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We have forever changed the way welders see!
The importance of welding compliance is obvious: non-compliance with weld procedures and welding defects can result in the need for expensive repair work, financial loss and—of particular concern—unsafe conditions.

Furthermore, globalisation means that equipment now originates from many countries, some of which do not enforce standards as high as those of Australia.

The National Welder Qualification Register

To kick-start the new year, I am pleased to announce that the WTIA will soon launch a new initiative: the National Welder Qualification Register. Not only will this initiative help Australia’s welding industry capture, grow and capitalise on its slowly disappearing skills and knowledge, it will also create process and economic efficiencies, particularly for asset managers.

The cost to the industry of qualifying welders is enormous. Currently, welders perform a test weld which is then assessed. Approximately 15% of welders are actually passing this assessment and at up to $1,000 per test, the costs are quickly becoming restrictive.

In fact, a well-known Australian power station recently spent approximately $80,000 qualifying welders. Similarly, a major mining group spent more than $45,000 on qualifying for a single project.

Perhaps most alarming of all, many industry representatives are attributing the dismal pass rate of weld tests to a lack of welder training and education.

Unfortunately, it has been many years since the trades of welder and boilermaker were taught at Australian TAFEs. Instead, this training has been replaced by courses such as light and heavy fabrication, in which the welding modules are of varying degrees of complexity, and are usually optional.

This lack of practical, hands-on training has not been helped by our technical standards, which lack flexibility and practical application.

As a result, the in-depth welding skills and knowledge that are so necessary to the construction of mining infrastructure and military hardware, and the maintenance of a whole range of critical infrastructure is gradually disappearing.

A number of WTIA members, who operate in the mining, oil and gas, and power sectors have approached us to assist in resolving this issue.

So, we will launch the National Welder Qualification Register in July this year. The Register will be a database of welders, all of whom are qualified to the processes set out in ISO9606, which is the international benchmark for the qualification of welders.

This cloud-based database will re-establish and revitalise the trade of welding in Australia, and raise the overall level of skill throughout the industry.

The Register will also help reduce the costs currently experienced by asset managers, who are expected to pre-qualify welders prior to the commencement of planned maintenance and repair work on steel infrastructure.

The National Welder Qualification Register is vital to ensuring the long-term sustainability of the Australian welding and fabricating industry, and is an initiative that has already garnered significant industry support.

Further updates on the initiative, including its launch date, will be provided over the coming months.

SMART Industry Group of Welding Equipment Suppliers

In addition to compliance issues surrounding workmanship and welder training, the WTIA is concerned at the volume of welding equipment currently being imported into Australia that does not comply with Australian standards and could therefore be unsafe.

To combat this issue, the WTIA is in the process of forming a SMART Industry Group of the major equipment suppliers in Australia. The objective of this SMART Group will be to draft a compliance system which enforces the certification of equipment to appropriate Australian standards, regardless of whether they are manufactured within Australia or overseas.

We then hope to be able to promote this standard to retailers and distributors of welding equipment, with a view to improving the overall safety of welding in Australia.

Should you require further information, or would like to join the WTIA SMART Industry Group of Welding Equipment Suppliers, please contact Bruce Ham, Chief Technology Officer, on b.ham@wtia.com.au.

From the WTIA CEO

Geoff Crittenden, WTIA CEO.
Inside the Industry: Breaking News

Productivity Commission: Rationale for Anti-Dumping is Weak
The Productivity Commission has released a research report that has found the underlying rationale for having an anti-dumping system is extremely weak, and exists to provide protection to a narrow range of Australian industries rather than to advance the interests of the community as a whole. Despite this, or because of it, usage of the system is on the rise.

The report, *Recent Developments in Anti-Dumping Activity*, found that there has been an increase in usage of anti-dumping measures in recent years, alongside policy changes that have made anti-dumping protections easier to access. Industry support, often tailored to specific firms, is the consequence.

Approximately 86% of investigations into dumping in 2014-2015 were related to steel imports.

Arrium Announces Redundancies and Pay-Cuts
Arrium has recently announced that it will make 30 redundancies and will ask mining employees to take a temporary pay cut of 10%. This announcement follows a $235.8 million loss (after tax) last year, and reports that Arrium is considering closing its Whyalla steelworks, which is currently operating at a loss.

According to the ABC, an unnamed spokesperson said, “The reality is that the business is not economic and it needs to reset its cost base to be viable. This [pay cut] concession is an interim measure and employees’ pay will return to their previous level once the business can afford to do so. This is about every employee, from senior management to the shop floor, contributing to securing the future of the mining business.”

Source: www.australianmining.com.au

Japanese Submarine Contract Bid Intensifies
The Japanese bid for the $50 billion contract to build Australia’s 12 new Future Submarine fleet has intensified. The head contractor, Mitsubishi Heavy Industries, has revealed plans to use the facilities built for the project as the base for a major innovation centre in Adelaide that would exploit new business and research links to move into a range of global non-defense commercial businesses.

According to reports in the Australian Financial Review, Mitsubishi Heavy Industries Chairman Hideaki Omiya, said the 29-company conglomerate would also embark on a local “wave of investment” in industries as varied as aircraft components and chemical manufacture. Mitsubishi Heavy Industries has already interviewed more than 200 Australian companies about providing parts for the submarines locally.

Source: www.afr.com

Arrium’s Whyalla Steelworks.

Air New Zealand to 3D Print Aircraft Interior Parts
Air New Zealand has been working with Auckland University of Technology to manufacture the fold down cocktail trays that form part of its award winning Business Premier seat using innovative 3D printing.

Air New Zealand Chief Operations Officer Bruce Parton said, “Aircraft interiors are made up of tens of thousands of parts. Not only can’t we hold stock of every replacement part we might need, we often only require a small number of units which can be really expensive to produce using traditional manufacturing methods and can involve frustrating delays while a replacement part is delivered.”

“A big advantage of 3D printing is that it allows us to make cost-effective lightweight parts ourselves, and to do so quickly without compromising on safety, strength or durability,” said Mr Parton.

Source: www.smh.com.au

BlueScope Reports $200 Million Profit
Just months after announcing 500 job cuts at its Port Kembla steelworks, BlueScope has reported a net profit after tax of $200.1 million for the first half of the 2016 financial year—a 116% increase on the corresponding period for last year.

In October, the New South Wales government agreed to defer $60 million in state payroll taxes over three years in a bid to prevent BlueScope from shutting its remaining Port Kembla blast furnace.

BlueScope said in August 2015 that it needed to cut $200 million of costs from the plant, otherwise the No. 5 blast furnace would be mothballed, endangering 5,000 direct and indirect jobs. Port Kembla workers agreed to 500 job cuts, wage freeze, and workplace restructuring to help save the plant and the remaining 4500 jobs.

BlueScope’s Managing Director and CEO, Paul O’Malley said, “Our focus on costs and lifting the performance of steelmaking operations in Australia and New Zealand is paying off. With the support of all our stakeholders we have been able to pursue Plan A [to keep the blast furnace running] at Port Kembla steelworks. This occurred despite the continuing headwinds of global overproduction causing weaker commodity steel prices and spreads.”

Source: www.smh.com.au

Source: www.australianmining.com.au

Japanese Government Launches 2016 Defence White Paper
According to Prime Minister Malcolm Turnbull and Minister for Defence Marise Payne, the 2016 Defence White Paper is a comprehensive and responsible long-term plan that will ensure Australia’s national security.

The Turnbull Government will increase Defence spending by $29.9 billion over the next decade, with the defence strategy and capability plans having already been independently costed to ensure they are achievable and affordable.

The Turnbull Government will invest $1.6 billion over 10 years in programs to build industry skills, drive competitiveness and export potential while harnessing Australian innovation and expertise. The Government will invest in new capability across the ADF including:

- A continuous naval shipbuilding program with nine future frigates and 12 offshore patrol vessels.
- 12 new regionally-superior submarines, with the commitment to maximise Australian industry involvement in acquisition and sustainment, through the Competitive Evaluation Process.
- Enhanced intelligence, surveillance and reconnaissance, space, electronic warfare and cyber capabilities.
- Advanced training, modern equipment, health care and logistics systems to support ADF personnel.
- Comprehensive upgrades to Defence infrastructure across Australia to support our larger future force, including key bases, training and testing ranges and fuel and explosive ordnance facilities.
- Modernised information management, operational communications, and command and control systems.


Source: www.smh.com.au

BlueScope’s Port Kembla Steelworks.

Breaking News

Arrium’s Whyalla Steelworks.
Lincoln Electric Announces New Organisational Structure

Lincoln Electric Holdings has recently announced the realignment of its organisational and leadership structure to drive greater operational efficiency and support the company’s 2020 vision and growth strategy. The global manufacturer of welding products has combined its North and South American Welding businesses into ‘Americas Welding’.

Additionally, their Europe and Asia Pacific welding businesses will be combined to create ‘International Welding’.

Christopher L. Mapes, Lincoln Electric’s Chairman, President and Chief Executive Officer, said, “We believe our new welding organisational structure will improve efficiencies by further integrating operational and product development processes across regions to better serve customer needs. This structure also leverages the functional and technical strength of our core teams in developing markets, which will help accelerate profitable growth in advanced applications as part of our 2020 growth strategy.”

