Fusion

Newsletter of the Southern African Institute of Welding

August 2019

SAIW
Southern African Institute of Welding

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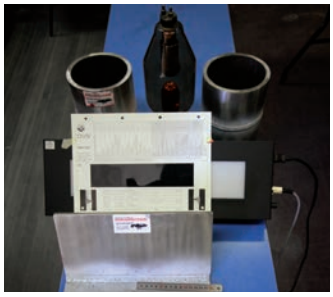

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Excellent response to newly launched Welding Inspectors Programme

Shelton Zichawo, SAIW training services manager, says that there has been a very encouraging response to the revamped Welding Inspectors Programme recently launched by the SAIW.

"After deep analysis and research, and taking into account the needs and desires of the local industry, we launched a new, improved Inspectors programme, which incorporates both SAIW Levels 1 and 2 with the relevant IIW programmes," Zichawo says.

He adds that from a local perspective alone, the advantages of the new programme are enormous in that it focuses squarely on national requirements in the development of local competence and addresses directly the local needs of national skills development. "And, perhaps most importantly, it's what our industry wants," he says.

Judging by the very positive and enthusiastic response to the new Inspectors programme it seems certain that it is exactly "what our industry wants".

Jim Guild, SAIW Caretaker Executive Director says that for more than 40 years the SAIW Welding Inspector programme (Level 1 and Level 2) were the backbone of the South African welding industry and by far the most

Shelton Zichawo

popular courses at the SAIW. Theses courses have been specifically tailored to meet local industry requirements and, since inception, they have been the preferred education and training choice of the large end-user organisations and fabricators in the local welding industry. "The SAIW, I think, started taking these iconic courses for granted and it was time to refocus on them," says Guild, "and I'm delighted that our action seems to be bearing fruit"!

In order to ensure the best possible standards, the SAIW has taken cognisance of the latest industry feed-back and has refined the courses to ensure they are completely up to date with the pertinent technology. "By amalgamating parts of the IWIP programmes with SAIW programmes we have created a world-class product to the satisfaction of the local industry. From the students' perspective they obtain two diplomas simultaneously at each level – one South Africa focused and one internationally focused," Guild says.

The new structure of the welding inspector programme is shown in the diagram on page 2.

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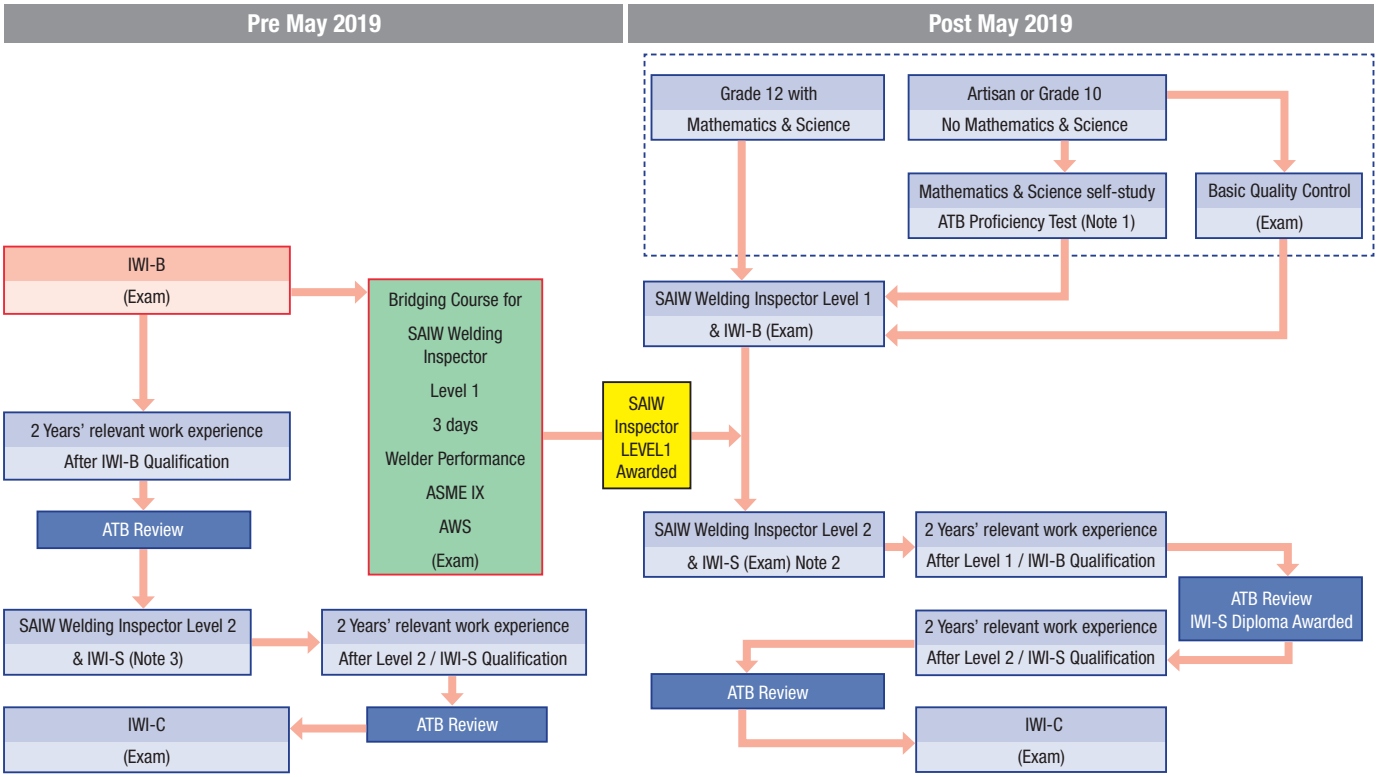
Excellent response to newly launched Welding Inspectors Programme

SAIW Welding Inspector & IIW Qualification Level for Career Progression



Advantages of new Bridge course
This is a fast track to the SAIW Welding Inspector Level 2 qualification.
NOTE:
(1) Authorized Training Body (ATB). Proficiency test is not required for SAIW Welding Inspector Level 1 **BUT** it is mandatory for IWI-B diploma.
(2) IWI-S Exams completed but relevant experience is required for awarding the IWI-S diploma. Only the SAIW Welding Inspectors Level 2 diploma will be awarded.
(3) Both the SAIW Welding Inspector Level 2 and IWI-S diploma awarded.

Course	Entry requirements
IWI-B International Welding Inspector at Basic Level	Grade 12 (with Maths & Science) or Grade 10 (with Maths & Science) and Basic quality control
IWI-S International Welding Inspector at Standard Level	IWI-B/SAIW Welding Inspector Level 1 and two years' relevant experience after IWI-B SAIW Welding Inspector Level 1
IWI-C International Welding Inspector at Comprehensive Level	IWI-S/SAIW Welding Inspector Level 2 and two years' relevant experience after IWI-S/SAIW Welding Inspector Level 2
SAIW Welding Inspector Level 1	Grade 10
SAIW Welding Inspector Level 2	SAIW Welding Inspectors Level 1 or IWI-B with Bridging course or IWI-B with two years' experience and ATB test

Upon successful completion of the SAIW Inspectors Level 1 qualification examination, the student will not only be issued with an SAIW Inspectors Level 1 qualification, providing access to the South African industry with this sought after 'feather in your cap', but also with an IWI Basic Diploma, allowing individuals to enter the global market, with an internationally recognised and respected International Institute of Welding (IIW) qualification.

