roux, R Kisten
SK Peters, SG Qwabe
ST Nxumalo, BI Paulsen
T Ngqelakhe, NB Sibiya
MS Mthethwa, JJ Manikus
DV Hutchinson, CN Sovendle
TR Khoza
PM Mokoena-Mokoena
CD Anthony, MS Koko
P Sibeko, A Jacobs
CJ Reiners, JO Briel
AA Stols, B Nkosi
J Jacobs, J Tiakou
AW Smith, DW Human
R du Preez, NT Mncwangi
N Creamer, EM Neves
C Janse van Rensburg
SW Sibanda, MC Hope
D Coleman

ASME Codes of Manufacture
PB Serzio
M Janse van Vuuren
D Brits
H van der Walt
JA Coertze
SJ van der Watt
MAJ Janneman
OH Francis
CB Pienaar
G Gordon
M Cochrane
SSP Msomi
BA Masina
A Coles
ME Ephraim
TA Tshabalala
A Sukhram
MC Cavie
OM Ramatja
R Nyathi
V Maneckchund
N Mashimbye
LO Tshamano
D Roberts
JCC Roux
CM Toolsee

Certified Students

Boilers
None

Pressure Vessels
SV Radebe
BP Ndlovu
MS Purcell
FM Nyembe
R du Plessis
SA Nkosi
GE Mahlangu
R Dekker
S Boardman
K Parker
T Mashilwane
LW Smith

IPE
JC Remy
M Cochrane
MS Skosana
R Naidoo

Welding of titanium and its alloys - Part 1

By Gene Mathers

Titanium is a reactive metal; it will burn in pure oxygen at 600°C and in nitrogen at around 800°C. Oxygen and nitrogen will also diffuse into titanium at temperatures above 400°C raising the tensile strength, but embrittling the metal. In the form of a powder or metal shavings titanium also constitutes a fire hazard.

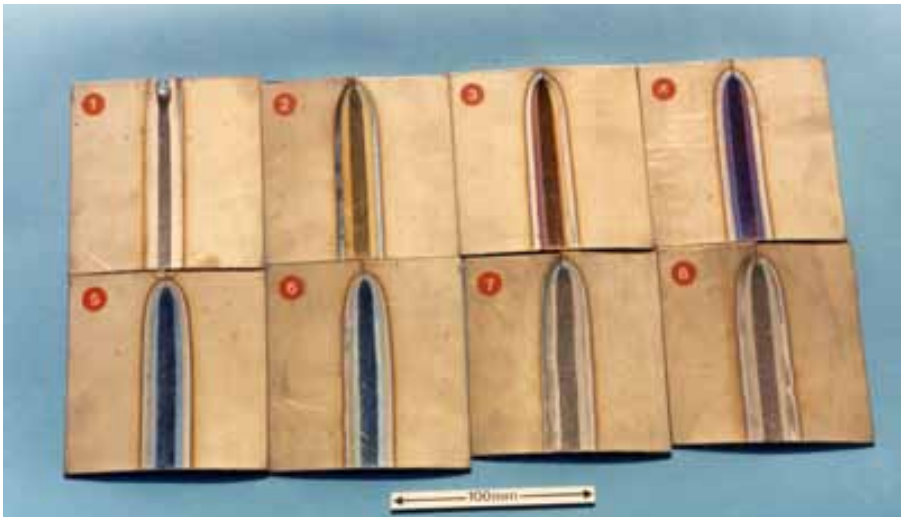
Despite this reactivity, titanium is used extensively in chemical processing, offshore and aerospace applications. This is due to:

- The tenacious protective oxide film that forms, giving the alloys very good corrosion resistance, particularly in chloride containing environments
- No loss of toughness at temperatures down to -196°C
- Good creep and oxidation resistance at temperatures up to almost 600°C
- Similar strength to steel but at approximately half the weight

Because of the affinity of titanium and its alloys for oxygen, nitrogen and hydrogen and the subsequent embrittlement, fluxed welding processes are not recommended although they have been used, primarily in the former USSR. Arc welding is therefore restricted to the gas shielded processes (TIG, MIG and plasma-TIG) although power beams, the solid phase processes and resistance welding are also used.

Titanium is allotropic; it has two different crystallographic forms depending on the temperature and chemical composition. Below 880°C it forms the hexagonal close packed alpha phase, above 880°C it exists as body centred cubic beta phase.

