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Cover Page

Newly released AccuPocket - the world's first portable off-grid battery powered MMA welding unit from Fronius - is now available from Australian distributors SMENCO with Voltage Reduction Device (VRD).

Weldability of materials - Steels

In arc welding, as the weld metal needs mechanical properties to match the parent metal, the welder must avoid forming defects in the weld. Imperfections are principally caused by:

- poor welder technique;
- insufficient measures to accommodate the material or welding process;
- high stress in the component.

Techniques to avoid imperfections such as lack of fusion and slag inclusions, which result from poor welder techniques, are relatively well known. However, the welder should be aware that the material itself may be susceptible to formation of imperfections caused by the welding process. In the materials section of the Job Knowledge for Welders, guidelines are given on material weldability and precautions to be taken to avoid defects.

Material types

In terms of weldability, commonly used materials can be divided into the following types:

- Steels
- Stainless steels
- Aluminium and its alloys
- Nickel and its alloys
- Copper and its alloys
- Titanium and its alloys
- Cast iron

Fusion welding processes can be used to weld most alloys of these materials, in a wide range of thickness. When imperfections are formed, they will be located in either the weld metal or the parent material immediately adjacent to the weld, called the heat affected zone (HAZ).

As chemical composition of the weld metal determines the risk of imperfections, the choice of filler metal may be crucial not only in achieving adequate mechanical properties and corrosion resistance but also in producing a sound weld.

However, HAZ imperfections are caused by the adverse effect of the heat generated during welding and can only be avoided by strict adherence to the welding procedure. This part of the materials section of Job Knowledge for Welders considers the weldability of carbon-manganese (C-Mn) steels and low alloy steels.

Imperfections in welds

Commonly used steels are considered to be readily welded. However, these materials can be at risk from the following types of imperfection:

- porosity;
- solidification cracking;
- hydrogen cracking;
- reheat cracking.

Other fabrication imperfections are lamellar tearing and liquation cracking but using modern steels and consumables, these types of defects are less likely to arise.

In discussing the main causes of imperfections, guidance is given on procedure and welder techniques for reducing the risk in arc welding.

Porosity

Porosity is formed by entrapment of discrete pockets of gas in the solidifying weld pool. The gas may originate from poor gas shielding, surface contaminants such as rust or grease, or insufficient deoxidants in the parent metal (autogenous weld), electrode or filler wire.

A particularly severe form of porosity is 'wormholes', caused by gross surface contamination or welding with damp electrodes.

The presence of manganese and silicon in the parent metal, electrode and filler wire is beneficial as they act as deoxidants combining with entrapped air in the weld pool to form slag. Rimming steels with a high oxygen content, can only be welded satisfactorily with a consumable which adds aluminium to the weld pool.

To obtain sound porosity-free welds, the joint area should be cleaned and degreased before welding. Primer coatings should be removed unless considered suitable for welding by that particular process and procedure.

When using gas shielded processes, the material surface demands more rigorous cleaning, such as by degreasing, grinding or machining, followed by final degreasing, and the arc must be protected from draughts.

Solidification cracking

Solidification cracks occur longitudinally as a result of the weld bead having insufficient strength to withstand the contraction stresses within the weld metal. Sulphur, phosphorus, and carbon pick up from the parent metal at high dilution increase the risk of weld metal (solidification) cracking especially in thick section and highly restrained joints.

When welding high carbon and sulphur content steels, thin weld beads will be more susceptible to solidification cracking. However, a weld with a large depth to width ratio can also be susceptible. In this case, the centre of the weld, the last part to solidify, will have a high concentration of impurities increasing the risk of cracking.

Solidification cracking is best avoided by careful attention to the choice of consumable, welding parameters and welder technique. To minimise the risk, consumables with low carbon and impurity levels and relatively high manganese and silicon contents are preferred.

High current density processes such as submerged-arc and CO_2, are more likely to induce cracking. The welding parameters must produce an adequate depth to width ratio in butt welds, or throat thickness in fillet welds. High welding speeds also increase the risk as the amount of segregation and weld stresses will increase. The welder should ensure that there is a good joint fit-up so as to avoid bridging wide gaps. Surface contaminants, such as cutting oils, should be removed before welding.