JUDGING BY THE VERY POSITIVE AND ENTHUSIASTIC RESPONSE TO THE NEW INSPECTORS PROGRAMME IT SEEMS CERTAIN THAT IT IS EXACTLY "WHAT OUR INDUSTRY WANTS".

Should students want to go to the next level, after completing SAIW Inspector Level 1 course, they will no longer be required to obtain two years' experience as Welding Inspectors before enrolling for the SAIW Level 2 course. The two years' experience will only come into play should a qualified Senior Welding and Fabrication Inspector (Level 2) wish to obtain the IWIP Standard qualification. "This enables the students to get into the market two years earlier with a higher qualification making them that much more marketable in the industry and more likely to get a higher paying job," says Zichawo.

He adds that the IWIP Comprehensive course, the highest level in the Inspectors programme will remain a stand-alone course in the future.

"A very small number of people may be caught at a crossroad in the progression path," says Zichawo, "but each person will be treated sympathetically and with support from SAIW to ensure they achieve the best outcome for their future."

Anyone uncertain about how they are affected by the changes that are being introduced is invited to speak with any of the lecturing staff or any of the following members of the SAIW staff – Shelton Zichawo, Nico Fourie, Laetitia Dormehl or Michelle Warmback on 011 298 2100.

Message from Jim Guild

We're well over a month passed the winter solstice, how time flies when you're having fun! Yes, we are having some fun at the Institute and in the welding industry in general, but, if we're honest with ourselves, it's not all fun! We're currently experiencing challenging times in the welding industry in South Africa and of course this affects the business of the SAIW.

But there's no point in sitting back and bemoaning the tough conditions. We have to move ahead and I'm glad that this is what we are doing at the Institute.

I'm pleased to report that our recent revamping of the SAIW's Inspectors programme, which now incorporates both SAIW Levels 1 and 2 with the relevant IIW programmes seems to be doing the trick as we have already seen an increased interest in the programme.

We revamped the Inspectors programme after careful analysis and research taking into account the needs and desires of the local industry. The end result is that there are great benefits in the new programme in that that it focuses squarely on national requirements in the development of local competence, and addresses directly the local needs of national skills development. This has been our most successful educational programme and we look forward to its rejuvenation!

THERE IS ALSO GOOD NEWS FROM OTHER AFRICAN COUNTRIES, WHERE WE HAVE LONG SINCE REALISED THAT THE SAIW NEEDS TO EXPAND IF WE WANT TO CONTINUE TO GROW AS, LOCALLY, THERE IS ONLY A LOW LEVEL OF CAPITAL EXPENDITURE PRODUCING PROJECT WORK, WHICH MANY OF OUR COMPANIES RELY ON FOR GROWTH.

Another encouraging note is that the SAIW Foundation is continuously contributing, in conjunction with important industry partners, in the training of students who will end up with qualifications that will enable them to get proper jobs in the industry! How important is this in times like these for young people! SAIW Foundation is currently partnered in two projects with ArcelorMittal and Afrox to provide 30 apprentices with top-class training enabling these young people to go on to become highly skilled welders and begin a life-time career in the welding industry. I urge all companies to take heed and to work with the SAIW Foundation for the good of the country.

There is also good news from other African countries, where we have long since realised that the SAIW needs to expand if we want to continue to grow as, locally, there is only a low level of capital expenditure producing project work, which many of our companies rely on for growth.

Firstly, in Mozambique the liquefied natural gas (LNG) developments are really big news! Recently, the US energy firm Anadarko Petroleum Corporation announced the go-ahead for the construction of a US$ 20 billion gas liquefaction and export terminal in

Jim Guild – SAIW Caretaker Executive Director

Mozambique. Taking into account that the Mozambique GNP is just US$ 13 billion, one can appreciate what an economic transformation the developments in LNG can bring about for that country, especially when a decision is expected later this year on another even larger Exxon LNG project.

The Anadarko project will yield 12.88 mtpa of liquified gas. It involves building infrastructure to extract gas from an Area 1 field offshore northern Mozambique, pumping the gas onshore and liquefying it, ready for further export by LNG tankers, mainly to Asia and Europe, which, as Donald Trump has explained some time ago, need to cut its reliance on Russian gas. The government of Mozambique has said the project is expected to create more than 5,000 direct jobs and 45,000 indirect jobs. Mozambique could become the new UAE!

Couple the Mozambique developments with other developments in oil and gas in Uganda and Kenya and it's plain to see that there will be many opportunities for South Africans. The types of personnel qualifications and company certifications needed for working in these projects are just what SAIW does best!

Secondly, the SAIW has been involved in training 75 welders for the O&G industry in Kenya. This has been a very successful exercise and well done to the Institute's Willie Williams who has been the chief trainer in this exercise.

So, all is not doom and gloom with the welding industry in South Africa and the SAIW! We are determined to utilise all the opportunities on this vibrant continent, to help with getting people good, solid jobs, which, after all, is the most important issue facing all of us

Help be part of this vital struggle by doing what you can!

Jim Guild
Caretaker Executive Director

ISO 3834 – a major benefit for fabricators

We have said numerous times in Fusion how important ISO 3834 accreditation is for any fabrication company. It is the "stamp of quality" and gives all end-users the assurance that they are dealing with a professional fabricator whose work is approved by the highest authority in the land.

Herman Potgieter, MD of SAIW Certification, which manages the ISO 3834 accreditation scheme, says that this is not for big companies only. It's for all companies. "In fact, smaller, lesser known companies could benefit even more because this stamp of approval shows they're on a par with the best," he says.

Potgieter adds that the demand, is such that SAIW Certification continues to get numerous requests for an explanation of the process for attaining ISO 3834 certification. "For this reason we have decided to once again show our readers exactly what has to be done", says Potgieter.

The process that has to be followed during the certification of an ISO 3834 certified company will be as follows:

1. **Enquiry** – Company contact SAIW Certification with regard to ISO/SANS 3834 certification.
2. **Marketing Visit (if required)** – Visit to the applicant company explaining the requirements of certification to ISO 3834.
3. **Submission of Proposal and Contract** – Application documentation to be send to applicant company to;
   - Establish the size of the company (small, medium or large and welding coordination personnel employed by the company)
   - Establish the scope of certification that has been applied for by verifying the product manufactured/maintained
   - Acceptance of basic "Terms and Conditions" as per contract.
4. **Proposal Acceptance** – Submission of agreement and signed contract to SAIW Certification.
5. **Application** – proof of payment to be submitted to SAIW Certification.
6. **Readiness Survey (Stage 1) audit** – gap analysis to establish compliance with the requirements of the relevant part of ISO 3834.
7. **Certification Application** – Submission of proof of payment of certification fee after a date has been finalised for certification.
8. **Certification Audit (Stage 2) audit** – After all areas identified during the "Gap Analysis" have been addressed and the applicant company is confident that all minimum requirements have been met.
9. **Clearance of Non-Conformities** – Proof of all non-conformances raised has to be sent to SAIW Certification for acceptance/approval.
10. **Certification Board Approval** – Certification recommendation report to be submitted to the Approvals Board for acceptance.
11. **Certification** – After final approval the certificate will be issued to the applicant company that will be valid for three (3) years where re-certification will be done in the third year with surveillance audits done annually in between.

For more information contact SAIW Certification on 011 298 2100

Two recently accredited companies – well done!

