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COVER PAGE

New Transmig 200i & 250i Welding Inverters

In November 2011, CIGWELD released the Transmig 200i and Transmig 250i single phase Multi-Process Inverters with power factor correction (PFC). These units are capable of performing three welding processes from the one unit, including GMAW/FCAW (MIG), MMAW (Stick) and GTAW (Lift TIG).

The 200i and 250i are packed full of functional and safety features suitable for the serious tradesperson/ fabricator who is looking for the total welding package and value for money.

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ENGINEERING (AND OTHER) CHALLENGES WITH OFFSHORE FABRICATION

INTRODUCTION

'Offshore' steelwork fabrication presents many challenges, including the tyranny of distance, variation in country design and fabrication standards, language (both written and verbal), cultural differences, contract and legal implications and of course budget, schedule and quality outcomes.



This paper explores a variety of issues that are likely to be encountered, both of a technical and non-technical nature, when steelwork fabrication is conducted in a location other than where the final product will be located for use.

The modern world of 'free trade' and minimising trade barriers is perceived to be made very simple by Politicians with the release of a policy, all with the best intentions of working together across a variety of borders. The reality however is somewhat different, particularly when the industries affected by these particular policies are governed by local regulations and by extensive interrelated technical requirements, also particular and possibly peculiar to the local environment.

Technical requirements are often governed by dozens of standards, all of which are potentially localised and may even be referenced as mandatory in statutory regulations. Whilst the 'ISO' suite of standards is an attempt by some parts of the world's technical population to create a 'standardised' planet, there is by no means a set of 'world standards' that govern even the most simple of structures.

Infrastructure Owners and their project personnel need to develop strategies for tendering, bid/tender evaluation, procurement, quality control, transport, delivery, erection, use and maintenance of structural steel that are different from those conventionally employed when design, materials, fabrication and erection all occur in the same jurisdiction.

These strategies need to address each phase of procurement and use, including the correlation between the standards used for design, fabrication and use.

This paper will describe what many will consider obvious. However, the application of management strategies to deal with the issues identified, including

their interrelationships, is generally far less obvious to see in action.

LOCAL' VERSUS 'OFFSHORE' FABRICATION

'Local' Fabrication

'Local' fabrication can be described as the situation where the design, materials, fabrication, transport, erection and use, plus all the standards applicable to these phases of the project lie *within the one jurisdiction*.

This generally implies that the technical issues associated with standards differences are relatively minor. The non-technical issues, particularly those to do with language and culture, also may not be of particular importance with regards to management and control.

'Local' fabrication can still have many of the issues raised in this paper.



'Offshore' Fabrication

'Offshore' fabrication may include a variety of situations where the design, materials, location of fabrication, construction and erection location and the final use location may all be in different jurisdictions. This in turn could result in a wide variety of available or applied standards, regulations, expectations and issues across different jurisdictions.

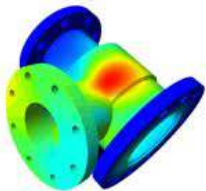
The below table provides a simplistic example of the variety of situations that could be experienced in the modern world of 'free trade', considering that the place of design and use is the same.

Fabrication Scenario	Location of Design and Use	Materials	Fabrication
'Local'	Location/Jurisdiction 1	Location/Jurisdiction 1	Location/Jurisdiction 1
'Offshore' Type 1	Location/Jurisdiction 1	Location/Jurisdiction 1	Location/Jurisdiction 2
'Offshore' Type 2	Location/Jurisdiction 1	Location/Jurisdiction 2	Location/Jurisdiction 2
'Offshore' Type 3	Location/Jurisdiction 1	Location/Jurisdiction 2	Location/Jurisdiction 3

Table 1 Variety of Standards Issues possible for 'Offshore' fabrication

The above table considers that the location for design and the location for use is the same, yet results in four different possible scenarios. If the location of design or use changes, an added multiple of possible scenarios is now present.

STRUCTURAL RELIABILITY



It is important to start at a base position of structural reliability, before independent consideration of many of the individual factors that can affect overall reliability. This is aptly

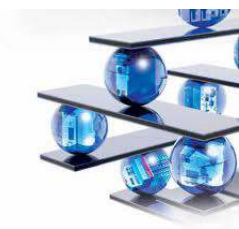
described in ISO 2394 *General principles on reliability of structures* [1]:

“It is important to recognize that structural reliability is an overall concept comprising models for describing actions, design rules, reliability elements, structural response and resistance, workmanship, quality control procedures and national requirements, all of which are mutually dependent. The modification of one factor in isolation could therefore disturb the balance of reliability inherent in the overall concept”

The alignment of what occurs in any workshop (either ‘local’ or ‘offshore’) to the original design requirements and design intentions is of vital importance.

With regards to fabrication and welding, ISO 3834 *Quality requirements for fusion welding of metallic materials* [2] states:

“For products to be free from serious problems in production and in service, it is necessary to provide controls, from the design phase, through material selection, into manufacture and subsequent inspection. For example, poor design may create serious and costly difficulties in the workshop, on site, or in service. Incorrect material selection may result in problems, such as cracking in welded joints.



To ensure sound and effective manufacturing, management needs to understand and appreciate the sources of potential trouble and to implement appropriate procedures for their control.”

CHALLENGES TO BE MANAGED

Technical Challenges

Technical challenges can be described as topics specific to the specification and production of the end product.



Basis of Design

The basis of design is the most commonly overlooked principle when undertaking procurement works in a location other than where the design was carried out. The basis for design is the platform from which all decisions should be made. This may (and most probably should) require access to the Designer and/or their calculations. The ability of Design Engineers to be able to assess their existing design against different standards is a key capability that will be required in the future.

Documented Design

The ‘documented design’ is the compilation of the drawings, the Specifications



and their referenced standards that describe the end product and how the Designer intended to achieve that end product.

These documents need to be clear on the requirements of the design, the standards applicable to the works and describe how substitutions of materials, standards and processes from that specified will be managed.

The documented design is required to be complied with, as deviation from that prescription implies a non-compliant product, unless authorised.



Further, all personnel involved with the project fabrication, including the Designer need to have an intimate understanding of the specifications and standards applicable. This includes reading them, as it is impossible to know what is in a document without actually reading it.