Hydrogen cracking

A characteristic feature of high carbon and low alloy steels is that the HAZ immediately adjacent to the weld hardens on welding with an attendant risk of cold (hydrogen) cracking. Although the risk of cracking is determined by the level of hydrogen produced by the welding process, susceptibility will also depend upon several contributory factors:

- material composition (carbon equivalent);
- section thickness;
- arc energy (heat) input;
- degree of restraint.

The amount of hydrogen generated is determined by the electrode type and the process. Basic electrodes generate less hydrogen than rutile electrodes (MMA) and the gas shielded processes (MIG and TIG) produce only a small amount of hydrogen in the weld pool. Steel composition and cooling rate determines the HAZ hardness.

Chemical composition determines material hardenability, and the higher the carbon and alloy content of the material, the greater the HAZ hardness.

Section thickness and arc energy influences the cooling rate and hence, the hardness of the HAZ.

For a given situation therefore, material composition, thickness, joint type, electrode composition and arc energy input, HAZ cracking is prevented by heating the material. Using preheat which reduces the cooling rate, promotes escape of hydrogen and reduces HAZ hardness so preventing a crack-sensitive structure being formed; the recommended levels of preheat for various practical situations are detailed in the appropriate standards e.g. BS EN1011-2:2001.

As cracking only occurs at temperatures slightly above ambient, maintaining the temperature of the weld area above the recommended level during fabrication is especially important. If the material is allowed to cool too quickly, cracking can occur up to several hours after welding, often termed 'delayed hydrogen cracking'.

After welding, therefore, it is beneficial to maintain the heating for a given period (hold time), depending on the steel thickness, to enable the hydrogen to diffuse from the weld area.

When welding C-Mn structural and pressure vessel steels, the measures which are taken to prevent HAZ cracking will also be adequate to avoid hydrogen cracking in the weld metal. However, with increasing alloying of the weld metal e.g. when welding alloyed or quenched and tempered steels, more stringent precautions may be necessary.

The risk of HAZ cracking is reduced by using a low hydrogen process, low hydrogen electrodes and high arc energy, and by reducing the level of restraint. Practical precautions to avoid hydrogen cracking include drying the electrodes and cleaning the joint faces.

When using a gas shielded process, a significant amount of hydrogen can be generated from contaminants on the surface of the components and filler wire so preheat and arc energy requirements should be maintained even for tack welds.

Reheat cracking

Reheat or stress relaxation cracking may occur in the HAZ of thick section components, usually of greater than 50mm thickness. The more likely cause of cracking is embrittlement of the HAZ during high temperature service or stress relief heat treatment.

As a coarse grained HAZ is more susceptible to cracking, low arc energy input welding procedures reduce the risk. Although reheat cracking occurs in sensitive materials, avoidance of high stresses during welding and elimination of local points of stress concentration, e.g. by dressing the weld toes, can reduce the risk.

Weldability of steel groups

PD CEN ISO/TR 15608:2005 identifies a number of steels groups which have similar metallurgical and welding characteristics. The main risks in welding these groups are:

Group 1. Low carbon unalloyed steels, no specific processing requirements, specified minimum yield strength R eH ≤ 460Nmm^2 .

For thin section, unalloyed materials, these are normally readily weldable. However, when welding thicker sections with a flux process, there is a risk of HAZ hydrogen cracking, which will need increased hydrogen control of the consumables or the use of preheat.

Group 2. Thermomechanically treated fine grain steels and cast steels with a specified miniumum yield strength R eH >360N/mm^2 .

For a given strength level, a thermomechanically processed (TMCP) steel will have a lower alloy content than a normalised steel, and thus will be more readily weldable with regard to avoidance of HAZ hydrogen cracking and the achievement of maximum hardness limits.

However, there is always some degree of softening in the HAZ after welding TMCP steels, and a restriction on the heat input used, so as not to degrade the properties of the joint zone (e.g. ≤2.5kJ/mm limits for 15mm plate).