A range of elements may be used to improve the mechanical properties, some stabilise the alpha phase and others promote the formation of beta. Oxygen, carbon, nitrogen and aluminium promote the formation of the alpha phase; chromium, molybdenum, niobium, tin and vanadium promote the formation of beta. By suitable additions of these elements it is possible to produce four families of titanium alloys, divided on the basis of microstructure, into commercially pure titanium, alpha or near alpha alloys, alpha-beta alloys and beta alloys. ASTM designations, a simple numbering system, are a commonly used shorthand way of identifying the various alloys and both these and the alloy composition, e.g. Ti-6Al-4V, will be used within this article.



TIG welds in commercially pure titanium sheet made with successively greater air contamination of the shielding

Commercially pure, unalloyed ASTM 1 - 4 and 7 grades contain small amounts of contaminants such as oxygen, nitrogen and carbon, typically less than 0.2%, and have mechanical properties matching those of a good quality low carbon steel. The fewer contaminants, the lower the tensile strength. The majority of these alloys are used for their corrosion resistance. Welding is straightforward and has little effect on the mechanical properties in the HAZ and they are generally welded in the annealed condition.

The alpha and near alpha alloys, typified by the Ti-5Al-2.5Sn alloy, have ultimate tensile strengths (UTSs) of 500-900MPa, 0.2% proof (PS) of 600-800MPa and elongations (El%) of around 18%. As with the commercially pure alloys the mechanical properties of this group are insensitive to heat treatment. Weldability is good, the alloys being welded in the annealed condition.

The alpha-beta alloys are sensitive to heat treatment, solution treatment and ageing, increasing the strength by 50% compared with the annealed condition. The very high strength alpha-beta alloys such as Ti-5Al-2Sn-2Zr-4Mo-4Cr may have a UTS of 1200MPa, PS of 1150MPa and an El% of 10.

Weldability of the alloys within this group, however, is dependent on the amount of beta present, the most strongly beta stabilised alloys being embrittled during welding and, although it is possible to restore some of the ductility by a post-weld heat treatment, this is often impractical. These very high strength, high beta content alloys are therefore rarely welded. Contrast this with possibly the most frequently used alpha-beta alloy, Ti-6Al-4V (ASTM Grade 5) with a UTS of 950MPa, a PS of 850MPa and El% of 15. This alloy has good formability, is readily workable, has good castability, excellent weldability and could be regarded as the alloy against which to benchmark all others.

The fully beta alloys, e.g. Ti-13V-11Cr-3Al, have similar strengths but with slightly improved ductility, typically around 15% elongation. The beta phase is termed metastable - cold work or heating to elevated temperatures may cause partial transformation to alpha. The alloys have high hardenability, very good forgeability and are very ductile. Weldability is good, taking place with the alloy in the annealed or solution treated condition, although to obtain the full strength it is generally necessary to weld in the annealed condition, cold work, solution treat and then carry out an ageing treatment.

Filler metals, all solid wires and matching the composition of the commoner of the alloys, are available, the relevant specifications being AWS A5.16/A5.16M:2007 Specification for titanium and titanium-alloy welding electrodes and rods and BS EN ISO 24034.2010 Welding consumables, solid wires and rods for fusion welding of titanium and titanium alloys. Although readily available, the range of consumables is somewhat restricted with only fourteen or fifteen compositions being

produced in accordance with these specifications.

Weldability, as mentioned above, is in general very good. The exception is the high beta alpha-beta alloys. The fundamental problem in welding titanium alloys is the elimination of atmospheric contamination. Contamination of the weld metal and the adjacent HAZs will increase tensile strength and hardness but may reduce ductility to an unacceptably low value such that cracks may occur even in conditions of only moderate restraint. The most likely contaminants are oxygen and nitrogen, picked up due to air entrained in the gas shield or from impure shield gas, and hydrogen from moisture or surface contamination.

The maximum tolerable limits in weld metal have been estimated as 0.3% oxygen, 0.15% nitrogen and 150ppm hydrogen, so scrupulous cleanliness is essential for both parent metals and filler wires. Degreasing the weld preparation followed by stainless steel wire brushing and a further degrease is generally sufficient. Heavily oxidised components may need to be pickled in a nitric/hydrofluoric acid mixture to remove the oxide layer. Degreasing of the filler wire for TIG welding should be done as a matter of course and the cleaned wire handled with clean cotton gloves; grease and perspiration from the fingers can cause local contamination and/or porosity. MIG wire should be ordered in a degreased condition, stored in clean, dry conditions and not left unprotected on the shop floor.