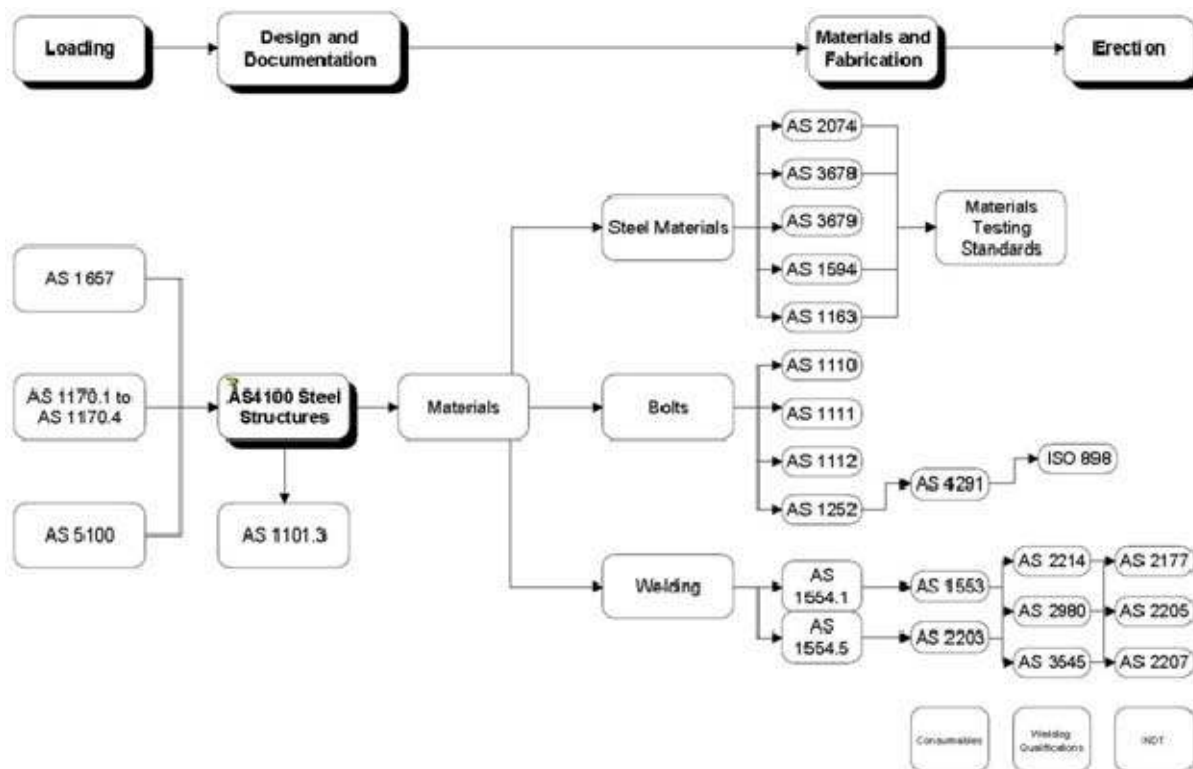


Figure 1 Australian Standards Relationships

Specifications and Standards

In an Australian context, the design of structural steelwork is generally addressed by the use of AS4100 *Steel structures* [3].

This standard makes reference to a wide variety of standards, which also refer to subsequent standards for execution of the works. Figure 1 illustrates the relationships between standards that are referenced directly by AS4100 or subsequently via the standards that AS4100 refers to.



Substitution of standards may need to be assessed not only for materials, but also welding, inspection (including NDT) and acceptance criteria.

The majority of welding standards around the world have an origin from either Europe or America. In general they are similar with different detail requirements. Therefore, while it may be necessary to assess some of those detail differences, it is more important that the standard to which the workshop wishes to work is a recognised standard and that the workshop actually uses it effectively. Imposition of an unfamiliar standard upon a workshop can cause more problems that it will solve.

The piece of steel or the weldment does not know what standard it is being manufactured to.

The involvement of the Design Engineer may also be required (including approval of use of an alternative standard). The choice of welding standard can also affect the methods and acceptance criteria for NDT. There is a significant level of linking of numerous standards, over many fields.

Materials

Steel materials are manufactured to an enormous number of worldwide standards. In the Australian and Asian regions, these could include Australian Standards, such as AS 3678 [4], AS 3679 [5] and AS 1163 [6], Euronorm Standards such as EN 10025 [7] and EN 10219 [8], Chinese Standards such as GB/T 1591 [9], GB 700 [10] and GB/T 8162 [11], or American Standards ASTM A36 [12], A572 [13] or A500 [14]. BS, JIS or DIN standards materials may also be available as well.



Some of these standards will cover dimensions only, some will cover material properties only, and some will cover both.

In an Australian context, a key difference between most other international standards and the structural steel Australian Standards AS 3678, AS 3679 and AS 1163 is that the international standards yield strengths are generally lower for the nominal and industry common, but poorly termed, 'Grade 350' type steel.

The grade designation of steels (i.e. Grade 350, S355, Q345 etc) is *generally* defined as the yield strength for up to 16mm thickness. As thickness increases, yield strength generally decreases *for the same grade*. Take the following examples of 20mm and 50mm plate for the relevant Australian Standards and for two other standards.

Standard and Grade	Yield strength (MPa)	
	20mm	50mm
AS 3678 Grade 350	350	340
EN 10025 Grade S355	345	335
GB/T 1591-1994 Grade Q345	325	295
GB/T 1591-2008 Grade Q345	335	295
Variation	25 MPa	45 MPa

Table 2 Yield strength comparison for various steel standards

There is a variation of up to 45 MPa, or a 13% difference between standards for the same plate thickness. Another comparison is that for the 50mm plate, Grade '350' has become Grade '295' with use of an overseas standard material. It also highlights that the year of the standard of use for plate manufacture is also important, with yield strength specified varying between two different versions of GB/T 1591 [9].

However, some design standards require consideration of yield and ultimate tensile strength, and conduct design on what is called a 'modified' yield. This highlights the importance of understanding the design basis for a structure as well.

Standard and Grade	Yield strength (MPa)	Ultimate tensile strength (MPa)	'Modified Yield' strength (MPa)
AS 3678 Grade 350 – 20mm plate	350	450	332.5
EN 10025 Grade S355 – 20mm plate	345	470-630	337-345
GB/T 1591-1994 Grade Q345 – 20mm plate	325	470-630	325
GB/T 1591-2008 Grade Q345 – 20mm plate	335	470-630	332

Table 3 'Modified Yield' strength comparison for various steel standards according to AS4324.1 [15] Clause 5.3

Strategies to manage materials issues can include:

- Where possible, the Design Engineer may obtain guidance from the Owner or Contractor on where the fabrication is likely to be carried out, and what materials are likely to be used. If this is possible, once the likely materials of construction are known, undertake the design to the relevant mechanical properties of the materials.
- Ensure that materials substitution processes include the Design Engineer, as there may be a design basis, and additional design requirements that are 'implied' by use of the design material, but may require design review for a material substitution.
- Whatever the materials used in design, it is imperative to state in the steelwork specifications, on drawings and in drawing notes the *Standard and the Grade* of steel specified, plus include a note that material substitution is permissible only with the approval of the *Design Engineer*.

A subsequent consequence of using a substitute materials standard is that the original design thickness may require substitution with a thicker plate. This may result in weight changes, drawn details no longer being accurate and potential cost penalties with these issues.

Pre-fabrication requirements

The works specification should contain a tollgate for approval of pre-fabrication requirements, such as welding procedure qualifications and welder qualifications.

Works related to the qualifications necessary should not be permitted to commence until the requirements of the relevant standard are completed.



The works and acceptance criteria

Establishment and policing of acceptance criteria is essential. Establishment of acceptance criteria will need to include design, pre-fabrication requirements, fabrication quality, documentation, defect corrective actions, signoff and approvals, acceptance, etc. In the majority of cases the acceptance criteria is defined by established standards, and therefore there is little justification for works that do not comply.

The Fabricator is responsible for producing a product that achieves the acceptance criteria. These criteria should not be viewed as 'stretch targets' (irrespective of where in the world the works are being done) but as the absolute minimum criteria to be achieved.

Acceptance criteria should be relaxed only in the most extenuating circumstances, and with sufficient engineering assessment.

Direct or 'implied' acceptance of works outside of the acceptance criteria can result in creation of new 'pseudo' acceptance criteria that can outlast this current project and affect others.

If it is defective, fix it.

Inspection (NDT)

Inspection forms an important part of assessing the product against the established acceptance criteria. The first responsibility for inspection lies with the Fabricator. Substituting the Fabricators responsibilities to present a compliant product with Owner financed third party inspection and detection of defects is an undesirable situation. Should this be permitted or even tolerated, the Fabricator is likely to form a reactive attitude to defects (where only those identified by the third party Inspector are rectified) rather than have procedures in place that actively control and manage their fabrication process to minimise the possibility of defects.



Non-destructive testing should not be seen as the great saviour for poor quality fabrication. ISO 3834 *Quality requirements for fusion welding of metallic materials* [2] gives the following guidance:

"Quality cannot be inspected into a product, it has to be built in. Even the most extensive and sophisticated non-destructive testing does not improve the quality of the product"

Third party auditing

Owners may need to establish strategies to undertake third party auditing of all phases of a project.



This may require the involvement of Design Engineers, specific quality inspection personnel (both full time and intermittently), and management.

However, the strategy must ensure that the third party auditing does not become the Fabricators quality control process.