Group 3. Quenched and tempered steels and precipitation hardened steels (except stainless steels), R_{eH}>360N/mm^2

These are weldable, but care must be taken to adhere to established procedures, as these often have high carbon contents, and thus high hardenability, leading to a hard HAZ susceptibility to cracking. As with TMCP steels, there maybe a restriction on heat input or preheat to avoid degradation of the steel properties.

Groups 4, 5 and 6. Chromium-molybdenum and chromium-molybdenum-vanadium creep resisting steels.

These are susceptible to hydrogen cracking, but with appropriate preheat and low hydrogen consumables, with temper bead techniques to minimise cracking, the steels are fairly weldable.

Postweld heat treatment is used to improve HAZ toughness in these steels.

Group 7. Ferritic, martensitic or precipitation hardened stainless steels.

When using a filler to produce matching weld metal strength, preheat is needed to avoid HAZ cracking. Postweld heat treatment is essential to restore HAZ toughness.

Group 8. Austenitic stainless steels.

These steels do not generally need preheat, but in order to avoid problems with solidification or liquation cracking upon welding, the consumables should be selected to give weld metal with a low impurity content, or if appropriate, residual ferrite in the weld metal.

Group 9. Nickel alloy steels, Ni≤10%.

These have a similar weldability to Groups 4, 5 & 6.

Group 10. Austenitic ferritic stainless steels (duplex).

In welding these steels, maintaining phase balance in the weld metal and in the HAZ requires careful selection of consumables, the absence of preheat and control of maximum interpass temperature, along with minimum heat input levels, as slow cooling encourages austenite formation in the HAZ.

Group 11. High carbon steels.

These steels will be less weldable owing to their increased carbon content with respect to Group 1.

It is likely that care over the choice of consumables and the use of high preheat levels would be needed. It is important to obtain advice before welding any steels that you do not have experience in.

References

1. *BS EN 1011-2:2001 'Welding - recommendations for welding of metallic materials - part 2: Arc welding of ferritic steels' British Standards Institution, March 2001.*
2. *PD CEN ISO/TR 15608:2005 'Welding - guidelines for a metallic material grouping system' British Standards Institution, October 2005.*

This article was written by **Gene Mathers**.

For more information visit **www.twi-global.com**

Weldability of materials – Cast Irons

Cast irons are iron based alloys containing more than 2% carbon, 1 to 3% silicon and up to 1% manganese. As cast irons are relatively inexpensive, very easily cast into complex shapes and readily machined, they are an important engineering and structural group of materials. Unfortunately not all grades are weldable and special precautions are normally required even with the so-called weldable grades.

Material types

Cast irons can be conveniently grouped according to their structure which influences their mechanical properties and weldability; the main groups of general engineering cast irons are shown in *Fig. 1*.

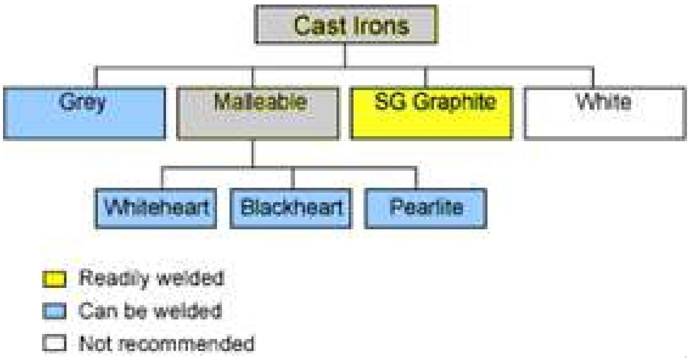

Fig.1. Main groups of engineering cast irons

Grey cast irons

Grey cast irons contain 2.0 - 4.5% carbon and 1 - 3% silicon. Their structure consists of branched and interconnected graphite flakes in a matrix which is pearlite, ferrite or a mixture of the two *(Fig.2a)*. The graphite flakes form planes of weakness and so strength and toughness are inferior to those of structural steels.