Pumps and Pipes Holdings

MDL Engineering

In the SPOTLIGHT

PAOLO TRINCHERO

IN EVERY FUSION WE TALK TO SOMEONE WHO HAS MADE A SIGNIFICANT CONTRIBUTION TO THE WELDING INDUSTRY AND/OR TO THE SAIW. THIS TIME WE FEATURE SOUTHERN AFRICAN INSTITUTE OF STEEL CONSTRUCTION (SAISC) CEO, PAOLO TRINCHERO. BORN IN JOHANNESBURG IN 1969 PAOLO HAS A "WONDERFUL WIFE, THREE FANTASTIC KIDS AND TOO MANY PETS TO MENTION".

F: Tell us about your life in the steel industry

PT: I have been involved in the steel industry for almost 31 years. Starting off in 1988 as a young Dorbyl structural engineering bursary student, I completed my BSc in civil engineering at WITS in 1990 and then in 1993 I did a Masters under the supervision of Professor Alan Kemp who introduced me to the workings of the SAISC, which I joined in 1998 as Consulting Development Engineer and Technology Director under the guidance of Dr Hennie de Clercq.

F: Did you ever work in the commercial environment?

PT: Yes. I became Engineering Manager at Macsteel Trading in 2003, ultimately becoming Group Business Development and Technical Director at Macsteel Corporate Services. But throughout my 11 years at Macsteel I never lost touch with the SAISC and became its CEO in 2013.

F: Why did you choose the SAISC route?

PT: I wanted to get back into engineering and contribute to the industry. Little did I realise, however, that the industry was heading into such a difficult place. After my first six months as CEO of SAISC, Highveld Steel went into business rescue and the boom times of the Soccer World Cup and the advent of the Steelwork for the large Power Station projects were really part of the past. The result is that currently we are faced with much tougher times in the steel construction industry in the Southern African region where large projects are few and far between and international competition is growing. The challenge now is to focus on the good things happening in the industry and rebuild capacity as our economy gradually improves.

F: How did you get involved with the SAIW?

PT: My first experience of the SAIW was as a first year civil engineering student at WITS. During our end of year experiential training in all things steel we went to the SAIW to learn more about welding and had great fun doing practicals and learning how to weld. I am not sure if our teachers and supervisors had quite as much fun as we did but our welds as you can expect were "perfect!"

Throughout my early engineering career, especially my time at WITS and on starting a new business within the Macsteel stable, the SAIW has been there to assist with great technical advice and training.

F: What do you feel about the SA welding industry and its future?

PT: Fortunately, the SA welding industry, which is a high-quality industry, does not depend on construction alone but also on a wide range of manufacturing, which helps to keep them going.

In the meantime the mining, manufacturing and construction industries will recover and the demand for skilled, well-trained people in the industry will return which will be good for the industry and for the SAIW.

F: What do you feel about the role that the SAIW plays in the future of the welding industry in SA?

PT: The SAIW plays a critical role in all fields that require welding and welding technology. The unique services they offer and the broad spectrum of the welding community means that the SAIW will continue to play a significant role in all things welding in Southern Africa and in Africa!

In addition to this they are a critical link to maintaining quality and international standards in our, and the continent's manufacturing community. I would like to encourage industry to utilise their services as they are a key link in the steel construction supply chain.

F: Thanks

Focus on courses

5-Day Welding Appreciation Course for Engineers

In many companies a mechanical or electrical engineer, engineering superintendent or engineering supervisor is given the responsibility of manging 'the welding department'. Often this engineer will have absolutely no welding background and almost certainly his/her university or college study programme will have included no training in welding technology at all.

Often engineers have no welding background. This course is of great benefit.

If the engineer is lucky, he may be assisted by an experienced welder or, if very lucky, a welding supervisor but this is not enough to accept the responsibilities assigned to him/her.

For these reasons the 5-Day Welding Appreciation course is one of the Institute's oldest courses and definitely one of its most successful says Shelton Zichawo, the SAIW Training Manager. '

"The course was developed in the early 1980s when it was derived from an in-company training course SAIW ran for AECI engineers. As time went on the course also became very popular with Sasol and Eskom engineers who attended as part of their professional development," says Zichawo.

He adds that the course is definitely not only for big companies. "It is an extremely important course for engineers working in smaller companies where there is very little in-house backup for the engineer who has to be a jack-of-all-trades."

The course content covers the common welding processes and their applications. It describes the effect of welding on materials and welding defects and their causes. The need for qualified welding procedures and how to go about specifying them are also discussed.

Very importantly engineers are encouraged to bring their welding experiences and problems to the course for sharing with the class in discussion. "It is surprising how many problems are similar and shared in a class of students," says Zichawo. "We try to introduce the engineers to the complexities of welding, inform them of what can go wrong, the consequences of a failure including economic failure and how they should go about managing the welding function to avoid major issues," Zichawo says.

It's very much about helping the engineer to know and be aware of when he or she needs to bring in specialist help. The case history discussion period is held at the end of the course and is often one of the most helpful parts of the course for the engineer.

The 5-Day Appreciation course can be held in-company and anyone interested in running the course should call Shelton Zichawo on 011 298 2100. The next pubic courses are scheduled for 12-16 August in Cape Town, 16-20 September in Durban and 21-25 October in Johannesburg.

For more information please contact the SAIW on 011 298 2100.

Cape Town RT Interpreter Course

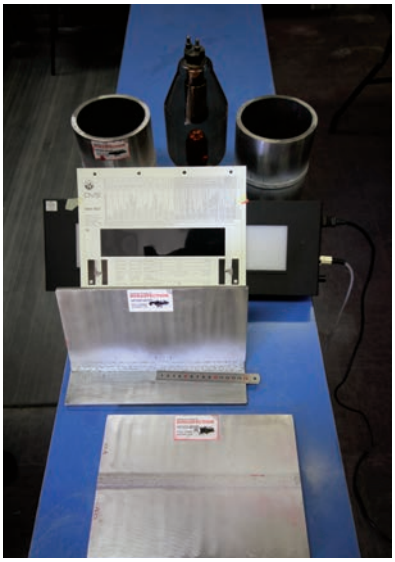
The Institute recently successfully ran the RT Interpreter course at its Cape Town branch in Milnerton with Hugo Vaughn as course lecturer.

Mark Digby explains that the course is intended for welding inspectors or engineering personnel wanting more in-depth knowledge of relevant codes of construction such ASME Section V Article 2 and Section VIII UW 51 and Appendix 4 as well as EN and ISO Codes.

Qualification as an RT Interpreter is a requirement for certification as an **Inspector of Pressurised Equipment**.

The RT Interpreter course is also offered in Durban and Johannesburg and can be arranged as an in-company course.

For more information on NDT courses running in Cape Town please contact Liz Berry at the Milnerton office on 021 555 2535 or Mark Digby in Johannesburg on 011 298 2120.



NDT – Liquid Penetrant Testing

INTRODUCTION

One of the most popular NDT training courses currently offered at the SAIW is Liquid Penetrant Testing. This dye-penetrant surface technique is often the 'first step' for NDT personnel in unlocking the numerous career opportunities in the exciting field of NDT. The method is offered at Level 1, 2 or 3 depending on the technician's experience level and/or company's need.

Since 1935, due to the growing use of light alloys and stainless steels, which could not be subjected to magnetic particle testing, the dye penetrant inspection method was developed. Continual research has perfected reliable and effective penetrant inspection products.