Erection

The flow on effects of poor work practices and acceptance of works with defects can cause issues at the erection location. This may include interface fit-

up, but also attitude that if defective works are acceptable at the workshop then they are acceptable at the worksite. This can result not only in direct costs due to rectification works, but long term costs associated with defective product.

Future use and maintenance

The use of offshore materials and offshore fabrication standards and practices can potentially lead to increased costs during use and maintenance of structures.

Owners will need to develop strategies to ensure that materials of construction (as opposed to materials of design) are accurately recorded and retrievable, plus documentation relating to weld procedures from manufacture are available for maintenance.



Statutory obligations

Statutory obligations, except those specifically required to obtain permits or registrations, are seldom reviewed in detail. As an example in the Australian mining industry context, the *Western Australian Mines Safety and Inspection Regulations 1995* [16] contain very specific duties with regards to Designers, Manufacturers and Importers. This includes the allocation of legal duties when items of plant are designed and manufactured outside the jurisdiction of the state. This is most clearly seen in part 6.9 of the regulations, which states:

"If the designer and the manufacturer of plant are both outside the jurisdiction of the State, the importer of the plant must carry out the designer's duties, and the manufacturer's duties under regulations 6.3, 6.4, 6.7 and 6.8"

This clearly places a responsibility on the 'Importer' (which may be a Contractor, or potentially the Owner themselves) to manage risks associated with the design and the manufacture of an item. This effectively excludes a defence based on fault by an offshore Supplier.

Non-Technical Challenges

Non-technical challenges can be described as topics that are not directly related to the specification and production of the end product, but can have a significant influence on the product and/or the project.

Safety

In an Australian context, some of the workshops in different areas of the world have totally different safety standards to what would be expected in Australia. This may result in expatriate Employees being exposed to additional risks at the offshore workshops due to the work site, travel for business, and out of hours activities. This requires an additional set of management strategies which may need to cover Employees direct safety risks at workshops, global and local travel, including Employees inexperienced with overseas exposures.



It can also have a 'cultural' effect on expatriate Employees when they return to their normal place of work – the mindset of a certain safety standard that their Employer would apparently accept at an 'offshore' location can be transferred to the local location that may affect both the Employers worksite and the Employees ability to retain employment.

The perception of advantage

It is not uncommon for decisions to be made very early in a project for 'offshore' procurement due to the perceived advantages of schedule and/or cost. These decisions are often made without any appreciable assessment of the technical and non-technical issues that will require management during procurement and during use of the structure.

The decision may also be made with absolutely no knowledge of the specific location or workshop where the fabrication may be procured. Subsequently, the decision to select and use a particular 'offshore' fabrication shop may be made personnel who are

unskilled in assessment of that workshops capabilities and quality processes. An example of this is management selection of an inadequate workshop that then requires the QA personnel to attempt to resolve all the issues present and entrenched at that workshop, due to that single poor decision. The perception of advantage can rapidly change to a reality of disadvantage.

Language and Interpretation

The issue of language and interpretation can be significantly underestimated. The issue of language is compounded when both verbal and written communications require translation/interpretation. The common misconception is that all is required is an interpreter/translator.

It needs to be recognised that interpretation and translation is a two-way process.

To highlight potential issues, some examples are provided:

a) 'Literal' interpretation

The English language can cause many issues with 'literal' interpretation. There is often a need to provide context when using certain words in the English language. As an example, using word recognition software rapidly identifies the necessity of context, and the confirmation that by increasing the volume of your voice, the level of understanding does not increase!

When there is an intention to issue documents to countries whose primary language is different, documents need to be read and reviewed with an entirely different mental approach, including reading every single word 'literally'.

Translators/Interpreters have the same issue – they must have sufficient experience in context and the process of communication must be slowed down, simplified and a process of confirmation of understanding both ways must be undertaken.

This is just as important with technical and/or contractual documentation, including standards. Many technical standards have been written by people whose basis for writing the standards was that a person of the same language would read them.

b) 'Convenient' interpretation

Situations can arise when there is no corresponding word/phrase for the relevant word/phrase requiring translation. This may be due to there being no equivalent word or due to the interpreter not having the vocabulary to achieve an accurate translation. In this situation, many translators will default to what they 'think' it means, or what they think needs to be communicated. Sometimes they will get it right and sometimes it will be out of context.

c) Interpreters/translators

Many interpreters/translators have been trained in the 'conversational' form of the language that they are interpreting, as this is the most common and the most used. Unfortunately this does not assist greatly when technical language is being used.

d) Slang/Dialects/Accent

Use of slang or a strong accent can also result in misunderstanding. A conscience change of one's common language characteristics may be needed to assist interpretation. To be able to resolve many issues with language requires time, patience and understanding (literally!). It also requires training of personnel to be able to maximise the efficiency of their communications and establish that both parties understand and have correctly communicated and understood the requirements. Remember, difficulty in understanding may be mutual.

Culture

Cultural differences can be behavioural, technical, procedural and bureaucratic.

There is no shortage of advice on general behavioural cultural differences across different countries, but issues associated with a technical environment are rarely dealt with.

For example, some cultures have a very well established hierarchy when technical meetings are being held. Open criticism or comment of a projects outcomes or schedule or cost could cause offence, or create barriers to progressing resolution of an issue.

Procedural culture may be so strong within an organisation that no matter how inefficient it appears to an observer, the ability to change that process or

culture is likely to be minimal. It may therefore be necessary to work around it.

The ability to read and balance cultural happenings with resolution of technical issues is a skill well worth investing in, to be able to satisfactorily achieve compliant works offshore.

The tyranny of distance

For 'local' fabrication it is generally a minor cost and a minor inconvenience to attend a workshop and resolve issues, either of a technical or non-technical nature.

Transferring the location of fabrication to thousands of kilometres away introduces all sorts of schedule, cost, communication and technical issues that now require an entirely different strategy to 'hop in the car and attend the workshop'.

Therefore, resourcing and budgeting needs to be allowed for both what is planned, and also contingency to manage what is unplanned.

Base level of knowledge/education

The base level of education and knowledge of fabrication personnel can vary significantly, and must be appreciated. For example, workshop floor employees in lower cost countries may not have a basic education, and may not be able to read. They may rely on verbal instruction from Supervision to achieve their daily tasks. They may have learnt their trade by observing others, rather than by any formal training.



This must be recognised, as communication of problems that need to be resolved may be about 'showing' as much as 'saying' or 'writing' about the issue.

Relationship of designer to end product

The modern structural steelwork procurement process often creates a separation of the Design Engineer from the end product by distance, contracts and care.



Many Design Engineers do not get to see the fruits of their design effort, therefore do not develop an

appreciation for size, or the difficulties in producing their designs.

Similarly, many Design Engineers are not aware of the substitutions that their designs may be subjected to. They are not familiar with 'common' worldwide design, steel or fabrication standards. For example, Australian standard materials may not be used for a particular design, even if it is being fabricated in Australia. This separation will need to change, to ensure that Design personnel not only remain responsible for their designs, but also have the ability to control how their design is implemented.



Contract/legal recourse

Purchasing offshore can result in a significantly reduced ability for any contractual/legal recourse should these avenues be required to be pursued.

End user attitude effects

Should substandard work practices, acceptance criteria and products be permitted (either directly or by lack of action) in an offshore location, the flow on effects to the local environment can include:

- a) An attitude that reduced quality is acceptable.
- b) An approach to rectification of defects that is substandard, because we are fixing someone else's problem. This can further exacerbate an already defective situation.

Combining The Technical With The Non-Technical

Many of the above topics merge to create a symbiotic relationship between the technical and the non-technical aspects. Failure to address a non-technical issue may affect a technical outcome, and vice versa. Many technical and non-technical topics are interrelated.

An example is the 'perception of priorities'. A recent example included a situation where a significant steel item was being assembled. Unfortunately the priority communicated at the time to the work crew was schedule – the assembly had to be complete by a certain date. However, the sub-assemblies were not completely painted, and once assembled, it would be very difficult to achieve a quality protective coating application.