During welding those parts of the weldment exposed to temperatures above 520°C will absorb oxygen and nitrogen and must therefore be protected until they have cooled below this critical temperature. Fortunately heat conduction in titanium is low so the area affected is limited in size and chill blocks can be used to reduce this heated zone even further.

The molten weld pool is protected by the normal gas shroud but the cooling weld and its HAZ will need additional protection by the use of a trailing shield with its own protective gas supply following along behind the welding torch. The back face of the weld also needs similar protection by the provision of an efficient gas purge.

Surface discolouration will give a good indication of the degree of atmospheric contamination as shown in the colour chart. Under perfect shielding conditions the weld will be bright and silvery in appearance. Discolouration at the outer edges of the HAZ is not generally significant and may be ignored. As contamination increases the colour changes from silver to a light straw colour, then dark straw, dark blue, light blue, grey and finally a powdery white.

The light and dark straw colours indicate light contamination that is normally acceptable. Dark blue indicates heavier contamination that may be acceptable depending on the service conditions. Light blue, grey and white indicate such a high level of contamination that they are regarded as unacceptable. In multi-pass welds the contamination will obviously affect any subsequent weld runs so that surface appearance alone is not a reliable guide to whether or not unacceptable contamination has occurred. A simple bend test is a reliable but destructive method of checking if the weld is unacceptably embrittled but note that the bend radius varies depending on the particular alloy. For example, a 3t bend radius is used for testing a Grade 2 weld but a 10t bend radius is used when testing Ti-6Al-4V. Portable hardness checks may also be carried out on production items; this requires knowledge of the hardness expected in the specific alloy weld metal.

Part 2 of this article will consider some of the other welding problems and provide guidance on TIG and MIG welding of titanium.

Branch NEWS

Cape Town

The first Cape Town Evening Meeting for 2013 was held on Wednesday, 20th of February and was hosted by Hyflo. The meeting took the form of a presentation by SAIW NDT manager, Harold Jansen, entitled "NDT in South Africa: SAIW and the Future".

The presentation focused on the ISO 20807 standard for NDT. This was closely followed by a site-visit to John Thompson (a division of Actom) Boilers on the 28th of February, for a tour of their newly ISO 3834 certified operation. Both meetings were very well attended and we thank all those involved for their hospitality and for sharing their expertise.

We were once again hosted by Hyflo on the 25th of April for an Evening Meeting presentation entitled "Comparison of Weld Symbols: AWS & ISO". Visiting SAIW lecturer, George Walker, did a fine job of explaining some of the finer points of both specifications. The attendance was, once again, very good.

Thank you to both Mr Walker and Hyflo for accommodating us.

For further information on forthcoming evening meetings or to be added to the Cape Town SAIW mailing list, please contact Liz Berry (berryl@saiw.co.za).

Cape Town Golf Day

The Cape Town Golf Day was enjoyed by 44 players, making up eleven four-balls, on the 18th of April 2013, and was held at the Mowbray Golf Club.

The winners on the day were the team fielded by ESAB, with team Gammatec and team DCD Marine coming in second and third respectively. The prize for Most Golf went to John Thompson. Closest to the Pin was won by Freddie Visser from the Renttech SA team and Longest Drive was won by Olof Esterhuizen from the Gammatec team.

The day was brought to an end with a fun-filled prize-giving and cocktail function. SAIW would like to thank its sponsors Dormac, SGS, Fabrinox, ESAB and The Guild Collection for their support on the day – it is wonderful to have such loyal sponsors making networking amongst SAIW members possible.

Durban

Recently a certification cocktail party was held by the Durban branch at Westville Country Club to recognise the success of the Kwa-Zulu Natal students in the SAIW Welding Inspector examinations.

While not everybody could attend the event, the evening was enjoyed by a total of 90 guests. Thirty six level 1 diplomas and 10 level 2 diplomas were awarded.

Mr Jim Guild addressed the audience before Mr Herman Potgieter assisted by Mr Tullio Monté, the chairman of the Durban committee and Mr David van der Merwe, a committee member, handed over the certificates.

Despite some problems with the power which slightly delayed the start of the event, a lot of fun was had by all. The deserving students can now look forward to a stronger career path in the welding industry.

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