Revenue for what is now Americas Welding was nearly $1.4 billion for the nine-month period, ended 30 September 2016. Revenue for what is now International Welding was approximately $402 million, for the same period.

Glencore Launches Legal Bid Against Government

One of the world’s largest mining company’s, Glencore has launched a legal bid against the Australian government to lower port access fees. In recently submitted filings before the Australian Competition Tribunal, Glencore has complained that increased fees to enter the newly privatised Newcastle Port, which produces more than 170m tonnes of saleable coal a year, will ‘materially impact on the profit margins of coal producers’.

The New South Wales government recently privatised the Newcastle port under a joint venture between Hastings Fund Management and China Merchants, known as the Port of Newcastle Operations (PNO).

Shortly after assuming its role as port operator, PNO published price increases and changes to the charging regime, which came into effect on 1 January 2015. The changes involved PNO imposing an average 40% price increase on the users of the shipping channels, with the price for the most common vessel type using the shipping channels increasing by 60%.

Newcastle Port has been used for commercial shipping for 215 years and is one of the largest coal export ports in the world. The channels are the only means by which coal ships can gain entry to and exit the Port, making it the only commercially viable option for the export of seaborne coal from the Hunter Valley.

Source: www.theguardian.com
No Mistakes About Welding Safety: NMW 2016

Could welders be unknowingly making mistakes that increase their injury risk? With Australia seeing more than 15,000 hospital visits each year—for eye injuries alone—due to welding-related accidents, it is essential to attend the Safety First Conference & Expo, taking place alongside National Manufacturing Week (May 11 to 13 at Sydney Showground, Sydney Olympic Park).

The Safety First Conference & Expo is a one-stop safety event, bringing together a showcase of safety solutions alongside a packed conference program, with industry leaders sharing the latest research and strategies for improving workplace safety.

Among keynote speakers at this year’s event is Cristian Sylvestre, Managing Director of Safe Start. Sylvestre will be bringing information from the world of neuroscience that could change the face of workplace health and safety. New research, says Sylvestre, is revealing a new aspect to safety: that unconscious errors arise from inattention—and that safety can be improved by keeping people’s minds alert.

Sylvestre will be sharing these insights, as well as tools for improving your chances of not having a workplace incident, in a Premium Forum session at the Safety First Conference & Expo.

The full Safety First Conference program—which includes free and premium sessions—will complement National Manufacturing Week (NMW)’s bursting-at-the-seams program, which includes speakers, demonstrations and a showcase of brands and innovative solutions from around the world.

The NMW showcase will be laid out in 12 Product Zones, including the Welding Technology Product Zone, which will include technologies designed to help welders work more productively, safely, and with the consistent quality that sets Australian industry apart.

Visitors to NMW will also experience a rolling series of demonstrations, giving welders the chance to see, touch and try new technologies that could make the difference to their operations.

Want to be part of it? Visit nationalmanufacturingweek.com.au to register, which is free to the trade industry, and access the full program, plus a raft of services that will help you make the most of opportunities to gain new insights and see the technologies that will shape industry’s future.

For further information, visit: www.nationalmanufacturingweek.com.au
Who’s Exhibiting at National Manufacturing Week?

National Manufacturing Week 2016 is set to include the largest showcase of welding, heat-treating, joining and associated products and technologies in Australia. Supported by the Welding Technology Institute of Australia (WTIA), the Welding Technology Product zone will provide a dynamic environment of live demonstrations and the chance to try before you buy. Product categories will include everything from gas equipment and metal forming, through to robotics and MIG, stick and TIG welding machines. Exhibitors are detailed below.

Adept Turnkey
Stand 1406
With over 27 years experience, a catalogue of over 40,000 vision components, and a range of machine vision systems and components for manufacturing quality control, Adept Turnkey offers automated inspection technology and advice for all welding and robotic welding applications.

Busicom Solutions
Stand 2220
Busicom provides comprehensive solutions for welding quality assurance and trade resourcing throughout Australia, including qualified welding crews, third party inspection and more. Busicom is dedicated to helping companies increase productivity and profitability.

Ensitech
Stand 1430
Ensitech is the inventor and manufacturer of the TIG Brush® Stainless Steel Weld Cleaning System, and a global leader in metal surface finishing. The System® provides an end-to-end process for preparing, cleaning, passivating and protecting welded and fabricated metal surfaces.

Goodwill Precision Machinery
Stand 1722
Established as a manufacturing company in 2004, Goodwill specialises in precision machining services for non-standard mechanical parts, spare parts, metal fabrication, precision welding and more. Goodwill also provides a range of design and assembly services.

Innovative Welding
Stand 1330
Innovative Welding is the Australian distributor for K-Tig keyhole welding systems, using CSIRO developed technology. This leading technology allows thick materials (up to 16mm) to be welded in one tenth of the time of traditional welding processes.

Klingspor Australia
Stand 1530
Klingspor Australia is a German based manufacturer of high-quality abrasive tools. Klingspor invented the flap disc and the cutting and grinding disc, and remains a leader in abrasive technology.

Leussink Engineering
Stand 1730
Leussink Engineering have been manufacturers of Demmeler world class jigging and fabrication systems for over 30 years, and are the newly appointed ANZ agent for FARO Metrology. Demmeler systems have many configurations to suit any application in research and development, fabrication and welding.

Magnet Sales Australia
Stand 1444
Magnet Sales Australia provides a vast quantity of magnetic solutions, including welders’ magnets, and is Australia’s dealer for the entire range of Magswitch welding and lifting products, including workholding, marine and more. The Magswitch range is one of the best magnet clamping systems in Australia.

Metal Science Technologies
Stand 1230
Metal Science Technologies will present the latest developments in stainless steel weld cleaning. Among this year’s highlights are four new machines, including the lightweight and highly portable EASYkleen TEC, the robust, economical EASYkleen PLUS BRUSH and two powerful EASYkleen PRO models.

Revolution Materials
Stand 2516
Revolution Materials is the exclusive agent in Australia for CB-Chemie und Biotechnologie GmbH, and Durauloy Technologies. At NMW, Revolution Materials will showcase Bio-Circle—a world leader in bio-remediating parts cleaners, with innovative, high-quality products for parts cleaning, corrosion and weld protection, and lubrication.

Supagas
Stand 1138
Supagas is your local gas supplier and a born and bred Australian company that has been providing gas services—including welding and specialty gas—since 1997. Supagas offers a range of shielding gases, specifically for MIG and TIG welding, targeted to mild steel, stainless, aluminium and alloy applications.

TesoCo
Stand 1426
Established in 1988, Tesuco supplies an extensive range of welding, brazing, cutting and heating equipment and accessories. Their gas equipment includes regulators, manifolds and gas welding, cutting and heating tools.

Weldbrush
Stand 1340
Weldbrush manufactures weld cleaning and electro polishing machines, which deliver real-time cost savings while lifting the industry standard for weld finishing. Their machines are fast, inexpensive, acid resistant, and easy to carry. Weldbrush units can clean stainless steel, brass and bronze.

Welding Technology Product Zone Sponsor: Kemppi Australia
Stands 1325, 1220, 1226
Leading international welding equipment manufacturer, Kemppi, will be showcasing its range of welding helmets at National Manufacturing week, including the Beta 90 FreshAir, Delta 90 FreshAir, and Delta- 90 FreshAir.

The helmets have been specifically designed to provide the utmost protection against welding, grinding and associated airborne fumes and dust contamination, ensuring comfort while meeting Australian standards.

Visit the Kemppi Australia team to talk about Kemppi’s innovative welding technologies and productive welding solutions that deliver on the Kemppi promise, ‘The Joy of Welding’.

In more than 60 years of operation, Kemppi has introduced many new innovations to the market, pioneering the development of both welding technology and productive welding solutions.

NMW Demonstration Program
See Kemppi on Wednesday 11 May at 2.20pm demonstrate welding with their new Pulse Mig welding package, monitored on Kemppi’s KAS3 online welding management system.

The demonstration will include the Fastmig X Black Pulse with supersnake sub feeder and valve added options, as well as a range of new products.

Contact: David Green on david.green@kemppi.com or 0419 551 018.
Worldwide Spending on 3D Printing to Grow from $11B to $26B by 2019

The global 3D printing industry is set to expand rapidly over the next three years, with predictions of a 27% compound annual growth rate. According to International Data Corporation (IDC), a global market intelligence provider, the $11 billion 3D printing industry in 2015 will balloon to $26.7 billion by 2019.

This is one of the fastest rates of growth yet predicted for 3D printing, where it is expected that the West European, Asian and United States markets will primarily drive the growth.

The expected high rate of growth and expansion will be driven primarily by a few select industries rather than a cumulative effect over the entire industry. Specifically, businesses that previously sold and manufactured mass-produced products will now be capable of customisation to better service individual needs and requirements.

While overall the United States, Western Europe and Asia will be responsible for most of the industry growth, the IDC expects that 3D printing will continue to develop rapidly in several emerging markets throughout the world.

“IDC’s 3D printing research indicates that the 3D printer market is primed and ready for greater mainstream adoption. There is strong appeal for this technology across several markets, and regions,” said Keith Kmetz, IDC’s Program Vice President of Imaging, Printing and Document Solutions research.

The aggregate share of global 3D printing spending by the United States, West European and Asian markets is expected to rise from the 59.2% recorded in 2014 to an estimated 70% by 2019. This will be a result of a greater adoption of 3D printing applications within the industrial sector. China in particular is expected to become a leading market for 3D printing hardware, products and services as they begin to heavily leverage their pre-existing manufacturing and distribution infrastructure.