This was brought to the attention of the work crew's supervision. Overnight, the items had their protective coating applied. There was no technical thought given to the quality requirements for the protective coating, but it was completed so as not to affect schedule.

CONCLUSIONS

Many of the challenges experienced during 'offshore' fabrication are caused by:

- a) Lack of a thorough enough evaluation process on an 'offshore' fabrication/procurement decision, including how risks will be managed.
- b) Lack of planning or strategy for execution of the necessary tasks from project conception to completion.
- c) Ignorance or lack of knowledge of the issues likely to be encountered.
- d) Driving the issue to the point of 'duress' – that is by either ignorance, or intentionally deferring any kind of action until the latest possible point in the schedule. This often places the issue at the feet of the person who should be least responsible for managing it.

All levels of personnel responsible for a project, including Management (even at the corporate level) need to adequately evaluate, plan and set strategy for the issues that are likely to arise with 'offshore' fabrication. The perceived advantages of executing fabrication



'offshore' can rapidly disappear with a failure to actively provide a strategy, skilled resources, budget and time for management of issues from project conception to project conclusion.

A strategy for 'offshore' fabrication needs to be a formal plan to be able to identify risks with various topics and assign controls for those risks. In some instances, if all the necessary considerations are dealt with in project development stages, the choice to procure 'offshore' may be determined to be detrimental to an overall project rather than beneficial. Many of the above topics are applicable to 'local' fabrication as well. 'Local' fabrication should not be considered immune from problems.

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New Transmig 200i & 250i Welding Inverters

In November 2011, CIGWELD released the Transmig 200i and Transmig 250i single phase Multi-Process Inverters with power factor correction (PFC). These units are capable of performing three welding processes from the one unit, including GMAW/FCAW (MIG), MMAW (Stick) and GTAW (Lift TIG).

The 200i and 250i are packed full of functional and safety features suitable for the serious tradesperson/fabricator who is looking for the total welding package and value for money.

The Latest in Inverter Technology

After the successful launch of the CIGWELD Transmig 175i 12 months ago, it was time to start rolling out the rest of the multi process welding inverter family.

The 200i and 250i the latest additions to the CIGWELD Transmig family of self contained single phase multi process inverters that are capable of performing GMAW/FCAW (MIG), MMAW (Stick) and GTAW (Lift TIG) welding processes.

Even light gauge aluminium jobs are made easy with the 200i and 250i as the ergonomic, well-balanced design of the



TWECO Fusion MIG gun ensures smooth feedability. Or plug in an optional TIG torch for superb performance for your stainless or mild steel applications.

These impressive units boast a range of features sure to satisfy the broad operating needs of the modern welding professional. Equipped with an integrated wire feed unit, Voltage Reduction Device (VRD) when in STICK mode, power factor correction (PFC) energy saving technology and digital voltage and amperage meters, the 200i and 250i provide excellent welding performance across a broad range of applications. These machines were used in field trials prior to launching and sparked some keen interest amongst the users. "I like that it's so compact, yet deceptively powerful," commented one welder trialling the 250i on some industrial fabrication work.

"The 3 in 1 processes of the 250i make this a handy and versatile tool to own, both at work and at home. I can't wait to get one of these in our workshop".

Technical Features Explained:

PFC

Power Factor Correction is a widely recognised method of reducing the electrical power consumption of inverter power supplies and allowing maximum performance to be achieved for a given input. Due to the new carbon tax policy, energy consumption costs are likely to increase substantially.

PFC makes the power source more efficient and will provide substantial power savings over the lifecycle of the unit. Testing has proven that the 200i and 250i can save you nearly 50% on your annual power costs over other conventional based machines.

VRD

Voltage Reduction Device is an electrical safety device that protects the user against electric shocks. It reduces the open circuit voltage when not welding (i.e. when changing electrodes), to all but eliminate the potential of electrocution. VRD is covered by both AS60974.1 and AS1674.

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New Edition of Welding Standards



Standards Australia has recently issued a new 2011 edition of AS/NZS 1554.5 Welding of Steel Structures subject to high levels of fatigue loading

Within this article, the AWI have attempted to highlight the changes between this (2011) edition and the previous 2004 version of the standard and where we believe it absolutely necessary the AWI™ have made some explanatory comment.

However, enquiries of a technical nature or for further details and clarifications should be directed to Standards Australia.

The AWI™ runs a technical online forum which can be accessed from our website -

www.austwelding.com.au and answers to technical questions regarding the changes to this standard could also be sought there.

Disclaimer – This article is for the members of AWI™. Direct comparison between AS/NZS 1554.5:2004 and AS/NZS 1554.5:2011 is limited to printing the changes that now appear in the 2011 edition of this standard. No comment is intended and the individual should satisfy themselves of the changes and any interpretations stated here.

Amendments to AS/NZS 1554.5 - 2004

Clauses:

This Standard specifically applies to welds subject to fatigue loading in excess of the range covered by AS/NZS 1554.1, Structural steel welding, Part 1: Welding of steel structures and hence, it should not be specified where AS/NZS 1554.1 is acceptable.

Clause 1.2 Exclusions

An additional note has been added regarding underwater welding

For guidance on underwater welding the user should refer to ISO 15614-10, ISO 15618-1 or ISO 15618-2, as appropriate.

Clause 1.6 Management of Quality

The previous title for this clause (Basic Welding Requirements) has changed and sub-clauses 1.6.1 has been added. The title and text that was in clause 1.6 of the 2004 standard has now been moved to sub-clause 1.6.2 Basic Welding Requirements of the 2011 edition.

1.6.1 Quality management

Fabricators shall ensure that all welding and related activities prescribed within Clause 1.7.2 and this Standard are managed under a suitable quality management system.

Such a system should generally comply with the requirements of AS/NZS ISO 3834 and its parts, particularly where fabrication activities require the approval of the principal or inspecting authority, or where the fabrication of large, complex or critical structures is being undertaken.

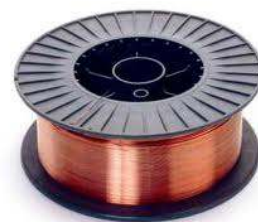
Clause 2.1 Parent Material

Sub-clause (c) has changed in a very minor way. The reference to NZS 3415 has been removed from the 2011 edition

Clause 2.3.1 Electrodes and filler wires

The first sub-section of this clause lists different standards to previous and has replaced AS/NZS 1553.1 and AS/NZS 1553.2.

Electrodes for manual metal-arc welding shall comply with AS/NZS 4855 or AS/NZS 4857, as applicable (see Clause 4.6.1).



The second paragraph of this clause has also changed some of the standards identified with electrodes or filler wires. AS2203.1 has been omitted and the ISO variants added.

Electrodes or filler wires for processes other than manual metal-arc welding shall comply with AS 1858.1, AS/NZS 1167.2, AS/NZS 2717.1,

AS/NZS ISO 17632, ISO 14341 or ISO 636, as applicable (see Clause 4.6.1).

Clause 3.2.5 Transition of thickness or width

This clause in the 2011 edition has had the following sub-section added:

Butt-welded T-joints may have a small fillet weld superimposed on each welded face not exceeding the lesser of 6 mm or $t_{\text{thinner}}/3$. Larger fillet welds are not permitted unless a compound joint (see Clause 3.4) has been specified by the designer.

This clause also refers to a new figure (Figure 3.2.5 C) which is a drawing detailing the toe angles etc for transition parts in T-joints.

Clause 4.1.2 Butt welds

The addition of details for a single bevel butts and J butts has made its way into to sub-clauses (d) and (f). This has meant a re-arranging of previous sub-clauses from the 2004 standard. Changes to the 2011 standards are identified below:



(d) A procedure qualification on a single bevel butt weld that has been welded from only the one side shall qualify

for welding a double bevel butt weld and a single bevel butt weld that has been welded on both sides.