Nodular cast irons

The mechanical properties of grey irons can be greatly improved if the graphite shape is modified to eliminate planes of weakness. Such modification is possible if molten iron, having a composition in the range 3.2 - 4.5% carbon and 1.8 - 2.8% silicon, is treated with magnesium or cerium additions before casting. This produces castings with graphite in spheroidal form instead of flakes, known as nodular, spheroidal graphite (SG) or ductile irons *(Fig.2b)*.

Nodular irons are available with pearlite, ferrite or pearlite-ferrite matrices which offer a combination of greater ductility and higher tensile strength than grey cast irons.

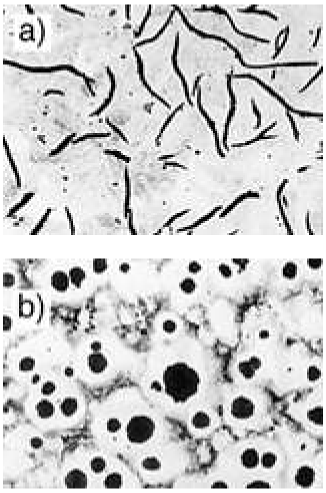

Fig.2. Microstructures of a) grey cast iron and b) spheroidal graphite cast iron

White cast irons

By reducing the carbon and silicon content and cooling rapidly, much of the carbon is retained in the form of iron carbide without graphite flakes. However, iron carbide, or cementite, is extremely hard and brittle and these castings are used where high hardness and wear resistance is needed.

Malleable irons

These are produced by heat treatment of closely controlled compositions of white irons which are decomposed to give carbon aggregates dispersed in a ferrite or pearlitic matrix. As the compact shape of the carbon does not reduce the matrix ductility to the same extent as graphite flakes, a useful level of ductility is obtained. Malleable iron may be divided into classes. Whiteheart, Blackheart and Pearlitic irons.

Whiteheart malleable irons

Whiteheart malleable castings are produced from high carbon white cast irons annealed in a decarburising medium. Carbon is removed at the casting surface, the loss being only compensated by the diffusion of carbon from the interior. Whiteheart castings are inhomogenous with a decarburised surface skin and a higher carbon core.

Blackheart malleable irons
Blackheart malleable irons are produced by annealing low carbon (2.2 - 2.9%) white iron castings without decarburisation. The resulting structure, of carbon in a ferrite matrix, is homogenous with better mechanical properties than those of whiteheart irons.

Pearlitic malleable irons
These have a pearlitic rather than ferritic matrix which gives them higher strength but lower ductility than ferritic, blackheart irons.

Weldability
This depends on microstructure and mechanical properties. For example, grey cast iron is inherently brittle and often cannot withstand stresses set up by a cooling weld. As the lack of ductility is caused by the coarse graphite flakes, the graphite clusters in malleable irons, and the nodular graphite in SG irons, give significantly higher ductility which improves the weldability.

The weldability may be lessened by the formation of hard and brittle microstructures in the heat affected zone (HAZ), consisting of iron carbides and martensite. As nodular and malleable irons are less likely to form martensite, they are more readily weldable, particularly if the ferrite content is high.
White cast iron which is very hard and contains iron carbides, is normally considered to be unweldable.
Welding process

Braze welding is frequently employed to avoid cracking. Braze welding is often called 'Bronze welding' in the UK. Bronze welding is a varient of braze welding employing copper-base fillers, it is regulated by BS 1724:1990. (This standard has been withdrawn, but no direct replacement has been identified.) As oxides and other impurities are not removed by melting, and mechanical cleaning will tend to smear the graphite across the surface, surfaces must be thoroughly cleaned, for example, by means of a salt bath.
In fusion welding, the oxy-acetylene, MMA, MIG/FCA welding processes can all be used. In general, low heat inputs conditions, extensive preheating and slow cooling are normally a pre-requisite to avoid HAZ cracking.

Oxy-acetylene because of the relatively low temperature heat source, oxy-acetylene welding will require a higher preheat than MMA. Penetration and dilution is low but the wide HAZ and slow cooling will produce a soft microstructure. Powder welding in which filler powder is fed from a small hopper mounted on the oxy-acetylene torch, is a very low heat input process and often used for buttering the surfaces before welding.