General Description

Penetrant or liquid penetrant testing (PT) refers to a surface type non-destructive testing method that allows a liquid (containing dye to increase visibility) to fill an empty void, which is open to the surface, due to the capillary action of the liquid.

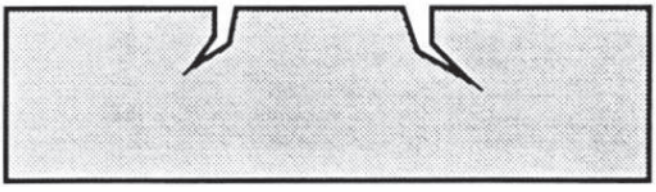
Once the excess penetrant is removed from the surface a developer is applied to the surface which allows the penetrant to be absorbed into a contrasting medium (normally white powder) revealing the presence of a discontinuity. Penetrant testing can effectively be applied to any type of material, as long as the discontinuity sought, is open to the surface.

The PT method offers the following advantages:

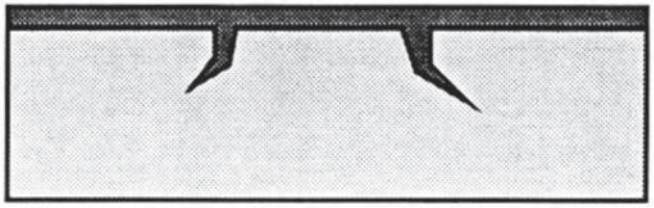
- Can be used to test a variety of different materials whether Magnetic or Non Magnetic
- Detects defects that are open to the surface and most detrimental to the strength of the part, e.g. Fatigue cracking
- Tests are quick, easily applied and relatively inexpensive
- Penetrant testing is very sensitive to fine surface cracks
- Easy to apply to and test components of complex geometry
- Flaws can be easily seen and remain so until wiped off, thus facilitating accurate repair

Basic principles of dye penetrant inspection

Step 1 - Preparation of the surface which consists in making the defect emerge and/or freeing it from any bodies that may prevent the infiltration of the penetrant product. (E.g. pickling, removing grease, etc.)

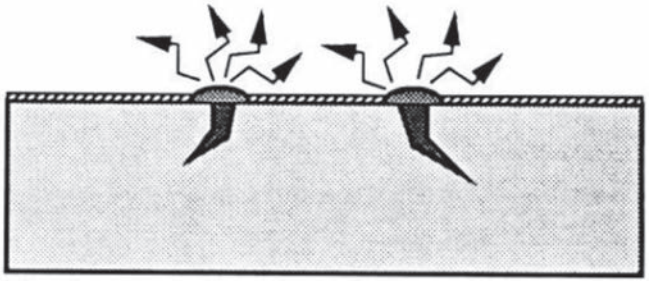


Step 2 - Application of the penetrant onto the surface to be inspected for a duration that is long enough to allow the penetrant product to infiltrate into the defects.



Step 3 - Elimination of the excess penetrant from the surface to be inspected. This operation should not remove the penetrant from the defects.

Step 4 - Application of developer made up of capillary agents which make the penetrant bleed out of the orifices.



Step 5 - Examination of dye penetrant inspection results.

Step 6 - Cleaning the surfaces post-test and surface protection. The surfaces are cleaned usually using the same process as pre cleaning.

Step 7 - If necessary, a protective cover is applied to store the parts.

For more information on this course or any other NDT Training courses please feel free to contact the NDT Training Manager Mark Digby on 011 298 2100 or go to our website on www.saiw.co.za

SAIW Foundation

Join with SAIW Foundation in implementing social responsibility projects

SAIW Foundation is currently partnered in two projects with ArcelorMittal and Afrox which are providing 30 apprentices with top-class training, enabling these young people to go on and to become highly skilled welders and begin a life-time career in the welding industry.

In these joint projects SAIW provides the required institutional training and the work- place training is either provided by the partner employer company or the partner company assists in placing the apprentices with an employer organisation. Both projects are well underway and headed for success.

The Foundation is also providing training for two International Welding Technologist students, Landi Xaba and Mmaphete Boipeto Robin Phete. They are now about halfway through the IWT programme and there is every indication they will be successful in achieving the coveted IWT qualification.

SAIW Foundation was established in 2013 as a not for profit company to provide training and qualification opportunities to needy students. The Foundation is funded by donations and is able to provide tax certificates allowing companies to deduct donations from taxable income.

THE MANAGEMENT TEAM AT SAIW BELIEVES JOINING WITH THE SAIW FOUNDATION TO ADDRESS SOCIAL RESPONSIBILITY IS ONE OF THE MOST REWARDING INITIATIVES A COMPANY CAN UNDERTAKE.

"There is a great opportunity for our industry members and clients to join with SAIW Foundation to use all or part of their social expenditure to train people an let them achieve qualifications which will stand them in good stead for a life-time ahead," says SAIW Caretaker Executive Director, Jim Guild.

IN THESE JOINT PROJECTS SAIW PROVIDES THE REQUIRED INSTITUTIONAL TRAINING AND THE WORK-PLACE TRAINING IS EITHER PROVIDED BY THE PARTNER EMPLOYER COMPANY OR THE PARTNER COMPANY ASSISTS IN PLACING THE APPRENTICES WITH AN EMPLOYER ORGANISATION. BOTH PROJECTS ARE WELL UNDERWAY AND HEADED FOR SUCCESS.

He adds that donations to SAIW Foundation can be as large or as small as the donor company wants. "Perhaps a company wants to provide funding for just one or two young students to obtain a welding or non-destructive testing qualification such as International Welding Technologist, SAIW and IIW Welding Inspector or Surface and Volume testing NDT qualifications to give them a start to obtain a job" he says.

Guild explains that in these cases the Foundation can do all the 'leg-work', identify and recruit the beneficiaries and try and help them find work. But the donor company has the benefit of being recognised as the awarding donor.

Alternatively, the company may want to join in a substantial project and play a significant role as well as being the funding donor. The current ArcelorMittal and Afrox projects are good examples of this type of project.

In all cases, part of the donation is tax deductible.

The management team at SAIW believes joining with the SAIW Foundation to address social responsibility is one of the most rewarding initiatives a company can undertake. The donors are helping needy beneficiaries to get a qualification which will stand them in good stead for life.

Interested companies should please contact either Etienne Nell or Michelle Warmback on 011 298 2100.

Landi Xaba and Mmaphete Boipeto Robin Phete seen with their SAIW lecturer David Makoge (middle)

SAIW trains Kenyans

For many years the SAIW has been extending its services all over the continent of Africa. "It's one of the most important things that we do," says SAIW Caretaker Executive Director, Jim Guild. "One of our most important missions has been to work with our African partners to ensure that together we build an African welding industry that is dynamic and always up to speed with the latest in welding technology. It is also good for SAIW business."

In its latest venture the SAIW has played a major role in training two Kenyan trainers to be able to run training courses in Shielded Metal Arc Welding (SMAW) and then helping those trainers to do the necessary in the training of 75 Kenyan welders.

The lead trainer was SAIW's Willie Williams. "Our task was to train the 75 young Kenyan welders to achieve an internationally recognised diploma in SMAW. The overall training was for six months and I was there for two of those months supervising the newly-trained Kenyan trainers. Altogether it was a very successful operation," says Willie.