(f) A procedure qualification on a single-J butt weld that has been welded from only the one side shall qualify for welding a double-J butt weld and a single-J butt weld that has been welded on both sides.

Further sub-clauses deal with details for double bevel and J butts:

(h) A procedure qualification on a double bevel butt weld shall also qualify for welding a single bevel butt weld that has been welded on both sides.

(j) A procedure qualification on a double-J butt weld shall also qualify for welding a Single-J butt weld that has been welded on both sides.

The previous sub-clause (g) has now moved to (k)

(k) Thickness limitations for butt welds shall comply with the following:

and there has been a further addition made to this sub-clause which identifies the requirements for T-butt joints.

(iii) For T butt joints between non-equal thickness members, the thickness limitation applicable to the prepared member abutting the non-prepared member shall apply.

Sub-clause (iii) also has the accompanying note:

NOTE: When applying these thickness limitations, an adjustment to the minimum preheat temperature may be required (see Clause 5.3.4).

Clause 4.2 Methods for Qualifying a Welding Procedure

The 2004 version had a single note to sub-clause 4.2 (b). The 2011 edition now has some significant changes via two notes. These are identified below:

NOTES:

b1. A completed welding procedure sheet such as that shown in Appendix C, together with records of any tests carried out as required by the application Standard to which the procedure was qualified (e.g. AS/NZS 3992, AWS D1.1), constitutes documentary evidence of prior experience. All WPS's should meet the requirements of essential variables of AS/NZS 1554.1.

b2. Due to changes in the welding consumable classifications systems used in Australia and New Zealand, reference should be made to Appendix F for guidance on the extension of weld procedure qualification. Weld procedures qualified using consumables classified under the former systems remain valid and may continue to be used without further qualification where consumable equivalence can be established.

AWI comment: It is AWI's understanding that this may require a new AS/NZS 1554.1 WPS document to be prepared referencing the PQR and supporting documents from the other code/s qualified procedure.

PROCEDURE QUALIFICATION RECORD									
Material specification				1					
Filler metal				Filler No.					
Process				Date qualified					
Welding standard				Welded by					
Edge preparation				Page					
Weldability group no.				Revision					
Specimen thickness				Qualified position					
Preheat temperature				PQR No.					
Inter-run temperature				Hold					
Type and check method				Other					
Run sequence				Joint details					
				If required, joint No.					
				No. Tests					
				Root gap 6 mm					
				Root face 6 mm					
				Root angle 17°					
				Backing					
Specification—Root				Reinforcement					
Specification—Root				Flow rate					
Purge gas				Welding parameters					
No.	Side	Position	4 mm	Trade name	Amperage	Voltage	Current	Speed	Heat
Technique				Stringer weld					
Initial cleaning				Electrical shock out					
Preheat time				Background material					
Source size				Background check					
Test results									
Test type	Visual	Macro	Tensile	Bend	Charpy V	Hardness	Other		
Test by									
Report No.									
Result									
Notes/Comments									
Witnessed by				Approved by					

Clause 4.6 Qualification of Welding Consumables

There has been a complete revamp of table 4.6.1(A) from the 2004 version. This is too big a change to clearly identify within this article, but essentially it identifies the new consumable classifications, particularly the new MMAW and FCAW consumable classifications MMAW AS/NZS 4855 and FCAW AS/NZS ISO 17632.

This section of the 2011 standard also introduces a new Appendix F which deals with changes to the welding classification system and the weld procedure requirements associated with these changes

Clause 4.6.1 Pre-qualified welding consumables

Sub-clause 4.6.1.1 (b) and (i) (B) adds L40, L50, Y20, or Y40 grade steels.

(b) Consumables for submerged arc and flux-cored arc welding conform to Columns 4 and 5 of Table 4.6.1(A), provided that for L0 grade steels the maximum arc energy is limited to 5 kJ/mm and for L15, L20, L40, L50, Y20, or Y40 grade steels the maximum arc energy is limited to 2.5 kJ/mm.

(i) Consumables with S, M or SM grading—

A) for multi-run butt welds or any fillet weld in L0 grade steel, 5 kJ/mm max.; or

(B) for multi-run butt welds or any fillet weld in L15, L20, L40, L50, Y20 or Y40 grade steels, 2.5 kJ/mm max.

Table 4.6.1(B) Steel Type Numbers

This table has had some additional Steel types added.

AWI™ Comment: It is the AWI's opinion that the following information is not a change in the new 2011 edition but of the conditions which have previously applied in the 2004 edition

It is a common practice to use Grade 350 Type 4 material when qualifying a PQR and assume this qualifies Grades 1, 2, 3 and 4. This is incorrect unless:

- The Grade 350 material has low temperature impact values less than or equal to the type 2 & 3 materials. Plus;
- Material thicknesses are also a factor in material types qualified.

In support of the above statement - refer to Section 4.8 Extension of Qualification Item (C) which states: "The Charpy-V impact test temperature of the other steel is not colder than that of the steel used in the qualified procedure"

There has been a complete revamp of table 4.6.1(C) from the 2004 version. It identifies the new consumable classifications, particularly the new MMAW and FCAW consumable classifications MMAW AS/NZS 4855 and FCAW AS/NZS ISO 17632.

Table 4.6.2 Note 5 Appendix B Table B1.

AWI™ Comment: Be aware that there is an error in note 5 of Table 4.6.2 as it refers to Clause 4.6.1.1 (h) which does not exist).



Table 4.6.2 Transverse Butt Tensile Test & Charpy – V impact Properties

There has been a complete revamp of table 4.6.2 from the 2004 version. It identifies additional new steel types 2S, 5S and 8C and omits steel type 8.

Table 4.7.1 Required Extent of Testing.

In this 2011 edition, changes have been applied to the notes to this table with new notes added and notes 1 and 3 amended. These changes will require the Fabricator's attention. Note 5 requires special attention as this note states:

Where bend tests are required as part of the weld procedure qualification process, preparations welded as "T" joints or corner joints should be welded as planar butt joints to permit bend tests to be taken. e.g. use B – C4a in lieu of T-C4a or C-C4a joints.

AWI™ Comment: It is the AWI's opinion that either of these Bevel joint types welded from one side only; then become a non pre-qualified joint. This fact will then warrant bend tests as well as a Macro testing. Furthermore, a Hardness Survey will be required if the preheat temperatures does not comply with Clause 5.3 (see note 2 of Table 4.7.1).

Clause 4.10 Records of Tests

The 2011 edition has had an additional note added to this clause.

NOTE: The WPS, PQR and any other supporting documentation may be considered as technical and/or intellectual property of the fabricator and as such, dissemination of this material may be restricted. The extent, type and control of this documentation should be agreed prior to the commencement of the work (see Appendix D).

Table 4.11 (A) Changes to Essential Variables:

Items b, e, o & u of this table have been amended

Item b – now references an added note at the bottom of the table and essentially incorporates changes to consumable classifications. This note states:

NOTE: Re-qualification is not required where the change in classification is due to a change in the

classification standard and equivalence is established (See Clause 4.2 and Appendix F)

Item e - in the 2004 version referenced AS 4882. The amended item e in this 2011 edition refers the reader to Table 4.11(D) which is a new table detailing the allowable variations to minor shielding gas components

Item o – in the 2011 edition extends the thickness qualified for a Butt weld from the previous edition from 0.75 – 1.5 t (in the 2004 version) to 0.5 t - 2t.

AWI™ Comment: This change could be a distinct advantage as it has the possibility of reducing the number of WPS's required to weld a wider range of material thicknesses qualified. This revised item also refers the reader to clause 4.1.2(k) which is where the previous sub-clause (g) has now moved to

Item U – is a new item in this table of the 2011 edition and relates to the pipe diameter qualified.