MMA widely used in the fabrication and repair of cast iron because the intense, high temperature arc enables higher welding speeds and lower preheat levels. The disadvantage of MMA is the greater weld pool penetration and parent metal dilution but using electrode negative polarity will help to reduce the HAZ.

MIG and FCA MIG (dip transfer) and especially the FCA processes can be used to achieve high deposition rates whilst limiting the amount of weld penetration.
Filler alloys
In oxy-acetylene welding, the consumable normally has slightly higher carbon and silicon content to give a weld with matching mechanical properties. The most common MMA filler rods are nickel, nickel - iron and nickel - copper alloys which can accommodate the high carbon dilution from the parent metal and produces a ductile machinable weld deposit.
In MIG welding, the electrode wires are usually nickel or Monel but copper alloys may be used. Flux cored wires, nickel-iron and nickel-iron-manganese wires, are also available for welding cast irons. Powders are based on nickel with additions of iron, chromium and cobalt to give a range of hardnesses.

Weld imperfections
The potential problem of high carbon weld metal deposits is avoided by using a nickel or nickel alloy consumable which produces finely divided graphite, lower porosity and a readily machinable deposit. However, nickel deposits which are high in sulphur and phosphorus from parent metal dilution, may result in solidification cracking.

The formation of hard and brittle HAZ structures make cast irons particularly prone to HAZ cracking during post-weld cooling. HAZ cracking risk is reduced by preheating and slow post-weld cooling. As preheating will slow the cooling rate both in weld deposit and HAZ, martensitic formation is suppressed and the HAZ hardness is somewhat reduced. Preheating can also dissipate shrinkage stresses and reduce distortion, lessening the likelihood of weld cracking and HAZ.

Cast iron type	Preheat temperature degrees C			
	MMA	MIG	Gas (fusion)	Gas (powder)
flake	300	300	600	300
nodular	RT-150	RT-150	600	200
whiteheart malleable	RT*	RT*	600	200

Table 1: Typical preheat levels for welding cast irons

As cracking may also result from unequal expansion, especially likely during preheating of complex castings or when preheating is localised on large components, preheat should always be applied gradually. Also, the casting should always be allowed to cool slowly to avoid thermal shock.

An alternative technique is 'quench' welding for large castings which would be difficult to preheat. The weld is made by depositing a series of small stringer weld beads at a low heat input to minimise the HAZ. These weld beads are hammer peened whilst hot to relieve shrinkage stresses and the weld area is quenched with an air blast or damp cloth to limit stress build up.
Repair of castings

Because of the possibility of casting defects and their inherent brittle nature, repairs to cast iron components are frequently required. For small repairs, MMA, oxy-acetylene, braze and powder welding processes can all be used. For larger areas, MMA or powder technique can be used for buttering the edges of the joint followed by MMA or MIG/FCA welding to fill the groove. This is shown schematically in *figure 3*.

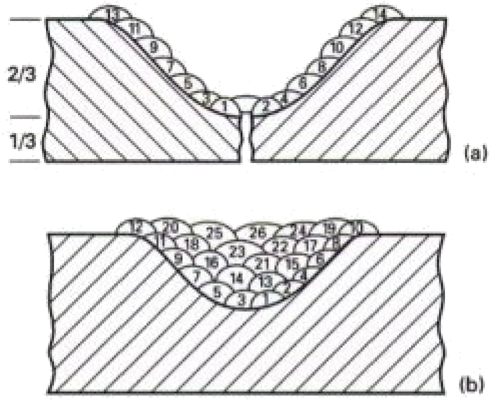

Fig.3. Repair of crack in cast iron from one side

a) bridging the crack by weld bead from buttered layers

b) sequence of welding

1. Remove defective area preferably by grinding or tungsten carbide burr. If air arc or MMA gouging is used, the component must be preheated locally to typically 300 degrees C.
2. After gouging, the prepared area should be lightly ground to remove any hardened material.
3. Preheat the casting to the temperature given in Table 1.
4. Butter the surface of the groove with MMA using a small diameter (2.4 or 3mm) electrode; use a nickel or Monel rod to produce a soft, ductile 'buttered' layer; alternatively use oxy-acetylene with a powder consumable.
5. Remove slag and peen each weld bead whilst still hot.
6. Fill the groove using nickel (3 or 4mm diameter) or nickel-iron electrodes for greater strength.