Similarly, according to the latest study from SmarTech Markets Publishing, the market for additive manufacturing of metal powders will generate revenues of around $1.2 billion by 2021, going on to reach $2.4 billion by 2025.

As metal additive manufacturing begins to be used for direct manufacturing and not just prototyping, many powder producers are matching powders not just with particular print processes, but with the actual end-use parts. There has also been an increasing variation in metal powder production, with entirely new processes being tested, and purpose-built variations of traditional atomisation processes developed.

Perhaps the most significant regional growth story in metal additive manufacturing has been in Asia, which is expected to account for $316 million in metal powders by 2021. China is emerging as especially important, with some metal additive manufacturing companies reportedly quadrupling their revenue in the last two years. This is not surprising given that in 2015, the Chinese State Food and Drug Administration approved the use of additively manufactured hip replacement cups, and the Chinese military started utilising a variety of metal additive manufacturing technologies to manufacture critical aircraft components.
What Kind of Insurance Does Your Business Need?

Businesses must deal with risk on a daily basis, regardless of their size or industry type. Business insurance is an essential part of managing these risks, and for small business owners uninsured at the time of an accident, the resulting costs can often lead to closure of the business. If you’re operating a small business, having insurance can help reduce your risk and allow you to succeed in the future. Your insurance premiums will vary depending on the size of structure of your business, but you should be aware that some forms of insurance are compulsory for all Australian businesses.

Mandatory Insurances

In Australia, there are certain types of insurance that are mandatory. For instance, if you employ people, you must take out workers compensation insurance to protect your employees in the event of an accident or sickness. If you own a motor vehicle, you must pay for third party personal injury insurance. If you own a motor vehicle, in the event of an accident or sickness. If you own a motor vehicle, you must take out workers compensation insurance to protect your employees—known as workers compensation—through an approved insurer. Workers compensation is covered by separate state and territory legislation. Independent contractors may require their own insurance.

Workers Compensation

Injury, illness or death in the workplace can cause severe hardship to your workers, their families, and your business. For this reason it’s important that you have adequate protection.

As an employer, it is your responsibility to maintain current workers compensation insurance to protect against financial hardship as a result of a workplace accident. In most cases, you must provide accident and sickness insurance for your employees—known as workers compensation—through an approved insurer. Workers compensation is covered by separate state and territory legislation. Independent contractors may require their own insurance.

Public Liability

While Public Liability Insurance is not mandatory by law, almost every head contractor and most private clients will insist that a public liability policy for $20 million is held. Any contractor in the construction industry needs that sort of cover to protect against the death or injury of a non employee and to cover against accidental damage to property. While $20 million might seem like a huge sum of money, a simple accident does have the potential to create major, expensive problems.

For instance, imagine the costs associated if a heavy tool or piece of machinery was dropped from the equivalent of a 2nd storey, landed on the windscreen of a passing car, causing a car accident which injures several people and results in damage to a number of nearby buildings.

The costs could easily, and very quickly, run into millions of dollars.

The vehicle insurers and the injured people would likely sue the contractor that dropped the tool for damages. And, if the contractor was without (or did not have an adequate amount of) public liability insurance, they would sue the project’s head contractor. This would make it highly unlikely that the contractor would ever be awarded repeat work by the head contractor.

Personal Accident and Illness

If you are self-employed, you won’t be covered by workers compensation. As such, it is recommended that you cover yourself for accident and sickness insurance through a private insurer. This policy will compensate you for loss of revenue while you recover.

As a business owner, you may also wish to consider personal life insurance, or income protection or disability insurance, which cover part of your normal income if you are prevented from working due to sickness or an accident.

Other Insurance

There are many other forms of insurance available to specialist contractors. Some of the insurances you might want to consider include:

- Machinery, plant, tools and equipment that belong to a contractor can be insured against theft and accidental damage.
- Contract works in cases where the contractor is directly responsible to the client can be insured against natural or malicious damage.
- Product liability insurance may be needed if the contractor designs or constructs items for a client.
- Pollution insurance may be needed if any type of material is used which may accidentally cause pollution.
- Surety and contractual insurance can be obtained against the risk of the contractor not being paid due to the actions of the client (such as bankruptcy).

Please note that the advice in this article is general. Individual businesses should determine their own specific insurance needs. The WTIA strongly recommends that the services of a reliable insurance broker are obtained.

IWE & IWT Qualification:

A pipeline to career success

In conjunction with the University of Wollongong, the WTIA is set to launch a newly restructured training course, which will see graduates obtain a globally recognised welding qualification.

Recognised by the International Institute of Welding (IIW), this highly sought-after welding qualification is International Welding Engineer (IWE) or International Welding Technologist (IWT), depending on applicant’s prerequisites. Successful completion will enable students to apply for international certification as IWE or IWT.

IWE and IWT qualifications provide a raft of benefits, including higher salary potential, stronger employment demand, and better job stability. Early enrolment will put you ahead of the curve, boost your career and earning potential, and make you the preferred candidate for large-scale projects around the globe.

How to Enrol: 02 8748 0100 | info@wtia.com.au | training@wtia.com.au | www.wtia.com.au
The Benefits of Welding Management Software

Smart Welding Manager is a cloud-based production welding management software for weld mapping, weld tracking and full traceability. There are mobile tablet apps for this software (iPad and Android versions) that can be used offline for working in areas without an internet connection.

The software application allows users to plan welds, allocate work to qualified welders by creating work packs, and features an easy interface to manage WPS, drawings, welder qualifications, materials, welding consumable and test requests.

Tablet computers can be used to record activities in the field, such as recording welding inspections, taking photographs and even create pictorial weld maps.

You can create the project data book or manufacturer’s data report (MDR) with one click and compile the MDR in one neat PDF file with all supporting documents, in the format your client has specified.

As Smart Welding Manager is a cloud-based application, it works with any standard web-browser and on any internet enabled device. This means the application can be accessed by any of your staff with access rights, regardless of where they are located or what type of computer or operating system they are using. Obviously, there is no requirement for servers and other hardware and you can save on installation and maintenance costs.

Final documentation such as a Project Data Book or a Manufacturer’s Data Report can be generated in the required format at the touch of a button, saving thousands of hours of valuable time, reducing project costs and increasing productivity. These reports can be quickly and easily configured according to client requirements.

It is a highly scalable software product. It would suit small, medium and large companies alike. The application resources can be increased as your requirements change, which makes Smart Welding Manager a very cost effective application. From just $13 per user per month, Smart Welding Manager offers remarkable value for money. Try it for free today.

Visit www.smartweldingmanager.com for more details.
The Changing Face of Welding Standards

Last revised in 2014, the AS/NZS 1554 series contains seven Standards that outline all necessary preparations, procedures and safety precautions that Australian welders must follow before, during and after welding occurs. Standards Australia has recently published an amendment to AS/NZS 1554.1: Structural Steel Welding. All fabricators should be aware of these changes, particularly in terms of how the changes impact on welding imported steels that contain undisclosed amounts of Boron.

AS/NZS 1554 provides rules for the welding of a wide range of steel constructions, including statically loaded welds, as well as welds that are subject to fatigue, machine frames and other types of steel constructions.

The Standard requires that weld preparations, welding consumables and welding procedures be qualified before the commencement of welding, and details all necessary steps that must be taken to ensure qualification. However, due to a procedural issue, further amendments to the Standard had to be carried out by Standards Australia. As a result, a correction amendment to AS/NZS 1554.1: Structural Steel Welding was issued in September 2015. The 2015 amendment reversed a number of changes that were implemented in 2014. Specifically, Standards Australia has amended clauses 2.1, 4.7.1, 4.7.7.1, 4.7.7.2 and 5.3.1. Similar clauses were amended in Part 5, as well as clauses 2.1, 4.7.1 and 5.3.1 in Part 7.

The majority of these changes were related to steels with boron content equal to or greater than 8ppm, particularly low and medium strength structural steels that contain undisclosed amounts of boron—there is currently an influx of these types of steels being imported into Australia, mainly from parts of Asia.

The Issue of Undisclosed Boron Content

Boron is an element traditionally used to achieve high hardenability in alloyed steels for subsequent heat-treatment. Only a very small level of boron is needed to substantially increase the hardenability of steel. A failure to disclose the boron content in structural steels can cause a myriad of issues when it comes to the welding process, including weld heat affected zone cracking.

It should be noted that steels containing boron can be welded, provided that the fabricator is aware of the presence of boron, and can modify their welding procedure accordingly.

When using AS/NZS 1554, welders need to be aware (particularly when working with imported structural steels) that it is vital that all the key elements, including boron, are listed on test certificates. This will ensure the integrity of the material that is undergoing welding, avoid hardenability issues, and prevent poor, brittle fracture performance.

Fabricators should also be aware that the preheat nomograms included in the AS/NSZS1554 series may not be applicable to steels containing boron.

The WTIA recommends that fabricators who are using, or who have been supplied with steel where the boron content is undisclosed, seek guidance from their supplier on the recommended welding procedure requirements for these particular steels.

Other than the revisions made regarding boron content, the balance of AS/NZS 1554 was not affected.