Table 4.11 (C) Minor changes in Essential Variables:

Item (d) – has been amended to introduce the following note at the bottom of the table . This note states:

NOTE: Examples include, but are not limited to a change from V-shape to U-shape, a change from V-shape to bevel-shape

Table 4.11 (D) Variation from Classification Permitted for Minor Shielding Gas Components

The 2004 version did not have this table, so in the 2011 edition it details the range of percentages permitted in varying minor shielding gas components.

AWI™ Comment: This table is essentially a copy of Table 4 from out of Australian Standard AS 4882 "Shielding Gases for Welding". The AWI™ believe that care must be taken regarding the "Tolerance on minor gas component" particularly when changing Shielding Gas Suppliers or using a substitute Gas Mixture. An alternate supplier's shielding gas mixture could render a Qualified Welding Procedure Non – Qualified due to the tolerance on the minor gas component being outside the acceptable tolerances.

Clause 4.12.2 Welders

There has been a large change to this section of the 2011 edition with some sub-clauses added. The last paragraph now states:



In addition, the requirements of Clauses 4.12.2.2 to 4.12.2.4 shall apply to the qualification of welders.

Below are the additional sub-clauses that have been added or amended from the 2004 version of the standard

Clause 4.12.2.2 Qualification via Standards

Qualifications obtained by welders under appropriate Standards laying down welder qualification tests are acceptable as evidence of their ability. Such evidence shall refer to welding carried out on joints and in positions as close as practicable to the actual joints and positions to be used in construction. Welders qualified to Standards such as AS 1796, AS/NZS 2980, AS/NZS 3992, NZS 4711 or ISO 9606-1 shall be deemed to be qualified.

Clause 4.12.2.3 Qualification via visual and macro examination

Welders already not qualified in accordance with Clause 4.12.2.2 for the welding process and position required by the welding procedure under the conditions of employment shall be required to demonstrate an ability to comply with the appropriate requirements of this Standard by welding a suitable test piece for all welding procedures required on the job. Each test weld shall have a minimum examination length of 300mm, be examined visually and by means of a macro test (see Table 4.7.1 for alternative test methods for butt welds applicable at the fabricator's discretion) and shall satisfy the requirements of Clause 6.2.2.

Grinding or repair of the capping passes of test welds is not permitted

Welder qualifications for welding to a specified welding procedure shall remain valid, providing the following criteria have been met:

- (a) It can be shown from records maintained by the organisation employing welders that the welders have been employed with reasonable continuity using the relevant welding processes, and, have continued to produce satisfactory welds as verified by a non-destructive examination.*

- (b) The procedure is used within its qualification limits and the following:*

- I. Welder qualifications established in any one position are extended within the limits of Table 4.12.2.3(A) of this Standard*

- II. For welds on pipe with an outside diameter d or hollow sections where d is the dimension of the smaller side, the welder is qualified as follows:*

- (A) For a test piece with an outside diameter of $\leq 100\text{mm}$, d to 2 d*

- (B) For a test piece with an outside diameter of $> 100\text{mm}$, $\geq 0.5 d$ to unlimited*

- III. Persons operating automatic or semi-automatic equipment and qualified to use a particular process with an approved consumable or combination of consumables shall be considered qualified to use other approved consumables or combinations of consumables with the same process – see Table 4.12.2.3(B)*

- IV. Welder qualifications established under this clause with any one of the steels covered by this Standard shall be considered as qualification to weld any other of the steels covered by this Standard*

Table 4.12.2.3 (A) Range of Welder Approval According to Welding Positions.

The original Table 4.12.2 from the 2004 version of the standard has now changed and the AWI™ have attempted below to identify the changes to welding position approval and made some commentary regarding these changes.

Welder Qualification 4G (PE O/H) Overhead Butt weld no longer qualifies all positions for butt welds and fillets. The 3G (PF V/U) and 3F (PE V/U) weld positions are no longer qualified with the 4G position.

A 4G and 3G V/U test plates are now required to cover all positions or alternatively a 5G or 6G V/U fixed position pipe (or a V/D). A pipe test requires a Macro Examination be taken from each weld position to be qualified.



Australian Standard AS 3545 (ISO 6947) Welding Positions recognises the AWS 5G and 5F weld positions as PF (V/U) and/or PG (V/D) e.g.

These positions would qualify a welder for a PF Butt weld to 1G (PA) 3G (PF) 1F (PA) 2F (PB) 3F (PF). (Table 4.12.2.3 (A) AS/NZS 1554.5 – 2011)

The AWS system does not differentiate between the direction of welding for the vertical position designation whereas AS 3545 (ISO 6947) system provides PF for Vertical up welding and PG for Vertical down welding.

The AWS 6G and 6F weld positions relate to the AS/ISO positions as H-LO45 V/U, J-LO45 V/D for Butt and Fillet welds. H = V/U and J = V/D at 45°. L = Angle.

(AS/NZS 2890 Welder Qualification Standard has the better option for WQs as a 4G qualifies all positions)

Refer to Clause 4.1.4. and also note Clause 4.12.2.3 item (b) (ii) (A) & (B) for the pipe diameters qualified for welder qualifications.

Refer to Clause 4.12.2.3 item (b) (iv) for the Steel Types qualified for welder Qualifications. Any Steel Type welded for a qualification test qualifies all steel Types (Types 1 – 8C) as listed in Table 4.6.1 (B).

Table 4.12.2.3 (B) Range of Qualification for Welding Consumables.

The 2011 edition of the standard now includes this Table and a set of notes outlining the range of consumables for which the welder is qualified for a variety of semi-automatic welding processes and also for submerged-arc welding (SAW).

Clause 4.12.2.4 Reapproval

This clause resembles previous paragraphs from the 2004 version but has changed significantly enough to be reproduced here:

Reapproval shall be required if any of the following conditions apply:

- (a) Six months or more have elapsed since the welder was employed on the relevant welding processes.*
- (b) For other than welders qualified to AS/NZS 2980, NZS 4711 or ISO 9606-1, the welder changes employment. Under such circumstances, the new employer shall qualify the welder who has changed employment.*
- (c) There is some specific reason to question the welder's ability*

AWI™ Comment: Welder Qualification and revalidation is a critical part of the Weld Quality and Traceability system and requires regular monitoring to ensure all welders are within the essential qualification period.

Following the initial welder qualification test, ongoing production welding NDE requirements ensures the welder revalidation and ongoing qualification. If no production welding NDE is relevant to the workscope welder qualification retesting is required within the specified revalidation period.

Clause 5.1 Preparation of Edges for welding

A new note has been added to sub-clause 5.1.1 General of the 2011 edition. This states:

NOTE: Mill edge plate and coil steels may contain surface discontinuities near the as-rolled edges, and fabricators should ensure that sufficient edge trim is removed to avoid these areas. Advice should be sought from the product manufacturer regarding the minimum amount of edge trim required.

A new note (note 2) has also been added to sub-clause 5.1.2 Thermal Cutting of the 2011 edition, which states:

2. For flame-cut surfaces being incorporated into the weld, it is considered good practice to lightly grind the cut faces to remove the carbide surface layer (see also Clause 5.8.2)

Clause 5.3.3 Extent of Preheating and Cooling after welding

A new paragraph has been added to this clause of the 2011 edition which reads:

If the measured preheat or inter-run temperature exceeds the maximum inter-run temperature allowed (when specified), all welding shall be delayed and the weld allowed to cool until within the specified preheat and inter-run temperature limits.

Clause 5.3.4. Determination of preheating temperature.

A new note (note 3) has also been added to this clause in the 2011 edition, which states:

3. The permitted heat input range (see Clauses 4.11 and 5.3) should be shown on WPS documents and be calculated using low-low-high (amps-volts-welding speed) parameters for the minimum arc energy and high-high-low (amps-volts-welding speed) parameters for the maximum arc energy.