Finally, to avoid cracking through residual stresses, the weld area should be covered to ensure the casting will cool slowly to room temperature.

For more information visit **www.twi-global.com**

Fronius ramps up the comfort factor

The Fronius MagicWave 2200 AC/DC Tig and TT 2200 DC Tig product families have been extended by the addition of a “Comfort” version, which was previously only available in the larger MW/TT 3000, 4000 & 5000 models.

The basic functions remain unchanged compared with the standard versions, but the “Comfort” version has a plain text display.

This has a number of advantages. Everything is spelled out in plain text, simplified and “tells it like it is”. That means no abbreviations, no numerical codes, just straight to-the-point announcements like “Main current”, “Lowered current” or “Electrode diameter”.

This is unique, in terms of both handling guidance and user-friendliness and ranks highly at the very forefront of modern technology

It is also available in several languages including German, English, French, Italian, Spanish, Czech, Swedish, Portuguese, Dutch & Polish (Finnish & Estonian coming soon)

Additional parameters can be easily set using the menu navigation. The plain text display is intuitive, easy to read and absolutely self-explanatory, meaning that anyone can learn to use it straight away.

The “Comfort” control panel employs the usual Fronius standards and can be controlled easily even when wearing protective gloves.

Fronius tig welders are Microprocessor controlled, Digital welding power sources which are generator compatible and thermostatically controlled making them user friendly in the workshop or in the harshest remote sites. They feature, *Active Wave technology, *Automatic tungsten cap-shaping, Tig-Pulse, TAC function, RPI ignition (Reverse polarity ignition), Anti-stick and 100 Job memory.

Also available are the optional VRD, water cooling, cold wire tig feeding, trolleys and robotic interfacing.

The units are completed with a range of tig torches featuring the renowned Fronius up/down remote control or can be operated with a range of remote pendants or foot controls.

(*Feature only available on the Magicwave AC/DC)

World first battery powered Accupocket - now with VRD

Newly released AccuPocket - the world’s first portable off-grid battery powered MMA welding unit from Fronius - is now available from Australian distributors SMENCO with Voltage Reduction Device (VRD).

Powered by high-performing lithium-ion rechargeable batteries, AccuPocket weighs just 11kg giving users unprecedented freedom of movement in manual electrode and TIG welding and makes AccuPocket the ideal solution for repair welding or site-erection work in remote terrain where there is no direct access to mains electricity.

A fully charged battery (400 Wh) delivers sufficient power to weld up to eight 3.25 mm diameter electrodes or 18 electrodes of 2.5 mm diameter.

The ActiveCharger device supplied with the AccuPocket is specially tailored to the requirements of the welding unit, and is based on Fronius' proven Active Inverter Technology.

An intelligent control system using AccuBoost Technology makes sure that the battery and the welding electronics work together perfectly. In practice, this results in better welding results than could be obtained with a comparable mains-only powered MMA welding unit.

Exceeding stringent Australian safety standards AccuPocket with VRD has an Open Circuit Voltage (OCD) of 12 V – three times lower than the 35 V maximum OCD standard required. When the welding circuit resistance is greater than 200 ohms (ie when touching the human body) the OCV is limited to 12 V and the VRD must be active within 0.3 seconds after welding stops.

No mains? No worries

Compared to conventional lithium-ion batteries, the rechargeable batteries used in the AccuPocket (lithium-iron-phosphate, $LiFePO_4$) stand out for having the highest intrinsic safety and environmental compatibility currently available, lower self-discharge and no memory-effect.

Built-in battery-management functions and the specially adapted external ActiveCharger – with Active Inverter Technology that detects the state of the battery and optimally adapts the charging characteristic – together ensure safe operation and long battery-cell life.

Together with the unit's compact dimensions (435 x 160 x 320 mm) in battery mode, AccuPocket is even safe to use in electrically high-risk environments because its internal design structure ensures that the highest voltage occuring anywhere inside it is always far below the permissible maximum of 113 VDC.