The buoyant oil and gas industry in Kenya has created a significant demand for local welders and, unfortunately there has been a serious dearth of such people in the country. This has prompted the founding of the local welding school, the East African Institute of Welding (EAIW), which is overseeing the SMAW training in Kenya. The EAIW is in the process of being accredited by the SAIW.

In the meantime, the Kenyan welders will be certified by SAIW Certification to ensure the global acceptance of their diploma.

"We are delighted to be part of this process and our next step will be to assist in training Kenyan welders in Gas Tungsten Arc Welding (GTAW), which is also crucial for the oil and gas industry. We look forward to a long and successful association with the EAIW," concluded Jim Guild.

Kenyan welders being trained with the assistance of SAIW. Willie Williams was Trainer in Chief.

And more from Africa

SAIW's Etienne Nell says that the programme to start providing specialist support in Kampala, Uganda, is on track.

The original MOU that was recently signed between the company Solid Rock and Total Uganga agreed that the SAIW would provide specialist training and lecturing to welders in Uganda.

Nell says that this is an excellent initiative with huge possibilities for growth for both the SAIW and the welding industry in Uganda. He adds that training will start within the next few months.

"We originally pitched for this against Chinese companies and we were the preferred supplier as a result of our superior understanding of African welding markets and, of course, our knowledge and procedures, which are world class.

Etienne Nell

JOB KNOWLEDGE 129

The previous article dealt with the manual scanning method of ultrasonic examination stating that accurate determination of weld flaw size and position - to within ±2mm - was difficult, if not impossible, in most circumstances. Methods developed now enable flaw sizes to be determined with accuracy better than ±1mm. This article will look at two of these techniques; time of flight diffraction (TOFD) and phased array ultrasonic testing (PAUT).

Conventional manually scanned ultrasonic testing normally uses a single fixed angle and frequency probe; the position and size of a flaw being determined by the amplitude of the signal reflected from the flaw and presented on an oscilloscope screen (Fig 3 in Job Knowledge 128). This is a somewhat unreliable method as the amplitude of the signal and therefore an estimate of its size depends on the orientation of the flaw. TOFD uses two angled compression wave probes mounted on a frame so that they are a fixed distance apart; one a transmitter, the other a receiver. The probes are positioned either side of a weld as shown in Fig 1. In a flaw-free weld two sound waves will be detected by the receiver – one that travels along the surface of the weld, the lateral wave, and one reflected from the back wall. When a flaw is present (for example a crack as shown in Fig 1) the pulse emitted by the transmitter is diffracted or scattered from the tip of a flaw and this diffracted signal is picked up by the receiver.

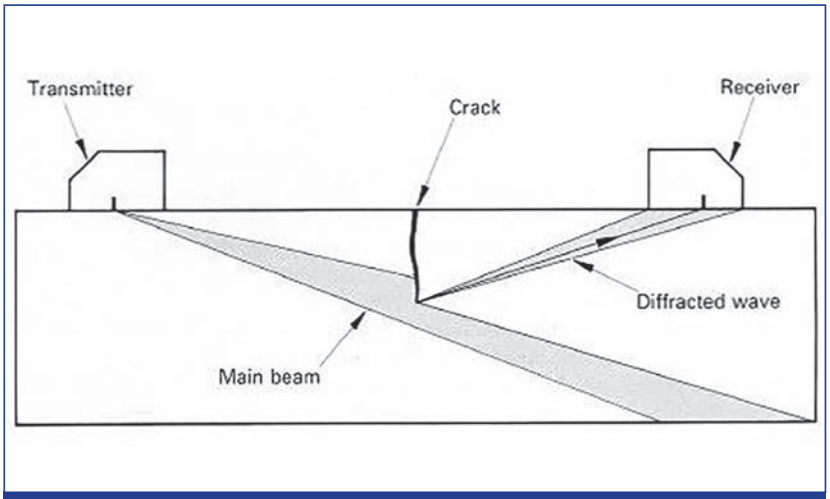


Figure 1: TOFD

TOFD USES TWO ANGLED COMPRESSION WAVE PROBES MOUNTED ON A FRAME SO THAT THEY ARE A FIXED DISTANCE APART; ONE A TRANSMITTER, THE OTHER A RECEIVER.

The time of flight of the signal is measured and compared with that of the lateral wave, a simple calculation enables the position of the tip of the flaw to be determined. Moving the probes in a predetermined scanning pattern enables the other end of the flaw to be detected so the flaw size can be established in both the trough thickness and longitudinal directions. The calculations are performed automatically by the software program within the equipment and the flaws displayed as a black and white A scan image.

Various scanning patterns may be used so that the results can be presented as A-scan, B-scan, looking along the weld length or D-scan, a side view. (For a description of A, B, C and D scans see Job Knowledge No. 127).

TOFD is regarded as the best method for the detection and sizing of planar, through-thickness flaws. One limitation is the detection of small surface breaking flaws on the scanning surface as these tend to be lost in the lateral wave response, although this may be not too significant as most surface breaking defects can be readily detected using MPI or liquid penetrant methods.

The rapid progress of electronics and computing power has enabled complex methods of scanning and data processing to be developed. This has culminated in phased array ultrasonic testing (PAUT) which, as the name suggests, uses an array of small transducers

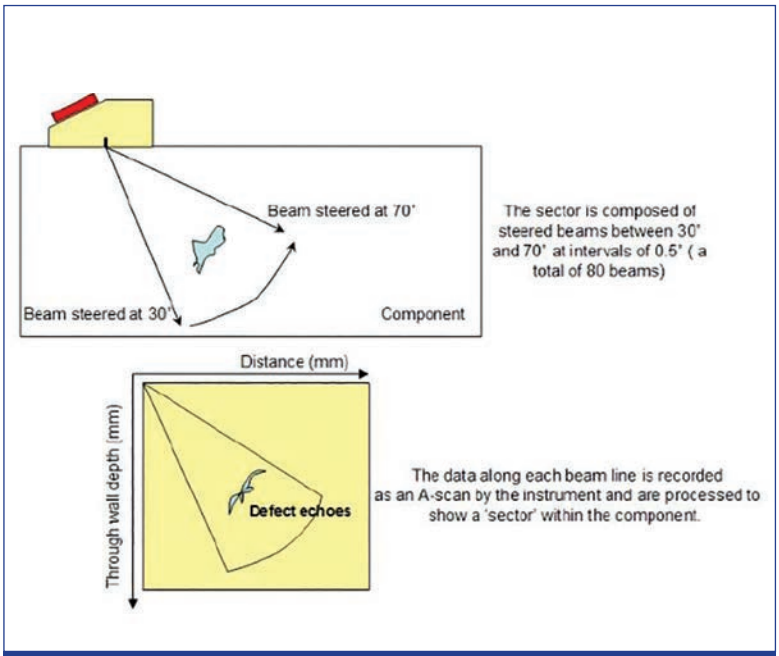


Figure 2: Illustration of the sector scan composed of many A-scans from the beams being steered through a range of angles. Note that, in addition to steering the beam, the focal law may also be focusing the sound field to improve defect detection and resolution

JOB KNOWLEDGE 129 (CONTINUED)