Table 5.3.4 (A) Preheat determination

This table has been changed from the 2004 version with the addition of some steel types, the amendment of grade designations and the removal of some steel types. The reader must assure themselves of the changes

Clause 5.3.5 Inter-run temperature determination

This is a new clause to the 2011 edition:

For welded structures subject to seismic loadings where seismic resisting steels [steel groups 2S and 5S, Table 4.6.1(B)] are specified, the maximum inter-run temperature shall be 300°C unless the weld procedure is qualified at a higher inter-run temperature, in which case the higher temperature shall prevail.

Clause 5.7 Control of Distortion and Residual Stress

Two new note (notes 1 and 2) have been added to sub-clause 5.7.1. General of the 2011 edition, which state:

NOTES:

1. *Guidance distortion and shrinkage is given in AS 3990, AS 4100 or NZS 3404.1.*
2. *The order in which weld joints and/or weld runs are deposited can have an effect on the residual stress, mechanical properties, hardness, corrosion, distortion, ease of welding likelihood of defects including lamellar tearing, fatigue and final appearance, and so influence the performance of the final joint. For critical joints, bead placement should be carefully considered by the fabricator when developing the welding procedure specification.*

Clause 6.3.3 Acceptance limits

This clause of the 2011 edition has added two notes to the clause detailing what should occur if non-complying welds are detected. The note and sub-notes state:

NOTE: Where non-complying welds are detected during a spot examination, two additional spots, each of the same length as the original spot, should be examined. They should comply with the following requirements, as appropriate:

- (a) Where the two additional spots pass, only the original spot should be repaired and examined.*
- (b) Where either of the two additional spots fail, the entire weld should be examined, and repaired as appropriate.*

Clause 7.2 Qualifications of Inspectors

This clause in the 2011 edition now introduces IIW qualifications for inspectors and places them as the lead qualification. There is also an additional note (note 3) which states:

3. *The inspector should not be involved in the supervision of the welded fabrication*

AWI™ Comment: The Welding Inspector qualifications listed appear to promote IIW and WTIA qualifications over other options; which in the experience of the AWI™ are often better suited to meet the requirements of the Australian Welding and Fabrication Industries.



Clause 7.3 Visual Inspection of work. (First paragraph-new)

This clause of the 2011 edition has a complete new paragraph at the beginning detailing the conduct of the inspector. This paragraph states:


The inspector shall conduct a visual examination in accordance with the requirements of AS 3978. Aids to visual examination may be used wherever necessary to facilitate the assessment of an imperfection. Inspection aids and measuring devices shall be sufficient to enable the inspector to detect imperfections that could occur on welds and test pieces.

Table B1 Permissible Service Temperature According to Steel Type & Thickness

This table has been amended from the 2004 version with new steel types added

Appendix F Weld Procedure Requirements Associated with Changes to the New Welding Consumable Classification Systems.

The new ISO based consumable classification systems brings together two seemingly incompatible systems in common usage:

- (a) *System A - used in Europe where consumables are classified predominantly by yield strength and the temperature at which 47 J minimum impact energy is guaranteed.*
- (b) *(b) System B - used extensively around the Pacific Rim and North America where consumables are classified by tensile strength and the temperature at which 27 J minimum impact energy is guaranteed.*
- 
- The ISO logo is a yellow pentagon with a black border and the letters 'iso' in white lowercase. It is surrounded by four small grey circles, suggesting a globe or a network.



Australia and New Zealand have generally followed the AWS based system B practice using a tensile strength based classification system with local variations including a 47 J minimum impact energy requirement at the temperature of test as the basis for its consumable classification requirements. For the MMAW process, the system used remained similar to that used by AWS. For the FCAW and other processes Australia developed its own unique classification systems. With the adoption of the harmonized ISO system, it is expected that usage of AWS based 'B' classification system will continue to dominate; however, there will be situations where the European based 'A' classification system will be preferred.

To extend the validity of weld procedures qualified under previous classification systems to utilize consumables classified under the harmonized ISO based classification system, the procedure described in this Appendix should be adopted, and where contractually required, agreed between the fabricator and principal prior to the commencement of welding to minimize the need for the fabricator to requalify weld procedures.



It is also recognized that consumables classified under the former Standards systems will remain available in the market and in fabricator's

consumable storage facilities for some time, and these may continue to be used. When welding to this Standard (AS/NZS 1554.1), the fabricator should obtain the new classification from the manufacturer and note the change of classification on both the weld procedure qualification record (PQR) and weld procedure specification (WPS) documents.

For other situations where equivalency cannot be established, the weld procedure should be re-qualified in accordance with the requirements of this Standard.

There are additional clauses and sub-clauses to this Appendix which are listed here:

F2 System Changes

- F2.1 Strength*
- F2.2 Impact resistance*
- F2.3 Flux designations (MMAW)*
- F2.4 Useability designations (FCAW)*
- F2.5 Positional designations*
- F2.6 Weld metal hydrogen*

- F3 *Extension of weld procedure qualification*
- F4 *Other processes*

There is also the addition of two tables in Appendix F of the 2011 edition.

Table F1 gives the equivalent strength designations across ISO, AWS and AS/NZS 1553 standards for both MMAW and FCAW processes. Table F2 then gives the MMAW flux designations for ISO systems A and B, AWS and AS/NZS 1553 standards.

AWI™ Comment: The changes to the MMAW and FCAW and the ISO based consumable classification systems which brings together two seemingly incompatible systems in common usage:

(a) System A used in Europe where consumables are classified predominantly by yield strength and the temperature at which 47 J minimum impact energy is guaranteed.

(b) System B used extensively around the Pacific Rim and North America where consumables are classified by tensile strength and the temperature at which 27 J minimum impact energy is guaranteed.

Australia and New Zealand have generally followed the AWS based system B practice using a tensile



strength based classification system with local variations including a 47 J minimum impact energy requirement at the temperature of test as the basis

for its consumable classification requirements.

For the MMAW process, the system used remained similar to that used by AWS. For the FCAW and other processes Australia developed its own unique classification systems.



With the adoption of the harmonized ISO system, it is expected that usage of AWS based 'B' classification system will continue to dominate; however, there will be situations where the European based 'A' classification system will be preferred.

To extend the validity of weld procedures qualified under previous classification systems to utilize consumables classified under the harmonized ISO

based classification system, the procedure described in this Appendix should be adopted, and where

contractually required, agreed between the fabricator and principal prior to the commencement of welding to minimize the need for the fabricator to requalify weld procedures.

It is also recognized that consumables classified under the former Standards systems will remain available in the market and in fabricator's consumable storage facilities for some time, and these may continue to be used. When welding to this Standard (AS/NZS 1554.1), the fabricator should obtain the new classification from the manufacturer and note the change of classification on both the weld procedure qualification record (PQR) and weld procedure specification (WPS) documents.

For other situations where equivalency cannot be established, the weld procedure should be requalified in accordance with the requirements of this Standard.



The AWI™ runs a technical online forum which can be accessed from our website -

www.austwelding.com.au and answers to technical questions regarding the changes to this standard could also be sought there.



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MSA Workforce Development Manager Nick Juniper said "there was very keen interest in the EBPPP, with applications from small, medium and large enterprises". MSA provided advice and assistance to all companies.

In fact the EBPPP has been so successful that a total of 829 people from 51 manufacturing companies across the states and territories are enrolled in 20 qualifications within MSAs coverage."



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Williams Metal Fabrications was founded in 1998 by Ross Williams as a general metal fabricator serving the automotive, mining, construction and manufacturing industries. In 2007 Ross partnered with Stuart Rogers, Peter Williams and Craig Williams whose combined knowledge and experience continues to further grow the company and its profile within the different areas and related industries.

Williams Metal Fabrications now specialises in the mining, civil and construction industries and has been catering for these industries for over 14 years. Over this time the business has diversified in order to cater for the ever-changing and increasingly competitive environment of the steel industry.

The workshop located at 181 Philip Highway, Elizabeth South, SA, has a manufacturing area of 2000 square metres, and possesses a 10 tonne overhead crane and an ever growing staff level of over 23 employees.