Future Changes to Welding Standards

In the short-term, it is unlikely that there will be any further changes made to AS/NZS 1554.1: Structural Steel Welding.

In addition, the WTIA is proposing to revise AS/NZS2980 Qualification of Welders for Fusion Welding of Steels to align it with the requirements of ISO9606-1 Qualification testing of welders – Fusion welding – Part 1: Steels. This revision will retain the option for the existing acceptance criteria but allow for users who need to comply with ISO9606-1. It should be noted that new Revalidation requirements have been included within ISO9606-1 and these will provide benefits for fabricators compliant with AS/NZS ISO3834 parts 2 or 3.

The revision of AS/NZS 2980 will support the proposed draft standard AS/NZS 5131: Fabrication and Erection of Structural Steelwork, and the latter was due to go to public comment around the time of publication. The objective of AS/NZS5131 is to provide designers, fabricators and erectors with guidance on best practice requirements for fabrication and erection of structural steel assemblies used in buildings, bridges and other structures. The Standard introduces the fundamental concept of a risk-based fit-for-purpose categorisation (“Construction Category” or CC) of a structure and its parts.
Revision & Harmonisation of AS/NZS 2885.2

Paul Grace, Chair of the ME-038.2 Standards Australia Committee, responsible for revision of AS/NZS 2885.2, summarises the major changes recently made to the standard. A long-time associate of the WTIA, Paul has over 25 years experience as a welding engineer and is currently the Principal Pipeline Engineer at Jemena. Paul has held a range of positions throughout his career, including Manager Gas and Water Engineering at Zinfra Group, Manager Engineering Services at Jemena, and was a State Technology Manager for the WTIA for over 10 years. Given his in-depth involvement in ME38 Australian Standards Main Committee for over 20 years, and his long-term industry experience, Paul brings a unique perspective to the topic.

The AS 2885 series consists of six parts. Because the revision date of each part is different, there is always some inconsistency between the parts. AS 2885 Parts 0, 1, and 5 were published in late 2012. A new format for all parts of AS 2885 was introduced in the 2012 editions, leaving a gap of consistency with AS 2885.2.

The Australian pipeline industry has seen a dramatic increase in design and construction activity over the past five years, particularly in large diameter, thick wall pipelines for the CSG market. This step change has resulted in the use of different technology for welding and non-destructive testing on these mega pipeline projects.

The 2007 version of AS 2885.2 did not cater well for this new technology. The 2016 revision addresses the major shortcomings to allow sufficient guidance for this technology. Major areas of revision include essential variables for the common pipeline welding processes and consumables, AUT revision, ECA revision, and qualification of personnel, welders, welding operators, welding supervisors, welding inspectors and welding engineers. The ME-038.02 sub-committee is a joint Australian and New Zealand committee, thus this revision is AS/NZS 2885.2.

The revision also addressed a number of minor alterations, to clarify parts of the Standard that have caused confusion for users of the Standard since 2007.

APGA (formally APIA) conducted a one day seminar on the subject of automatic welding and the appropriateness of the current Standards including AS 2885.2—2007, in Brisbane in 2012. The seminar was well attended with over 80 attendees, including two international expert presenters. All participants agreed that the new revision of AS 2885.2 was a major need for the pipeline industry.

At the ME-038 main committee meeting (from 27 February to 1 March 2013), the committee fully supported the case for revision.

The AS 2885 series is adopted by each Australian State as the basis for technical and safety regulation of complying gas and liquid petroleum pipelines. The licence for each complying pipeline specifies that it is to be designed, constructed, operated and maintained in accordance with the AS 2885 series.

The revision of AS 2885.2 commenced in 2013 and went out for public comment in 2015 — approximately 400 items were submitted to the sub-committee for consideration. The final draft was sent to the main ME-038 committee for ballot and received a positive vote early March 2016.

Major changes included new essential variables for processes and consumables, AUT revision, ECA revision, and qualification of personnel, welders, welding operators, welding supervisors, welding inspectors and welding engineers.

The revision also addressed a number of minor revisions to clarify parts of the Standard that have caused confusion to users of the Standard since 2007.

This Standard specifies the minimum requirements for safety, welding consumables, weld preparations, welding processes, qualifications of welding procedures and personnel, and fabrication and inspection requirements for the construction and maintenance welding of carbon and carbon-manganese steel pipelines down to 3.2 mm wall thickness designed and constructed in accordance with AS 2885.1. The objective of this revision was to include technical changes, which became necessary as a result of experience in the use of the Standard in the intervening years since the previous edition, in particular in relation to the construction of large diameter thick wall pipelines in recent years.

Major Changes
(a) Definitions have been updated to match AS 2885 series definitions, where applicable.
(b) The sections in the document have been re-arranged to match the sequence of steps in qualifying a welding procedure and the subsequent welding and testing.
(c) The qualifications for welding engineers, supervisors, inspectors, welders and welder operators have been defined and put in a new Section 3, Qualifications.
(d) The materials section has been updated to put limits on boron in welding consumables, and the welding consumable table has been modified to reflect currently available consumables.
(e) The welding design requirements have been updated and added to Section 5 (Design of a welded joint).
(f) Section 6 (Qualification of a welding procedure specification) has been updated to include other welding processes and their specific requirements.
(g) Requirements for qualifying aluminothermic and pin brazing welding have been added to Section 6.
(h) Section 7 (Assessment of the test weld to qualify a welding procedure) has been updated to include requirements for sub-size Charpy tests and additional mechanical testing for some types of procedure qualification including repairs.
(i) Section 13 (Post-weld heat treatment and post-weld cooling) has been updated to make it a requirement for weld procedure qualification requirements (WPS) to test the weld and base metal in the heat treated condition.
(j) The items to consider prior to in-service welding has been added to Section 16 (Welding onto an in-service pipeline).
The Burning Issue: Oxy-Fuel Safety Tips

Oxy-fuel welding and cutting are both processes that use a combination of fuel gases and oxygen to weld and cut metals, respectively. Pure oxygen, instead of air, is used to increase the flame temperature to allow localised melting of materials (such as steel). Given that a propane and air flame burns at approximately 1,980°C, a propane and oxygen flame burns at about 2,253°C, and an acetylene and oxygen flame burns at over 3,500°C, the safety considerations when using oxy-fuel are vital. As with all welding processes, maintaining a clean working environment and performing all necessary safety checks are always essential.

Backfires and Flashbacks

When conducting oxy-fuel welding or cutting, some of the most serious and common safety risks are backfires and flashbacks.

A backfire is a momentary recession of the flame into the torch, which can cause a flashback or a sustained backfire. It is usually signaled by a popping sound, after which the flame may either extinguish or reignite at the end of the torch. The fabricator will usually hear a ‘pop’ before the flame is extinguished.

It is not uncommon for backfires to occur at high gas exit velocities, particularly if the nozzle or tip is placed too close to the work piece. In this case, it is not normally a safety concern. In fact, many manufacturers induce backfires during design and production tests to ensure flame integrity of welding torches and tips.

A sustained backfire, on the other hand, can be quite dangerous. This occurs where there is recession of the flame into the torch body with continued burning. A sustained backfire is usually characterised by an initial popping sound followed by a squealing or hissing sound.

Similarly, a flashback involves the recession of the flame through the torch and into the hose, regulator, and cylinder, which has the potential to cause an explosion.

A flashback is generally caused by the reverse flow of gases upstream into hoses or other equipment. This reverse flow is usually the result of: improper shutdown or startup procedures; allowing cylinder pressures to become too low; and faulty check valves.

When using oxy-fuel, it is vital to always ensure that there is enough fuel in both cylinders to complete the job before any work is commenced. Reverse flow of a gas generally happens when one cylinder empties during operation, creating an imbalance of pressure. A clogged or blocked tip can also cause a backflow.

References

- www.harrisproductsgroup.com
- www.weldingdesign.com

At A Glance: Oxy-Fuel Safety Guidelines

1. Chain cylinders to prevent them falling over. A 2,000psi oxygen cylinder can become a lethal projectile if it falls and its cylinder valve is sheared.
2. Vent the oxygen regulator valve and inspect the filter and its cylinder valve is sheared.
3. Regardless of which fuel gas is used, always shut down the oxygen first and the fuel last. This technique prevents a sudden pressure surge, accompanied by substantial heat, and prevents unnecessary strain on the regulator.
4. Always open the oxygen cylinder valve slowly. This prevents a sudden pressure surge, accompanied by substantial heat, and prevents unnecessary strain on the regulator.
5. Purge the system by bleeding off each hose independently. If reverse flow has occurred, this purging safely bleeds off any mixed gases.
6. Always use the correct tip size and pressure. Each tip is designed to operate at a specific pressure. If too much pressure is used, the system can be back-pressured and reverse flow occurs. If too little pressure is used, the tip will sputter and pop and perhaps encourage backfire or flashback.
7. Do not use oxygen as a substitute for air. If clothing is blown off with oxygen, the clothing will absorb the oxygen. Then, if a spark or other source of ignition touches the clothing, the three necessary ingredients for a fire are present.
8. Never use oxygen around oil. Oil is a combustible material with an extremely low flash point.
9. After connecting the attachments and tips, check the entire system for leaks, including the regulator adjusting mechanism, the cylinder gas valve, and the fuel gas valve and regulator.
10. Most torches come in sections, the torch handle and various attachments. Before using an attachment, check its cone end and be sure the two O-rings are not missing nor damaged.