Even when attached to the ActiveCharger, the AccuPocket can still be used to carry on working, in hybrid mode. During run-times, the energy from the battery is used to ensure a constant arc under all operating conditions (e.g. mains-voltage fluctuations).

The welding off-times are then used for recharging the battery. The battery exercises a buffering function which lessens the load on the supply network, in turn preventing the annoyance of circuit-breakers being tripped on jobsites. What's more, the full welding amperage of 150 A is available in TIG mode, or 140 A in MMA mode, even in a 110 V network.

Due to the extremely efficient Active Charger that only draws maximum 9.5 A the AccuPocket can also be run from very small generators. In this case, the integrated rechargeable battery reduces the required maximum power input, meaning that a much lower-capacity current source can be used.

Instead of an 8 kV generator, a 2 kV unit is now sufficient - this ties up less capital and facilitates portable deployment.

Thanks to its facility for battery-powered operation, AccuPocket minimises time-consuming weld preparation work. This means that in many applications, it is actually more economical, over its service life as a whole, than conventional electrode welding systems.

About Fronius

Fronius International is a family owned Austrian company with nearly 2600 staff worldwide. Fronius is a world leader in the fields of welding technology, battery charging systems and solar electronics.

About SMENCO

SMENCO is one of Australia's leading distributors of welding equipment, consumables, and associated welding technology from around the world.

Among other leading international brands, SMENCO is the national distributor for Fronius welding equipment and Castolin Eutectic (both recognised as leaders in Welding Technology and Wear Solutions), Bohler Welding Consumables, Kemper Fume Extraction, Bug-O Automated Welding Systems, and BOA Bore Repair Systems.

Based in Melbourne with offices in Brisbane, Sydney, Melbourne & Perth, SMENCO personnel have an enviable reputation for knowledge, experience and commitment to their customers and their industries.

SMENCO company trained and experienced field staff are backed by a comprehensive national Distributor Network to provide customers with service that's never far away.

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The WeldNet

The WeldNet is a specialised welding and metallurgical engineering consultancy group based in Perth, Western Australia. The group has been established for over 20 years, and services clients in the oil and gas, mineral processing, mining, construction and fabrication industries in Australia and overseas.
The WeldNet offers contract and ad-hoc welding and metallurgical engineering consultancy on design, fabrication, construction, QA/QC as well as the following services:

- Drafting and third-party review / validation of materials procurement, fabrication and welding project specifications.
- Drafting and qualification of WPS/PQRs and third-party validation of welding procedure specifications.
- Materials and weld failure investigation.
- Expert witness consultancy.

Chevron Wheatstone Platform

The WeldNet provides materials and welding engineering consultancy from front end engineering design (FEED) through to construction, operations, maintenance and shutdown to many of the major Australian projects carried out over the last 20+ years. The WeldNet current projects include:

APA Group
- Mondarra Gas Storage Facility
- Eastern Goldfields Pipeline Project
- Dandenong Regulator Station
- Murrin Murrin Lateral (hot-tap)

Apache Energy
- Varanus Island Compressor Project
- John Brookes Pipeline Repair Project

BAE Systems
- Welding Engineer based in BAE - John Brookes, Kongsberg, Chevron, EMAS Projects and Ship Refit / Repairs

BHP Billiton Petroleum
- Stybarrow and Pyrenees FPSO Operations
- Macedon Pipeline Construction Project

Chevron
- Gorgon Upstream Pipelines and DomGas
- Wheatstone Upstream Topsides & Structures
- Wheatstone Risers & Caissons (DSME)
- Wheatstone Hook-Up Support (Clough)

DBP
- Fortescue River Gas Pipeline JV
- Wheatstone Ashburton West Pipeline

Momentum Engineering
- Winchelsea Compressor Station & MV11 FPSO
- WEL Projects Support