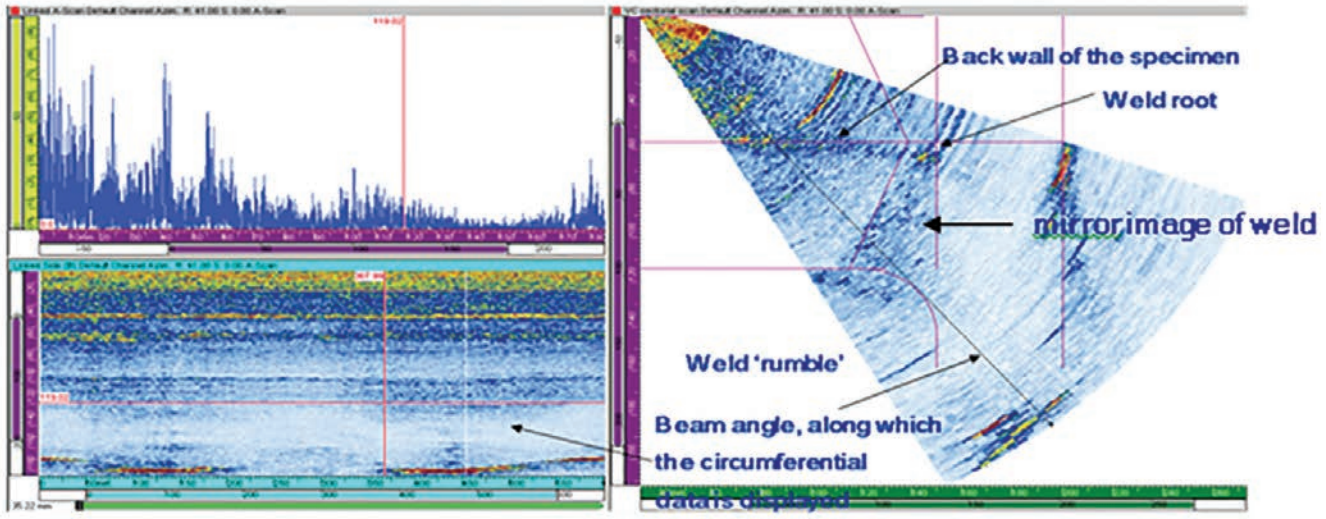


Figure 3: Phased array results showing A-scan, B-scan and S-scan of a nozzle to shell weld

unlike the conventional manual A-scan probe with only one transducer. A single PAUT probe may contain between several tens and several hundreds of transducers. These small transducers are computer controlled and can be pulsed independently in a set sequence or phase; the pulses of sound interfering with each other to produce a sound beam of a certain angle, see Fig. 2. By varying the time and pattern of the pulses, the angle and shape of the beam can be varied so that the beam can be steered electronically, sectorial scanning or S-scan.

FOR THE NON-DESTRUCTIVE EXAMINATION OF WELDS THIS ABILITY TO INSPECT A WELD WITH MULTIPLE ANGLE BEAMS FROM A SINGLE PROBE MEANS THAT THE PROBABILITY OF DETECTING FLAWS IS GREATLY INCREASED.

The benefits of this technology compared with conventional single transducer scanning are that the beam can be steered and focused with a single probe. Beam steering enables the beam to be swept through an object without moving the probe, the reflected data being processed to provide a visual image of a cone shaped slice through the object. Moving the probe enables a large number of slices to be assembled to provide a three dimensional image – a good example is the use in medical diagnostics to examine the functioning of the heart in real time.

For the non-destructive examination of welds this ability to inspect a weld with multiple angle beams from a single probe means that the probability of detecting flaws is greatly increased. It is also possible to focus the beam electronically at multiple depths to improve the ability to accurately determine the size and position of weld flaws.

The small probe size and the ability to manipulate the beam without moving the probe enables inspections in limited access or of components of a complex shape. Cost is also a factor – although the probes and the processing/display units are more expensive than the single transducer equipment, the time to perform a scan can be substantially reduced. Work carried out by TWI suggests that a phased array scan can take 20% of the time for a conventional scan with better coverage although the off-line interpretation of the results may take longer.

The results may be presented as S-, A-, B- or C-scans, enabling better interpretation. The results of a phased array examination of a single sided nozzle to shell weld is given in Fig. 3. The weld shape is given by the red lines superimposed on the S-scan display. This is a single sided weld, the lower half of the image being a mirror of the weld. Whilst the scanning operation may be performed automatically by mechanised manipulating equipment and the accuracy may be better than ±1mm, the interpretation must be carried out by experienced and skilled personnel trained specifically in the interpretation of phased array scanning results. An investigation by TWI showed that the skill of the individual carrying out the interpretation was by far the most important factor in producing reproducible and accurate results.

Scanning can be performed manually or with the probe attached to a carriage. A typical application is the examination of pipe butt welds using orbiting crawler tractors

WORK CARRIED OUT BY TWI SUGGESTS THAT A PHASED ARRAY SCAN CAN TAKE 20% OF THE TIME FOR A CONVENTIONAL SCAN WITH BETTER COVERAGE ALTHOUGH THE OFF-LINE INTERPRETATION OF THE RESULTS MAY TAKE LONGER.

Such dedicated and robust mechanised equipment is readily available for site use, replacing radiography and giving benefits in terms of cost, flaw detection and health and safety issues.

An excellent example of the capabilities of PAUT is given in the article 'Measuring the crack growth rate (da/dt) of a fatigue crack using phased array ultrasonics' by Channa Nageswaran, Principal Project Leader at TWI.

This article was written by Gene Mathers.

Qualification and Certification

CONGRATULATIONS TO THE PEOPLE BELOW WHO RECENTLY ACHIEVED QUALIFICATION AND CERTIFICATION

COMPETENT PERSON-PRESSURE VESSEL

Barnard FJ
Booysen CHZ
Govender S
Hartzenberg GL
Mavuso MZ
Modimola RS
Thulukanam R
Toolsee CM
Venn JR
Wright PT
Yunus MM

Competent Person Boilers

Mashiyane NF
Msibi MS

Inspector of Pressure Equipment

Adams CJ
Le Roux A
Msibi MS
Stoman S

MT 1

Groenewald AC
Jodo SP
Mabuza NR
Machipa AR
Mafadza F
Malatjie S
Mavimbela LP
May MR
Mogwaneng OM
Molala PM
Msimanga ME
Myeni TM
Ndaka TS
Nhlabathi BB
Nkosi EK
Nkosi JS
Ntshangase LC
Rufu I
Shanbangu SS

MT 2

Karrim JA
Aphane ME
Conradie ML
Duffy MJC
Epoh LR
Khoza LT
Maganedisa MD
Masawi WK
May MR
Meyer J
Mills TC
Mkasi
Mlangeni ME
Modise MP
Motaung ST
Mthabela JJ
Mthombeni NE
Nzima RX
Petersen G
Peterson OM
Scherman A
Sham JD
Thwala AM
Tlailane TR
Tshikalange S
Van Den Berg DH
Watson D
Weber J

PT 1

Gabuza JS
Govender D
Malatjie S
Mavimbela LP
May MR
Mngeni NP
Mogola AN
Mogwaneng OM
Msimanga ME
Myeni TM
Nemakonde K
Nhlabathi W
Nkabinde Y
Ntshangase LC
Phatsoane A
Rafu I
Shabangu SS
Siboiya ZG
Sithole TF
Skosana JE
Tshabalala SS

PT 2

Karrim JA
Aphane ME
Bartman CR
Brits PF
Conradie ML
Duffy MJC
Govender L
Hlatshwayo NS
Jordaan JDBL
Maganedisa MD
Makongoza K
Malakoane DJ
Masawi WK
Matshela KT
May MR
Metsana MC
Mhlanga TL
Mills TC
Nkosi JS
Nkosi SS
Nzima RX
Petersen LN
Scherman CJ
Seabi TJ
Sham JD
Tlailane TR
Watson D