Wiki-SCAN™ PORTABLE SYSTEM FOR WELD INSPECTION

Wiki-SCAN™ eliminates the time consuming and repetitive task of manually measuring welds and joint preparations in the field with conventional mechanical gauges. Thanks to SERVO-ROBOT’s «point and shoot» technology, Wiki-SCAN™ is easy to use and provides repeatable and accurate results with electronic permanent records that can be sent through Wi-Fi direct to the client anywhere in the world.

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Email: ndt@ndt.com.au  •   Web: www.ndt.com.au

For more information, download the WTIA’s Technical Guidance Note 8: Recommended Daily Oxy-Fuel Safety Guidelines.

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- www.harrisproductsgroup.com

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Weld Purging With Pre-Heat
In High Strength Steel

Some engineering alloys are prone to cracking during welding. Industry sectors having to overcome this problem are principally in power engineering and nuclear and include low and medium alloy steels that have been specially developed for their high strength. Metallurgists have learned that heating the joint prior to and after welding (pre-heating and post-heating) can reduce the sensitivity to cracking quite significantly.

Creep Resistant Steels
Many high strength steel alloys are prone to cracking during welding. The power turbine, pressure vessel and the oil and gas industry sectors all employ a range of low and medium alloy steels that have been specially developed for their high strength. Examples of these alloys can be found in those steels containing chromium, molybdenum and vanadium (the Cr/Mo/V series).

As the alloy content increases then so does the tendency of the steels to become hard and brittle. In practical terms this means they are prone to cracking. It has been found that by controlling the heating and cooling rates of fusion joints during welding the propensity to harden and thus crack can be significantly reduced. Another problem arises during welding of Cr/Mo/V steels and this is associated with the sensitivity of the materials to the presence of contaminating products in the welding consumables and shield gases. Low hydrogen welding processes are therefore essential. Care needs to be taken in selection of filler metals and it is essential that any shield gases are of high purity.

Heating joints prior to and after welding (pre-heating and post-heating) can therefore reduce the sensitivity to cracking quite significantly. It involves temperatures in the region of 200°C, although this may be much higher for certain materials.

High Strength Stainless Steels
Pre and post-weld heating is required to prevent cracking of many ferritic and martensitic steels.

Ferritic stainless steels have a chromium content in the range 11-28% and commonly used alloys include the 430 and 407 grades. The alloys exhibit poor heat affected zone (HAZ) toughness and preheating will reduce the HAZ cooling rate, maintain the weld metal above the ductile-brittle transition temperature and may reduce residual stresses. Preheat temperature should be within the range of 55°C to 250°C, depending on material composition.

The most common martensitic alloys have a moderate chromium content of 12% to 18% and this type of stainless steel is very prone to hydrogen cracking. The risk of cracking can be reduced by preheating to between 200 and 300°C and by carrying out post-weld heat treatment, typically at 650°C to 750°C.

Welding Procedures
The preferred welding techniques are GTAW and GMAW, which offer protection of the exposed upper fusion zone. However, the joint around the underbead needs to be protected by separate inert gas coverage—weld purging—involving removal of oxygen from the vicinity of the joint to prevent contamination during the thermal cycle.

For most welding applications, standard methods of purge gas protection of the underbead are adequate. However, meeting the requirements of inert gas purging when using pre and postweld heating necessitate the use of purge systems capable of withstanding the temperatures involved whilst at the same time maintaining adequate gas sealing characteristics. They are also rugged enough to survive multiple-use applications.

Specially engineered purge products have been designed over the past five years that are capable of withstanding the temperatures involved and the efficiency of these purge systems is significant in the maintenance of both low and medium alloy steels in the higher strength, low hydrogen environments.

References
- TWI Job Knowledge, Welding of ferritic creep-resistant steels
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Post Weld Heat Treatment Of Welded Structures

The welding process generally involves melting and subsequent cooling, and the result of this thermal cycle is distortion if the welded item is free to move, or residual stress if the item is securely held. There comes a point when the amount of residual stress can create potential problems, either immediately or during the life of the welded structure, and it needs to be reduced or removed. Post weld heat treatment is the most widely used form of stress relieving on completion of fabrication of welded structures. The principle is that as the temperature is raised, the yield stress and the elastic modulus of the material fall. A point is reached when the yield stress no longer supports the residual stresses and some localised plastic deformation occurs.

Effect on Mechanical Properties

The general changes to expect from post weld heat treatment are:
- Yield strength is temporarily decreased slightly
- Tensile strength is decreased
- Ductility is increased and improved
- Hardness levels are reduced
- Toughness is slightly reduced at short times, but the effect can be significant over longer times
- Creep resisting material strength is fully developed

Other advantages include:
- Improved diffusion of hydrogen
- Improved toughness by softening the heat affected zone.
- Improved dimensional stability.
- Better resistance to stress corrosion cracking.
- Reduced effects of cold work.

When to Post Weld Heat Treat

For carbon-manganese steels, post weld heat treatment is mandatory at a thickness of 32-38mm. For alloy steels, that thickness is typically between 13-20mm.

Post weld heat treatment of structural steels and large machines used in the mining industry are almost never subjected to post weld heat treatment.

Most requirements for post weld heat treatment can be found in the fabrication standard to which the vessel is constructed. In Australia, most fabrication standards now refer to AS/NZS 4458 for manufacture, as well as post weld heat treatment.

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Internal Firing

Vessels of suitable dimensions and arrangement of openings can be post weld heat treated by gas firing through nozzles or manways. Manways are large enough to accommodate the gas burners, but care needs to be exercised with the diameter and position of nozzles and expert opinion should be sought.

Care must also be taken to place deflector plates inside the vessel and opposite the burner entry points to avoid direct flame impingement on the shell. It is not advisable to post weld heat treat vessels that contain internals in this manner.

Local Heating

Circumferential weld seams can be post weld heat treated by heating a band around the weld. Although not specifically stated, such heating is essentially limited to resistance or induction heating, mainly because of the controls required on heated band width, width of insulation and temperature measurement requirements.

Thermocouples

The normal chromel-alumel thermocouples perform well for the temperature ranges in heat treatment. Insulated wire types are preferable because they can be attached directly to equipment being heat treated by capacitor discharge. The number and placement of thermocouples is, to an extent, regulated by Standard requirements which must be observed.

Test Pieces

The use of test pieces such as Production Test Plate (PTP) and Coupon Plate are only needed where local post weld heat treatment has been applied and therefore their use is limited to furnace heat treated vessels. Again there are Standards surrounding test piece usage and they must have a separate thermocouple attached.

Non-Destructive Testing

Standards require that all non-destructive testing be carried out after post weld heat treatment, unless the material is not sensitive to heat treatment cracking or it is not a high alloy steel.

Omission of Post Weld Heat Treatment

In a general sense, any alteration, modification or repair to an item of pressurised equipment that was originally post weld heat treated after fabrication needs to be post weld heat treated again after repair.
Over the course of three years, various designs were engineered and developed, and in-depth strength tests performed on bucket prototypes. Once the design was perfected, G&G Mining Fabrication built two of the buckets, which were then shipped to two separate mine sites in March 2016.

Each of these mine sites is quite different, with varying degrees of abrasiveness in the surrounding environment. These environmental variations will allow G&G Mining Fabrication to monitor wear and tear on the buckets more effectively.

Project Outcomes

The original bucket design weighed in at 21 tonnes. The new bucket weighs just 16.4 tonnes. Furthermore, the original bucket size was 15m³, while the new bucket size has been increased to 18m³.

Effectively, the new bucket design has reduced the overall mass of the bucket by 4,000kg, whilst retaining all of its strength, ensuring far less stress on the equipment, and securing the advantage of a 3m³ capacity increase.

It is estimated that the new bucket will reduce the number of swings required to fill a haul truck from six to five—over five swings (or bucket loads), the new bucket will move almost an additional 8m³ of dirt per swing. This will see a massive increase in production and efficiency for the global mining giant. Plus, the bucket was designed to be maintenance-free, offering even more cost savings for the mine operator.

G&G Mining Fabrication will monitor the performance of the two new buckets very closely over the coming months, including rounds of tests and photographic imaging to determine how the bucket flexes while in operation, how the steel is performing, and how operators find the new bucket performance.

G&G Mining Fabrication has grown to be a highly successful operation that employs a large team of experts, with extensive experience that has seen them become the preferred bucket manufacturer to both Hitachi and Komatsu in Western Australia.

Excavator Bucket Design Improvement

Project Overview
- **Company:** G&G Mining Fabrication
- **Client:** Major Mining Company
- **Date:** 2013 to current
- **Services Provided:** design and manufacture of improved bucket for Hitachi EX3600 excavator

Project Background

G&G Mining Fabrication was approached over three years ago by a major mining company, with one seemingly simple request: increase our production rates, and therefore the overall efficiency of our mine.

The more specific objective of the mining company was to reduce the number of swings required by a Hitachi EX3600 excavator to load a haul truck.

G&G Mining Fabrication gladly accepted the challenge, and set about designing a new excavator bucket that would reduce the number of swings required to fill a haul truck by 18%.

The excavator bucket design in question had been in use for more than 60 years. As such, G&G Mining Fabrication had to not only devise a new bucket concept, but also new steels, and even new Australian Standards to support their design and development work.