Monadelphous
- West Angelas Pipeline & INPEX Ichthys Project

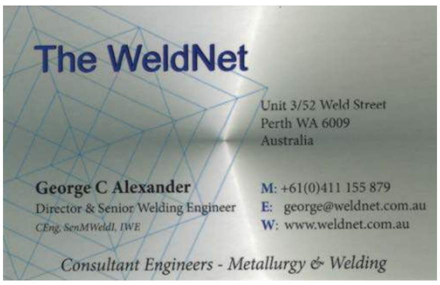
Norton Rose Fulbright & Shine Lawyers
- Pipeline and Mining Expert Witness

Technip
- Wheatstone Subsea Rigid Spools

Woodside Energy
- Greater Western Flank - Phase 2
- Persephone Project

WorleyParsons
- Welding Engineer based in WP providing WEL Brownfields Support and WP Project support

The WeldNet prides itself on continual professional development of its team and would like to congratulate James Alexander for recently completing his IIW International Welding Engineer qualification and Ashley Bell for commencing his Materials Science degree at Curtin University WA. The WeldNet would also like to welcome Alan Bishop (Senior Welding Engineer) to the team, providing a focus for WeldNet consultancy services in the eastern states.
www.weldnet.com.au



Progress of the AWI

AWI has forged new relationships that allows better access to students.

A key responsibility of the AWI is to provide a credible, transparent and user friendly welding qualification system for its members.

AWI has been working closely with two RTO's to allow direct transition from there courses into the AWI qualifications. We have also identified other opportunities for AWI members to have their qualification from the WTIA converted into AWI qualification.

For those students that have studied and successfully completed welding supervisors in accordance with the following you are now able to apply to the AWI for recognition to make the qualification recognised Nationally.

For Qualifications gained through:
Challenger Institute of Technology - **2014 to Present**
TAFENSW - **2014 to Present**
WTIA - Qualification **issued prior** **to Jan 2002**

The AWI has seen some great interest in the program. The AWI has a strict requirement that the students must have completed a trade or equivalent, this has been instigated with the view to ensure the qualifications regain the respect they once had.

Get in touch with the AWI for more information
admin@austwelding.com.au

We are currently offering direct transition for **AS1796:2001** Certification for welders and welding supervisors Certificate number 10 plus;

AS2214:2004 Certification for welding supervisors - Structural steel welding.

For those that do not meet the above criteria, you are not excluded, if you have studied elsewhere, you can gain direct entry into the exams and achieve your AWI qualifications as well.

The industry has been waiting for the return of a practical, relevant qualification, which is a cost competitive alternative to the offerings of the WTIA.

Wait no longer, the AWI are making this happen! AWI examination papers have been written and validated by industry experts that have extensive experience in the relevant disciplines. We have had some fantastic feedback from running these examinations are exampled below:

'they are based much more on what we need to know in the workshop'

and

'it was a very detailed exam but based on practical application of being a supervisor'.

The AWI has listened to industry, but more importantly - YOU - and have provided a certification system that measures the skills and knowledge of welding supervisors. The AWI is raising the bar on these important industry qualifications as well as giving you a quality alternative.

AWI actively supports and promotes the AS 1796 and AS 2214 Welding Supervisors qualifications and encourages all members and the Metal Fabrication Industry to embrace these qualifications. AWI has established an alliance with a number TAFE Colleges around the country and takes pleasure in supporting and promoting these Colleges and programs and are now endorsing Welder Qualification AS 1796 Certificates 1 – 9, Welding supervisors AS1796 and AS2214.

Further information or Application forms are available through selected TAFE Colleges and from:

admin@austwelding.com.au

The welding supervisors exams will be running around the country (based on demand) on the following dates:

2nd and 3rd of July
1st and 2nd of October
3rd and 4th December

Membership Benefits

The benefits of membership of the AWI are:

- The provision of a professional network for members to exchange information and ideas relating to all things welding
- Subscription to E-News Bulleting WeldED
- The opportunity to join a national organisation whose main objectives are to:
    - Promote the advancement of the Australian Welding and fabrication Industry
    - Promote its members and their services to others in the Welding Industry
    - Create a network of people who are passionate about, and want to aid the Australian Welding and Fabrication Industry
    - Endorsement of Australian welding and inspection qualifications
- Encourage participition in working groups to further develop your knowledge in your area of specialisation and aid other members

AUSTRALIAN WELDING INSTITUTE

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