UT1

Cerovich BR
Malepe LR
Mkasi C
Monama LP
Msimanga T
Nhlapo M
Perumal K
Peterson OM
Ruthman JJ
Sithole WM
Van Rooyen L

UT 2

Machaha CTM
Mahlangu DH
Makongoza K
Nzima RX
Peterson JP
Scherman CJ
Sham JD

UT WALL THICKNESS

Willenberg GA
Moloi LI
Blignaut JJ
Conradie ML
Durman MB
Guza CH
Hadebe M
Hlongwane SM
Jordaan JDBL
Khumalo N
Kubheka A
Le Roux JP
Lehlalerwa MM
Madiseng K
Malungake N
Marumo MS
Masango NJ
Masebe WT
Masemola PM
Matlhabe SJ
Matshika S
Mkhonza NN
Mngeni NP
Mokete T
Mtsweni PP
Mulaudzi M
Nkosi BJ
Petersen G
Shanbangu BT
Stuurman ZA
Thokoane KM
Watson D

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Luthuli LA
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Makaya G
Manana LC
Marebane YL
Maseko BA
Maseko KN
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IWIP - BASICS

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Mthimunye W
Ndlovu T
Sambo S
Nkosi XP
Thabethe NM
Zuma SH
Bellew RJ
Bidounga N
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Botha AW
Botha J
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Chauke T
Chetty JR
Cleophas WM
Cockman M
Digomo EM
Dlamini NTP
Dlamini NZ
Dlamini PN
Dos Santos MR
Dunn JG
Elrix HG
Engelbrecht WJJ
Fabeku HO
Firmin AC
Fisher RRJ
Gama NVE
Godwin DD
Gilbert TJ
Goba NF
Grobler J
Gunkel KA
Haynes A
Hendricks K
Herbert ZY
Hlatshwayo S
Horn S
Janse Van Vuuren WP
Kekana RK
Kekana T
Kgole MM
Khanyile NP
Khumalo B
Khumalo SP
King KL
Kleinsmith L
Kogate MP
Kok HJR
Kok TD
Langwood J
Lefakane EK

Qualification and Certification

Lefeea NR
Loots O
Lottering D
Mabuza MS
Mahlalela IM
Mahlambi N
Mahomed S
Maila MP
Makama M
Makgwahlela NS
Malinga MW
Mapatlanyane EM
Marais BL
Maregedze TS
Mashaba ER
Masilela SC
Masombuka BV
Mathenjwa FR
Mathonsi FV
Mavuso BC
May MR
Mazantsana MS
Mbambo SA
Mbongwa NG
Meje L
Mgwenya MD
Minnie H
Mkhabela AD
Mkhabela MG
Mkhungo FS
Mlangeni SE
Mmatli K
Mndawo LP
Mnyakeni J
Mogale TD
Mohlala BD
Mokgotho MJ
Mokua KR
Moloantoa MC
Moola JY
Mphatlanyane MS
Mthimunye DC
Mthimunye NF
Mtshali DV
Mushunje J
Myeni BW
Mzoyi N
Naicker D
Naidoo V
Naidoo J
Ndleleni B
Ndlovu SE
Nene CM
Nkambule TP
Nkosi NL
Nkosi NG

Nkosi SK
Nkuna R
Nkwanyana BP
Nordien D
Ntuli TF
Nxumalo S
Paul CB
Peta MS
Pieterse WM
Pillay D
Pillay W
Pretorius CJ
Radebe PN
Reddy KS
Roos C
Saunders DR
Shabalala NMC
Shabangu PH
Shadung MIJ
Shandu ZB
Shoaib M
Shuumbwa M
Sibeko ML
Sikhakhane NF
Silinda SL
Sithole S
Skhosana SC
Slater KS
Smuts MG
Somakahle NP
Spies JH
Starbuck J
Steenkamp IR
Steyn CJJ
Swanepoel TA
Swartz CK
Thobela MJ
Thobela ME
Tholo W
Toon DJ
Tshabalala XP
Twala MM
Van Der Merwe V
Van Niekerk D
Wilson PJA
Xulu XV
Zita ZJ
Zondo BV
Zulu NN

Basics of Welding Control

Barnard V
Buthelezi K
Chiloane BT

Dahile T
De Beer HM
Dhladhla NF
Dlamini GJ
Dlamini MS
Dlamini TP
Dlamini T
Dlamini ZF
Erlank GF
Fisher L
Gama SE
Hlophe SA
Jacobs S
Jiyana LB
Juqu MA
Khan AM
Khoza SO
Khoza JM
Khumalo S
Khumalo TM
King JH
Kleinsmith L
Koom SSP
Kubeka LW
Kunda E
Lloyd QC
Locke JP
Luthuli TN
Mabaso MZ
Mabaso N
Mabundza NW
Maccario AA
Mafuleka NJ
Mahlalalela N
Mahlalela F
Mahlalela S
Mahlangu SE
Mahlangu SL
Mahlangu SN
Mahlobo MS
Makhubu SI
Malherbe SA
Malinga MW
Mamba KR
Mambuvu R
Manamela MRM
Manavhela RE
Manhlangu MC
Maphanga MP
Marais LA
Maredi IL
Maree J
Masanabo MM
Maseko NF
Mashele S
Mashinini K

Mashinini PP
Masina FS
Mathebula AT
Mathumbu ET
Mavuso MT
Mavuso NE
Mavuso SA
Mbatha NS
Mbatha LI
Mbokazi SM
Mdhluli FW
Mdluli CU
Mgwenya LI
Mkhabela AD
Mkhavele NW
Mkhonza MT
Mkhwanazi AD
Mkhwanazi XC
Mlotshwa SC
Mngomezulu KM
Mnguni NP
Mnguni SN
Mnisi N
Mnyakeni J
Moahloli K
Mogoaneng RP
Mohlala TG
Mokoena MA
Mokoena MP
Moloisane TB
Motshabaesi T
Msweli M
Mthimunye NF
Myeni BW
Nala MM
Ndlovu SV
Ngcobo T
Ngobeni NC
Ngomane SS
Ngubane VS
Ngwane BW
Nhlanhla CCT
Nkomo KS
Nkosi MS
Nkosi MV
Nkosi NG
Nkosi PJ
Nkosi TP
Nkutha ZA
Ntshanage MH
Ntuli S
Oliver CE
Olivier S
Palitha T
Peyana V
Pieterse WM

Pillay EC
Qwelani A
Radebe SI
Ramaotswa PM
Rantshabeng G
Mashego MS
Reddy TJ
Roolvink L
Rust A
Saul-Iwane NV
Schalkwyk SJ
Seboko J
Selepe BH
Setati MP
Shabalala SE
Shai R
Sibeko V
Sibindi S
Sibiya L
Simelane BL
Simelane ZI
Sithole JP
Sithole NH
Siwela M
Steenkamp IR
Steffen A
Tembe MC
Tembe NZ
Thoka S
Van Der Merwe V
Van Jaarsveld L
Vilikazi HG
Vilikazi MT
Weatherby-Boehm G
Zulu SJ
Zwane N