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Given the extremely unique design of the bucket, it comes as no surprise that there are currently more than 30 patents pending on the bucket. These patents cover everything from its structural content and the materials used in its manufacture, through to its assembly method. This bucket is the result of three years research and design, coupled with the knowledge and expertise to turn a challenging concept into a successful new product.
Lincoln Electric Opens Centre of Excellence

Lincoln Electric Australia’s newly opened Advanced Welding Technology Centre of Excellence is a multi-million dollar purpose-built facility. The first of its kind in Australia, the facility is dedicated to showcasing the latest state-of-the-art welding equipment and automation technology from around the world, including robot cells and plasma cutting machines.

Adapting to the current economic climate, Lincoln Electric has converted their once traditional manufacturing business to one that is now 100% commercial. The opening of their new facilities in Padstow, Sydney supports this organisational change. The facilities will enable Lincoln to demonstrate the very latest in welding technology, and deliver better, more effective, and more efficient welding processes to the Australian market.

Application Centre

Lincoln has invested a little over $1 million in their new Application Centre, representing one of the largest investments in Australia’s industrial sector in recent times.

According to Lincoln’s Marketing Manager, Paul Smith, “The Application Centre was established so that Lincoln can demonstrate to industry better ways of welding, ways that will increase productivity and reduce costs to make Australian manufacturers more competitive, both locally and globally.”

The Application Centre is home to a range of technology, including a robotic cell, large and small profile cutting machines, and a sub-arc line.

The Centre showcases Lincoln’s Power Wave platform—highly versatile software-based welding machines which are able to perform multiple processes on multiple materials and can be dialed up to provide the exact welding arc for a particular material, welding diameter and shielding gas, as well as a number of propriety waveforms. All these features provide greatly improved productivity through a much faster welding process.

Virtual reality welding training systems are on-hand at the Application Centre. These machines are able to help apprentice welders and fabricators learn how to weld without wasting materials, gas and wire. From an industry viewpoint, these machines can even be used to pre-qualify a welder—the machines can measure and score welds.

Lincoln’s latest MIG and TIG orbital welding machines, and fume extraction equipment (including mobile carts and a downdraft table) are also on display.

Perhaps most importantly, all this state-of-the-art equipment and robotics is linked to Lincoln’s production monitoring software. This software enables welders and fabricators to: confirm that correct weld procedures are being used; accurately capture arc welding times; determine the efficiencies of different operators; and pinpoint bottlenecks within the welding process. It can improve the entire welding process.

Lincoln Electric would like to offer a standing, open-door invitation to Australia’s welding and fabricating industry. If you would like to tour the facilities, or discuss Lincoln’s products and services, please contact Paul Smith, Lincoln Electric Marketing Manager, on paul.smith@lincolnelectric.com.au.

About Lincoln Electric

Lincoln Electric was established in Cleveland, Ohio in 1895. John C. Lincoln founded the company with a capital investment of just $200. The initial product: electric motors of his own design.

In 1938, Australia became the first country outside the United States to have a local subsidiary—the Lincoln Electric Company Australia Pty Ltd was inaugurated in Alexandria, New South Wales.

Responsible for many Australian welding firsts, Lincoln produced the first full iron powder electrode in the 1950s, as well as the Jetweld fast-fill low hydrogen stick electrodes and Innershield self-shielded flux covered wire electrodes. All these products increased welding industry production dramatically.

Over the last 78 years, Lincoln Electric has played an integral role in the development of Australian industry and infrastructure, having worked on many of Australia’s most iconic projects. These projects have included the Snowy Hydro Scheme, Bass Straight oil rigs, the Olympic Stadium, the Great Southern Stand at the MCG, and numerous other power, gas and water sector projects.

In 1995, Lincoln achieved its $1 billion sales goal during its centennial year, and by 1998 Lincoln Australia had expanded its influence Asia, becoming a regional resource centre for the whole of Asia Pacific.
Lincoln Electric Launches New Products

As part of the opening of their new Australian facilities, Lincoln Electric has launched twelve new products, including the three technologically advanced items below. The Aspect 300 TIG welding machine is highly advanced and offers considerable amount of functionality not currently available on comparable machines. The next-generation Flextec 350X, a rugged multi-process power source, comes complete with LN-25X Cross-Link Technology, allowing the operator to set the wire feed speed and voltage remotely (without the need for expensive interconnection cables), thereby dramatically increasing flexibility.

Aspect 300 TIG Welding Machine

The Aspect 300 is an industrial AC/DC TIG welding machine designed and manufactured using the latest inverter digital technology. The machine has been designed and built to perform in the most hazardous environments at high outputs. Its features include:

- Advanced inverter technology for superior TIG performance
- Superb welding characteristics with TIG DC, TIG AC and Stick welding processes
- Adjustable cleaning and penetration, for aluminium welding
- Variable AC frequency for control of travel speed and penetration
- Full function user-friendly control panel layout with graph and a numeric display to make it easy to set all welding parameters
- Power Factor Correction (PFC) advantages in reducing running costs

Flextec 350X

This multiprocess welder is easy to set up and easy to operate, but rugged and versatile enough for construction, fabrication, shipbuilding and other heavy-duty applications. The Flextec covers nearly all the bases: MIG, TIG, stick, cored wire and gouging. Its features include:

- A streamlined operator panel and easy process selection to minimise set-up time
- Components designed to run cool for long life in high temperature environments
- Fully encapsulated and environmentally protected electronics
- Lightweight and portable
- Compatible with cross-the-arc, analog, digital or CrossLinc feeders
- Premium multi-process arc characteristics work with all DC wire, stick and TIG processes

LN-25X with CrossLinc Technology

The LN-25X enables full control of your welding system, without the control cables, thereby reducing job site clutter, and eliminating unnecessary movement of personnel across job sites. It can be used in a range of applications, from shipbuilding to structural welding. Its features include:

- Remotely controls preset voltage without a control cable, to ensure correct settings for every weld
- Industry proven Maxtrac Wire Drive System provides reliable feeding and easy changeover
- Trigger Interlock switch provides operator comfort over long welds
- Arc hour meter allows tracking maintenance and productivity
- Digital meters display voltage, current and wire feed speed
- Fully encapsulated electronics and replaceable flame resistant case, which can be installed in under five minutes
The State of Australia’s Steel Industry

The local steel industry is an integral part of the Australian economy, making a substantial contribution to the nation’s gross product, employment levels and exports. However, recent years have been highly disruptive for Australian manufacturing and the steel industry has not been an exception. The accelerated industrialisation of China, sharp rises in commodity and energy prices, and the significant appreciation of the Australian dollar have all posed a number of challenges to the industry.

In recent years, Australia’s structural steel fabricating industry has seen solid growth in domestic demand, which is largely being met by rapidly accelerating import penetration.

Indeed, the domestic demand for structural steel fabricated products is projected to climb by an annualised 3% over the five years through 2015-2016, to total $9.0 billion.

Although demand is growing, steel industry revenue is expected to contract by 1.4% per annum over the same period, falling to $6.6 billion. This revenue contraction is a result of a loss in market share due to imported steel products.

Imports have surged by almost fourfold over the past five years, accounting for an estimated 27.8% of domestic demand in 2015-2016, up from just 8.9% in 2010-2011.

Reduced investment into large-scale resource infrastructure projects and weaker demand from the residential building market are also contributing to reduced revenue throughout the Australian steel industry.

While the reduction in value of the Australian dollar has provided a reprieve to current constrictions, the growth of competitive challenges continues to reduce demand for steel inputs from many key downstream industries. In response, upstream domestic steelmakers have closed capacity and reshaped their operations.

Despite this doom and gloom, the industry is expected to make a gradual recovery over the next five years, as improved economic conditions support investment in building and infrastructure construction. Plus, opportunities for growth, innovation and the development of niche markets for specialised products and expertise are still a viable option for many individual steel businesses.

By specialising, innovating, remaining agile and responsive to a changing steel world, Australia can maintain its quality reputation. It is through this innovation that Australian steel manufacturers, welders and fabricators can distinguish themselves, rather than engaging in a unwinnable price war with cheaper international competitors.

Snapshot: Australia’s Steel Industry

Australia has one of the most dynamic and innovative steel sectors in the world. According to the AIS, the Australian steel industry chain, from iron and steel production through to downstream users such as fabricators, employs over 90,000 Australians and has an annual turnover of $30 billion. The integrated Australian steel channel typically holds in excess of two million tonnes of inventory available through distributors located on over 300 sites across the country.

The Australian steel industry consists of two main producers, each of which holds a 20% market share: BlueScope Steel and Arrium (formerly OneSteel).

Established in 1915, BlueScope is a global leader in premium coated and painted steel products. With more than 100 facilities in 17 countries, BlueScope employs over 16,000 people globally. They are the third largest manufacturer of painted and coated steel products in the world, including brands like Colorbond, Zincalume and Lysaght.

Arrium Steel includes both Steel and Recycling businesses. The Steel business is Australia’s only manufacturer of steel long products with a steel-making capacity of approximately 2.5 million tonnes per annum. It is also Australia’s leading steel distributor and reinforcing steel supplier. The Recycling business has operations focused on the southern and east coasts of Australia, as well as non-ferrous operations in Asia.