In 2009 WMF developed and implemented a Quality Management System (QMS) to standardise company procedures, continually improve product quality, customer satisfaction, prevent non-conformances, and improve profitability. This Quality Management System complies with the requirements of ISO 9001:2008.

The QMS is a critical part of the business whose purpose is to define the responsibility and authority of the management personnel involved in the operation of the system, and to provide a general description of the requirements of the standard as they apply to Williams Metal Fabrications.



WMF prides itself on its low cost efficiency, high quality products and workmanship and is always striving for further improvement

WMF boasts high end clientele such as Boral Resources, Adelaide Brighton Cement, Domus International, John Holland, Coleman Rail, Catcon, York Civil and Built Environs just to name a few.

Core Specialisations:

Williams Metal Fabrication specialises in a range of fields and services and is at the forefront of technology and technique.

Fabrication

Fabrication of a diverse range of products with a large network of support businesses to help to assist and supply their clients a complete service. Labour Hire and Installation Trade Certified experienced crews proficient in installation of steel erection, repair of existing infrastructure & plant including machinery guarding and fencing.

Project Management

WMF has extensive experience in project management, particularly in shutdowns. Design and 3-dimensional modelling. Access to designers using Inventor 3D to provide Structural Calculations which ensure the design.

Past Projects:

Williams Metal Fabrication has a solid portfolio of projects which include:



Crusher Control Room – Prominent Hill

Supply of Steelwork to York Civil for Prominent Hill and the Angus Zinc Project at Strathalbyn

Design of the 9 level stairway for the Crusher Control Tower at Prominent Hill

In June 2008, WMF fabricated the Crusher Control Room for Built Environs. This was fully fitted in their workshop prior to transport to Prominent Hill. Once onsite the completed unit was installed atop the Primary Crusher at Prominent Hill.

Fabrication, supply and delivery of the Whenan Shaft Head Frame Awning for Ware Products at Olympic Dam

Recent & Current Projects:

Manufacture of Wine Presses and Mooring Winch Drums for Hypac

Supply of Platform Panels, Stairs & Handrail, Labour, & HD Bolts for Olympic Dam

Manufacture & Installation of 5, 7 & 10 tonne Gantry Beams for Demag Cranes

Mobile Concrete Plant for Boral Resources

Manufacture & Installation of Banbury Guarding at Bridgestone

Manufacture of Pre-Cast Barrier Moulds for NEXY

Manufacture of Leveling Brackets, Hold Down Bolts & Components for NEXY

Fabrication of Pipe Supports for Beverley Uranium Mine and Olympic Dam

Fabrication of 50m Pipe Support Steelwork for Beverley Uranium Mine

Fabrication of Inspection Point Covers for Belair Rail Upgrade Project

Supply of UNC Studs and Nuts for Olympic Dam

Fabrication of Service Bridge for Beverley Uranium Mine

Supply of Labour at Berth 7, Prominent Hill Mine, Olympic Dam

Demolition and Salvage of Boral Wingfield Plant & Ongoing Plant Maintenance



Supply of Labour for the Tunneling Crew with Adelaide Aqua – Adelaide Desalination

Manufacture & Installation of the Helipad Access Stairs for the Santé Fe Barge

Future Projects:

Urban Superway – Supply Labour to Pre-Cast Yard, Pile Caps & Pile Splicing

Tracksure SA - Rail Upgrade

Viterra – Manufacture, Installation and Repairs

Energen Solutions – Christies Beach Water Treatment Plant, Scrubber Vessel Walkway

Business Expansion:

Williams Metal Fabrication has grown to considerable success with its November 2010 acquisition of Minlaton Engineering. Recently celebrating their one year anniversary, Minlaton Engineering located at 39 Maitland Road, Minlaton, SA, has maintained a commitment to securing the best priced products and providing a quality service on time, every time. They are continually expanding their stock range and broadening their scope of services



Minlaton Engineering is currently in the process of developing and implementing their Quality Management Systems to become ISO 9001:2008 accredited.



For further information please contact:

Williams Metal Fabrications on 08 8287 6489 or visit www.williamsmetalfab.com

Bore Repair Systems available from experts at SMENCO

One of Australia's leading distributors of welding equipment, consumables and

associated welding technology from around the world, comes the Bore Repair BOA Series – the bore welding system for restoring worn bores on all types of equipment.



Automatic bore welding with BOA is 70% quicker than hand welding and 50% faster than bore machining.

The system is an industry favourite for repairs on all types of Caterpillar, Case, Komatsu, Deere, LeTorneau and other brands of earth moving equipment.

SMENCO has the complete range of Bore Repair systems including BOA-M1 and BOA-408 Bore Welding System and the EV-Series Boring Bar System.

(X-head) BOA-M1 BORE WELDING SYSTEM

The BOA-M1 Bore Welder is the most compact and low cost bore welding system on the market. Its

compact design allows it to operate in very tight spaces not possible with any other system.



The manual drive set-up is ideal for a new customer starting out who wants to do quality welding at the lowest possible entry cost.

It is also popular as a second bore welding system for existing owners of the BOA-308 and BOA-408 units.

It has the same great features as the well-known BOA-308/408 systems such as the patented quick release clutch system and telescopic welding gun for easy operation – and it is more compact.

The BOA-M1 can either be supplied with motor drive system or it can be added at a later date.

Huntingdon Fusion has eye on weld purge monitoring

The global leaders in weld purge monitoring, Huntingdon Fusion Techniques, has released its latest PurgEye™100 monitor with Auto Calibration to maintain its class-leading reputation. With tungsten inert gas welding (TIG) of important joints in stainless steels and other reactive metals, it is essential to know that the oxygen content in the welding volume has been reduced to a low level to allow a weld start with minimal risk of oxidation.

Welding can begin once the desired oxygen level is achieved, so use a PurgEye™ Weld Purge Monitor™ everytime for a guaranteed accurate reading. The

system can be used with any pipe welding system, weld purging chamber or weld purging enclosure and is shipped in a robust storage case to maintain the instrument in good condition together with all accessories



SMENCO, one of Australia's leading distributors of welding equipment and welding technology, is the national distributor for Huntingdon Fusion and has recently announced its appointment as national distributor for Bohler Welding, T-Put welding consumables for pipeline construction and DWT pipe preparation and pipe cutting equipment.

Anthony England, Managing Director SMENCO Pty Ltd, said the new PurgEye™100 monitor would improve welding efficiencies in the pipeline industry and was very competitively priced.

At the touch of a button you can calibrate to the atmospheric level of 20.94%. The sensor is easy to replace and self calibrate and provides extreme accuracy at 0.1% which is especially important for weld purging. The monitor can be used as a continuously reading instrument or as a sampling instrument

More information

SMENCO Pty Ltd

Ph: 1300 728 422

www.smenco.com.au



Progress of the AWI™

With Christmas upon us again, it is time for the AWI to reflect on its position.

The AWI has now been running for 18 months with a great deal of milestones under our belt.

Some of these milestones include

- Membership numbers that are nearing 500
- Our In-Augural Tradeshow
- Getting the Education and Certification committee up and running
- Developing a web site
- Developing a social media presence
- Forming an alliance with an International welding body
- Assisting industry embrace AS/NZS ISO 3834

With two organisation getting on board with the AWI model of AS/NZS ISO3834, the AWI has paved the way for industry to embrace the welding quality standard. One company has just come up for the first surveillance audit and another has seamlessly transferred from the WTIA/IIW system to the AWI model with fantastic feedback on the process.

It appears this has opened the floodgates with many more inquiries being fielded and organisations positioning themselves to use the AWI model of AS/NZS ISO 3834.

The AWI team would like to thank our sponsors for their support through the year and we look forward to your continuing support in 2012.

In closing we would like to wish our members a Merry Christmas and a safe and prosperous New Year.



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