RT 1

Andries CL
Mafiri ER
Malgas KFP
Sibanda T
Thokoane J

RT 2

Alawad SAS
Fouche AR
Marais JO
Murphy CT
Ntombela RM
Pretorius JH
Ramohlokoane SG
Smit RS
Walgenbach MA

Weir M
Tugwana MD

Visual Testing

Adendorff FB
Baloyi NC
Botha FC
Bowman WD
Brits PF
Combrinck H
De Kock R
Dreyer LI
Duffy MJC
Engelbrecht PR
Fouche AR
Genis CD
Govender D
Hato M
Hoffman EM
Hunter LJ
Jooste JP
Kriel J
Labuschagne J
Lottering DN
Malaza BNL
Mathebe JS
McGarrie G
Meerholz SG
Mhlongo DM
Moodley TG
Motsaalore KP
Mthimunye BR
Ndala ZL
Ngubane A
Schnetler RH
Schoeman MA
Smith C
Smuts JJ
Smuts SJN
Van Der Berg H
Van Der Berg RJ
Venter JA
Wilding SN

RT Interpreters

Adams CJ
Coleman D
Maneckchund V
Moloi ST
Rodrigues CM
Tshirema R
Van Niekerk C

Focus on standards

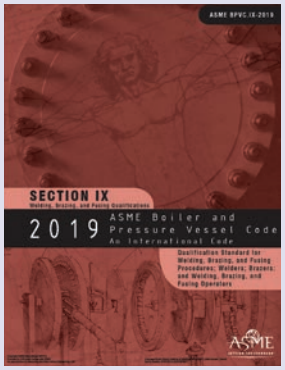
Riaan Loots

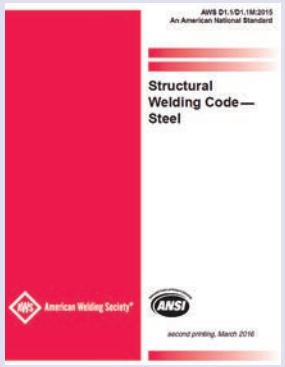
Riaan Loots

INTRODUCTION

Welding standards are always being reviewed, updated and revised. The policies and timelines for new editions are unfortunately different between the main standards being utilised in South Africa, for example ISO standards will cover a full six step process that might run the course over a couple of years. ASME is currently publishing a revised version every 2 years for the Section IX part of the Boiler and Pressure Vessel Code and the American Welding Society (AWS) is currently on a 5 year publication cycle for the popular D1.1 standard.

This might lead to some confusion with regards to the usefulness and applicability of an organisation's existing welding documentation (PQRs, WPSs and Welder Performance Certificates). In this article, the relevant sections of the most popular standards/codes used in South Africa will be quoted directly from the most current version of the standard.





ISO 15614-1: 2017

Introduction

*All **new** (emphasis by author) welding procedure tests are to be carried out in accordance with this document from the date of its issue. However, this document does not invalidate previous welding procedure tests made to former national standards or specifications or previous issues of this document.*

ASME IX: 2019

QG-108 QUALIFICATIONS MADE TO PREVIOUS EDITIONS

*Joining procedures, procedure qualifications, and performance qualifications that were made in accordance with Editions and Addenda of this Section **as far back** as the 1962 Edition **may be used in any construction** for which the **current Edition** has been specified. (All emphasis by the author)*

*Joining procedures, procedure qualifications, and performance qualifications that were made in accordance with Editions and Addenda of this Section **prior** to the **1962** Edition **may be used in any construction** for which the **current Edition** has been specified provided the requirements of the 1962 Edition or any later edition have been met. (All emphasis by the author)*

*Procedure specifications, PQRs, and performance qualification records meeting the above requirements **do not require amendment** to include any variables required by later Editions and Addenda, except as specified in **QW-420***. *Qualification of **new** procedure specifications for joining processes, and performance qualifications for persons applying them, shall be in accordance with the current Edition of Section IX. (All emphasis by the author)*

*(QW-420 covers the Base Metal Groupings and is not intended to be quoted for this article).

AWS D1.1/D1.1M: 2015

4.3 Common Requirements for WPS and Welding Personnel Performance Qualification

4.3.1 Qualification to Earlier Editions. *Qualifications which were performed to and met the requirements of **earlier editions of AWS D1.1 or AWS D1.0 or AWS D2.0** while those editions were in effect are valid and may be used. The use of earlier editions shall be prohibited for new qualifications in lieu of the current editions, unless the specific early edition is specified in the contract documents.* (All emphasis by the author)

What is quite clear from all the standards mentioned above, is that existing documents are quite valid, once the requirements as stipulated in the applicable standard has been met. New documents must be written or qualified to according to the latest/current version of the applicable standard. For example, an ASME IX: 2007 PQR can be used to write a new WPS, covering the essential variables and adhering to ASME IX:2019 and any new welder or existing welder without the applicable qualified ranges will be tested according to ASME IX: 2019.

For any assistance or enquiries with regards to your existing and or new welding documentation, please contact SAIW Technical Services at (011) 298 2100 or info@saiw.co.za

Don't miss the 2019 SAIW Annual Dinner

Friday, 25 October 2019

BOOKING FORM

Please send the following information to Dimitra Kreouzi on dimitra.kreouzi@saiw.co.za

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Company Name	
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VAT Number	
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COMMENTS OR ANY ADDITIONAL REQUIREMENTS	

BOOKINGS CLOSE ON 16 OCTOBER 2019 – BOOKINGS IS ON A FIRST COME FIRST SERVED BASIS

Meet the SAIW Team

We'd like you to get to know the SAIW better so you can see what we do and how well we do it. There's no better way than through the stories of our people. Please meet Liz Berry, Western Cape Area Representative

The name Liz Berry has become synonymous with the Cape Town branch of the SAIW, which she has formally managed since 2014. Originally, through a colleague at Oerlikon South Africa (OESA), where she was working at the time, she joined the CT SAIW committee. It wasn't long before Jim Guild asked her to manage the CT branch on an informal basis. The rest is history.

Liz Berry

Liz was born in Queenstown, Eastern Cape and attended Queenstown Girls High. Immediately after school, like all sane young women, she took a gap year ending up farming in Australia for several months.

On her return she took a job at a small Cape Town hotel where she remained for eight years. "I did everything there! I was receptionist, accountant, room service manager, dining room manager, you name it. I really enjoyed my time there and because my responsibilities were so diverse, I learnt a lot," says Liz.

During this time a friend of hers from the hotel was offered a job at OESA, which she couldn't take up. She told them that she had someone else perfect for the job – Liz Berry. And so began Liz's love affair with the welding industry.

In 2014 the CT branch was formally opened and Liz was now fulltime! "I've loved working in the branch and even though things are a bit tight at the moment we're doing what we can to keep business going on a strong basis. I have high hopes for the welding industry in Cape Town and this will obviously benefit the Institute," Liz says.

Since having joined the SAIW Liz has completed her Inspector Levels 1 and 2 and has done several courses associated with the IPE qualification.

Liz is married with two grown up kids and she enjoys reading, outdoor activity and gets a great kick out of the natural environment.

BRANCH NEWS

Durban Golf Day

The SAIW Durban Golf Day once again bettered par!! Traditionally the branch has utilised this day to show its appreciation to clients and suppliers who have supported the branch over the years. It has always been a successful networking experience and 2019 was no different!

Congratulations to the winners from DMR Stainless Steel Suppliers – from l-r Suraj, Collin, Pradeep and Sivon

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