References
- IBISWorld Industry Report C2221: Structural Steel Fabricating in Australia
- www.dfat.gov.au
- www.steel.org.au
NEW DEVELOPMENTS: STEEL SUMMIT

South Australia’s Treasurer and Mineral Resources and Energy Minister, Mr Tom Koutsantonis, called upon the federal and state governments to unite with South Australia to ensure the continued success of Australia’s steel sector.

"Our steelmakers and fabricators are facing major challenges and low-cost imports from countries with inferior quality standards than Australia."

"This is having a detrimental impact on our steel industry," Mr Koutsantonis said. “South Australia wants every state and also the Federal Government to get behind us to ensure quality and safety standards are implemented.”

Attended by almost 200 representatives from construction and building companies, industry groups and government along with contractors, architects, engineers, steelmakers and fabricators, the Summit was convened to bring together participants from all facets of the Australian steel supply chain to explain the aims of the States’ recently created Steel Certification Policy, and Steel Taskforce.

The meeting replaced a more general Industry Participation Forum planned for earlier in the month with the more targeted event driven by the State’s recognition of the steel industry’s substantial contribution to the local economy and the growing threat of non-compliant steelwork as global supply chains exert greater risk to development projects in the state.

The Summit included discussions on establishing a third-party audit process to ensure contractors adhere to the new steelwork compliance scheme as well as providing information on State Government assistance now available for local steel fabricators to become certified.

Steel Certification Policy and Steel Taskforce

In response to the growing evidence of unfair trade practices and inferior imports, late last year the South Australian State Government announced a new steel policy that mandates all future State Government construction builds use steel only from Australian-standard certified fabricators and mills.

All steelwork procured for public works in South Australia will now be independently tested and certified to Australian standards. Steel will have to be sourced from mills with Australasian Certification Authority for Reinforcing and Structural Steel third party certification, and for steelwork to be supplied from fabricators they must be independently certified to the recently created National Structural Steelwork Compliance Scheme, which is facilitated by the Australian Steel Institute.

"We also established a new Steel Taskforce that is working with the Industry Participation Advocate to design initiatives that ensure steelmakers and fabricators can compete fairly for local contracts, giving the industry a competitive edge against low quality imports,” Mr Koutsantonis said.

"We want other governments to implement similar mandates, which is why I am writing to all state and federal ministers asking them to take a stand with South Australia.”

"We cannot allow uncompetitive pressures to impact upon an industry that has provided decades of jobs and prosperity for South Australia,” Mr Koutsantonis said.

The Steel Taskforce’s $4.3 million funding over four years will help South Australia’s steel fabrication sector fall in line with Steelwork Compliance Australia requirements.

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An independent audit process is being established to ensure contractors adhere to the new mandate.

The Certification Policy will cover Australian Steel Standards for welded beams, hot rolled beams and columns, structural plate, and structural tube and pipe. For reinforcing, it will cover bar, coil and mesh, and pre and post tensioning strand.

The National Structural Steelwork Compliance Scheme will cover all the fabrication, welding, bolting and coating specifications.

The new Scheme and Policy will be incorporated into AS/NZS 5131 and referenced from both AS 4100 and AS/NZSS1100.

While the compliance process will involve an initial minor cost and process review, experience from fabricators who have been certified is that they quickly recoup this through rework savings. Plus, the State Government is providing some funds to offset this cost.

South Australia’s Industry Participation Advocate, Ian Nightingale, said contract conditions for State Government projects will be developed shortly that specify steel is to be sourced from mills with Australian Certification Authority for Reinforcing and Structural Steel third-party certification.

“Steelwork will be required to come from steel fabricators independently certified to the recently created National Structural Steelwork Compliance Scheme,” Mr Nightingale said.

Australasian Steel Institute Chief Executive, Tony Dixon said that the Government’s new commitment provides the missing link in achieving seamless supply channels for the steelwork for public projects.

“Steelwork which is commonly dependent on for structural support is clearly a safety-critical item and for that reason alone needs to comply with established standards as the growing spate of building failures due to non-conforming building products attest,” he said.

“Australian Standards are recognised as some of the world’s most rigorous befitting the nation’s standing as an advanced economy with safety, environmental sustainability and ethical business behaviours held in high regard.”

“The South Australian approach is a sound, viable model for safe and sustainable procurement and we would encourage other States to adopt this position,” said Mr Dixon.

The WTiA fully supports the current efforts of the South Australian Government to build its public works procurement regime, and to embrace superior safety and quality standards by ensuring all steelwork is fit for purpose, and will be assisting the Australian Steel Institute with compliance auditing.

Geoff Crittenden, WTiA Chief Executive Officer said that the new certification scheme offers a raft of benefits to welders and fabricators.

“As independent verification by an unbiased party that understands the industry, certification will give welders and fabricators a point of differentiation from their competitors. It will ensure less re-work is required, and that weld quality is paramount.”

“For many welding and fabricating workshops, the certification process will improve project management processes, from tender review and estimating right through to project handover. Certification in Australia will even be beneficial when applying for international accreditations.”

“The end-result: an improved bottom line for all welding and fabricating businesses,” said Mr Crittenden.

Asian Steel Makers to Face Anti-Dumping Inquiry

The Federal Government has also recently initiated the development of the second stage of its anti-dumping reforms, with the commissioning of a report on the impact of Asian steel makers in the Australian market. Announcing the beginning of the next stage of reform and the report into Asian steel makers, Minister for Industry, Innovation and Science Christopher Pyne said that the Government strongly supports free trade and open markets, but free trade must also be fair trade.

“In recent times, I have expressed my ongoing concern about the negative impact Asian steel and aluminium markets are having on Australian manufacturers,” Mr Pyne said.

“Accordingly I have asked the Anti-Dumping Commissioner to prepare a report which will: identify trends in dumping and circumvention behaviour in Asian steel and aluminium markets; identify existing dumping duties across all steel and aluminium products; and make recommendations on the most effective measures where there is evidence of these activities. The findings of the report, expected to be delivered in early April, will inform the next tranche of anti-dumping reforms,” Mr Pyne said.

Trading practices like systemic dumping, circumvention and subsidies are unfair on Australian businesses. When they occur, Australian law provides for remedies consistent with World Trade Organization agreements.

Tranche one of the anti-dumping reforms, implemented last year are already having an impact. The reforms have also increased pressure on uncooperative exporters, established a new investigations unit which is up and running and provided additional support to Australian businesses engaging with the anti-dumping system.

The reforms also addressed the practice of overseas businesses that avoid paying dumping duties by slightly modifying their products and improved the way the Anti-Dumping Review Panel undertakes merits review of anti-dumping decisions. The newly-established Anti-Dumping Information Service (ADIS), within the Anti-Dumping Commission, will prepare the steel and aluminium report.

To pledge your support for South Australia’s reforms, visit: www.supportoursteel.com

While in South Australia the government has earmarked $10 billion for public works, this is only a fraction of the $200 billion that is slated for spending on infrastructure across the nation. Recent BIS Shrapnel analysis found that a shift nationally to 90% local supply of steel for public infrastructure would increase annual domestic production to 1.5 million tonnes within the next five years alone. The study found that cumulative production of an additional 3.4 million tonnes during the five-year period would add $4.3 billion to Australia’s real GDP.
Senate Inquiry into the Future of Australian Steel

In late November 2015, the Senate called for an inquiry into the future sustainability of Australia's steel industry and its supply chain. The inquiry was referred to the Senate Economics References Committee, with the report required by the Senate by the end of June 2016. With submissions closing in February, the inquiry heard directly from the industry and supply chain about the issues facing manufacturing high-quality steel in Australia.

Some of the largest players in Australia’s steel, welding and construction industries made submissions to the inquiry, including Arrium Mining and Materials, BlueScope Steel, and Steelforce.

Various industry associations were also involved, including the WTIA, the Australian Steel Institute, the Australian Constructors Association, AI Group, the Bureau of Steel Manufacturers of Australia, and the National Association of Steel-Framed Housing.

All the submissions had one clear objective in common: to ensure that businesses operating within Australia’s steel industry are sustainable long-term, and able to generate sufficient cashflow and shareholder return to support reinvestment in the industry.

While each of the submissions included a range of different recommendations, there were a number of recurring themes.

Industry Development
A number of submissions recommended that the Government undertake programs of business support and development to enhance the capabilities of downstream manufacturers and fabricators, and to support the competitiveness and sustainability of the entire Australian steel industry.

It was suggested that these programs may include:
• Exploration of ways to grow domestic and international markets, through broad economic policies that boost aggregate demand.
• Compilation of a data base that identifies supply opportunities for the manufacture and fabrication of steel products in Australia.
• Examination of ways to build a more integrated sector through greater collaboration between businesses.
• Exploration of ways to increase design led innovation to lift competitiveness.

Government Imposed Regulatory Costs
Various submissions called for a reduction of government-imposed regulatory costs, particularly those related to energy, environment, transport, infrastructure and tax.

Australian Standards
Compliance with relevant standards is a central component for ensuring a level playing field between steel manufacturers, whether they are local or international.

There is evidence from a range of sources that some steels being supplied into projects are non-compliant with specifications and standards. There needs to be a better overall product conformity system and in the case of high risk construction safety related products like steel, there needs to be Government support.

The Federal Government needs to implement swift remedies to counter unfair imports and ensure compliance with Australian Standards.

Government Procurement
The Senate Inquiry submissions called for the barriers and distortions against local industry participation in government contracts and in major projects to be addressed through a commitment to the procurement principles of: value for money, clarity, transparency, and improvement of processes, full and fair access, full and fair opportunities for local suppliers, and supporting industry through effective planning and communication.

In particular, the value for money principle in Government procurement must look beyond “least cost,” and bring to bear and make more transparent, a broader cost-benefit equation or value model that considers whole-of-life costs.

Industry Participation Agreements
It was recommended by a number of industry groups that the Federal Government encourage State and Territory Governments to adopt Industry Participation Plans for initiatives of more than $100 million, particularly for jointly funded and run Federal-State projects.

Under this approach, prime contractors would develop plans in collaboration with the Industry Capability Network, in accordance with the following principles:
• Local small and medium enterprises should be provided with a full and fair opportunity to compete for government contracts.
• Local industry engagement should extend to all levels of the procurement supply chain, not just lead contractors.
• Information on the procurement pipeline should be freely available and communicated, so that local industry can plan ahead and be involved.
• All government tendering mechanisms should be open, clear, accountable and should minimise tendering costs.

Anti-Dumping Arrangements
While the improvements that have been made in recent years to Australia’s WTO-compliant anti-dumping arrangements were applauded by those organisations that made submissions, it was suggested that the arrangements could be more effective and more appropriately resourced.

It was suggested that a number of changes could significantly improve the existing system:
• Improved time-frames for investigations to ensure that statutory minimums are not exceeded.
• More detailed and accurate verification of exporter data and certification documents.
• Setting of dumping duties at a level that will discourage further dumping, and allow for profit levels that enable manufacturers to fund reinvestment in their own businesses.

References
• www.aph.gov.au
Mitchell Dinham is the Automation Project Manager at Lincoln Electric Australia, based in their brand new Advanced Welding Technology Centre of Excellence in Padstow, New South Wales. Mitch has worked at Lincoln Electric for just over nine years. He started out as an Engineer in Lincoln’s automation department, after completing his Bachelor of Engineering in Mechatronics and Robotics.

After just 12 months in this role, Mitch commenced a Ph.D in Robotics and Computer Vision (as applied to the field of robotic welding) at Western Sydney University. Lincoln Electric and the Australian Research Council sponsored Mitch’s Ph.D.

Mitch’s thesis topic explored the possibilities of further automating welding robotics. Currently, robotic welding is quite a rigid process—welding robots need to be programmed by a human operator using teach and playback methods. Mitch aimed to develop a process whereby an autonomous welding robot would be capable of detecting weld joints, and then calculating the welding path required, all without any human intervention.

In the course of his career, Mitch has already undertaken extensive travel, installing robotics systems on behalf of Lincoln all over Australia, as well as in New Zealand and Egypt. He has travelled to China and South Korea to present findings associated with his Ph.D. He has also had more than 10 academic papers published in peer reviewed journals and presented at conferences.

Describe your job.

My current role at Lincoln Electric is Automation Project Manager. The role is very rounded, including aspects of sales, engineering, customer service and technical support. No two days are ever the same.

My focus is to deliver automated solutions to meet the demands of our customers. These include robotic systems, mechanised systems, CNC profile machines, welding fume extraction, pipe cutting and welding and virtual reality training.

What inspired you to choose a career in the welding industry?

I actually didn’t choose to start my career in welding. I chose to do a Ph.D because I wanted to be at the forefront of innovation. I wanted to contribute to the advancement of robotic technology in Australia. I was lucky enough to be sponsored by Lincoln Electric and the Australian Research Council to undertake this study and research part-time.

What do you believe is the biggest challenge for the industry at the moment?

The biggest challenge for the metal manufacturing industry is competition with cheap imports.

There are many factors that contribute to this, but if the industry wants to survive it needs to invest in new technologies and training to optimise and streamline the manufacturing processes.

The push at the moment from all levels is for Australian manufacturing to be more innovative. From what I have seen, we are more than capable of doing this.

What is the most interesting project you’ve worked on? Why?

I have had the opportunity to work on some amazing projects with great people, but the most interesting has been working with Boss Engineering in Inverell, New South Wales.

Boss Engineering is an amazing success story for Australian Manufacturing. They are a perfect example of how innovative products, coupled with automation solutions, and a skilled workforce can create a company that dominates its market.

I have had the good fortune to partner directly with Boss Engineering’s business owners to provide a number of automated welding solutions.

Who or what has inspired you the most professionally?

The amazing bunch of engineers and technicians at Lincoln are a constant source of inspiration. They really are like family.

The academic achievements of my Ph.D supervisor, Dr Gu Fang, at Western Sydney University also inspired me to obtain my Ph.D.

What gives you the most satisfaction at work?

My greatest satisfaction comes from the success of our customers. I feel personally invested in any solution I provide. My main goal is always to see our customers thrive.

Mitchell Dinham, Automation Project Manager at Lincoln Electric.

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An Update from: SMART Industry Groups

About SMART Industry Groups

WTIA’s SMART (Save Money and Re-engineer with Technology) Industry Groups provide a facilitated private forum where industry-specific members can discuss and analyse welding-related challenges and issues, and source potential solutions. For further information on any of the SMART Groups, please contact info@wtia.com.au.

General News

With Paolo Corronca (the former SMART Industry Groups Coordinator) moving into a new role in South Australia, each SMART Group will now be facilitated by a dedicated WTIA Technology Manager. All administration support will be provided by the WTIA’s corporate head office in Sydney. As such, for all SMART Group inquiries, please contact info@wtia.com.au.

SMART APT Group

The SMART APT Group held its first national meeting for the year over two days in February. The theme of the meeting was ‘Emerging Technologies’.

On the first day, the group had a guided tour across three different organisations in Clayton, Melbourne, including Hardchrome Engineering (where a visit of the workshop featured the latest production line equipment); the CSIRO (where participants attended both a seminar and a guided tour of the lab); and the Australian Synchrotron (where participants were again treated to a seminar and a guided tour of the lab); and participants attended both a seminar and a technical tour). The second day started with a presentation and a technical tour) and a guided tour of the lab; and

A number of technical presentations were also provided by various members, including:
- Characterisation of the Cold Work in 316L Stainless Steel from Ondrej Muransky (ANSTO)
- Advanced Creep Analysis of High Temperature Components Using FEA from Annette Karstensen (Quest Integrity)
- Boiler Tube Protection Using Laser Cladding Process from Mehd Soodi (HardChrome Engineering)
- The Changing World of Inspection, Testing and Acceptance from David Lake (ATTAR)
- High Pressure Piping Risk Management from Mark Rooney (GDF Suez)

The group has been working on a project to update the Austroad Steel Fabrication Specifications. It is expected that these harmonised Specifications will be finalised by the end of 2016.

SMART Road and Rail Group

Sasanka Sinha is the new SMART Road and Rail Group facilitator, in line with the WTIA’s restructuring plan. Sasanka is a mechanical and welding engineer, with extensive international experience in fabrication and welding, particularly in the fields of shipbuilding, railway wagons, steel plant equipment, boilers, pressure vessels, construction and mining equipment.

The objective of this project is to create a harmonised technical specification, shared across all of Australia’s state-based Road Authorities. This will enable a competitive national tendering process, based on a standard set of technical requirements for all road and rail projects.

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SMART Procurement Group

Following the first meeting of the SMART Procurement Group in October 2015, the WTIA undertook detailed research. This research delved into potential solutions for providing advice to asset owners and contractors on the best way to procure fabricated products.

Due to the complexity and unique nature of individual company procurement systems, the WTIA believes that the best way forward is to prepare a set of Risk Management Guidelines. These Guidelines would then complement the procurement processes of individual organisations, improving most procurement processes by providing specific steel fabrication risk insights.

The risk insights will include:
- Key risks, the range of potential consequences and the likelihood of each based on certain criteria
- Guidance on how to mitigate risks that a procurer either cannot avoid or chooses to take
- Guidance on how some risks could be dealt with under the procurement RFT and contract

SMART Defence Group

With the recent release by the Federal Government of the 2016 Defence White Paper, the WTIA has scheduled the next SMART Defence Group meeting for April in Sydney.

The objective of this meeting is to ensure the participation of the main players within the Australian Defence Industry, and to discuss the changes in the Defence White Paper.

About SMART Industry Groups

WTIA’s SMART (Save Money and Re-engineer with Technology) Industry Groups provide a facilitated private forum where industry-specific members can discuss and analyse welding-related challenges and issues, and source potential solutions. For further information on any of the SMART Groups, please contact info@wtia.com.au.
What improvements in fatigue life can be expected as a result of toe dressing in a fillet weld?

A major cause of fatigue damage in welded structures is the severe stress concentration at the toe of a fillet weld, where inherent crack-like flaws readily precipitate fatigue cracking. It follows that, if weld toes are machined or ground to eliminate such flaws and give a smoother profile, an improvement of fatigue strength should result.

Welded joints represent particularly severe stress concentrations. Research at The Welding Institute (TWI) in Cambridge, England, identified an acute line of research relating to structural steels (such as Q&T steels) to avoid over-tempering production of coarse-grained HAZ. Extra precautions may be required for production of coarse-grained HAZ.

Interpass temperature is just as important as the preheat temperature. For instance, the yield and ultimate tensile strengths of the weld metal are both a function of the interpass temperature. High values of interpass temperature tend to reduce the weld metal strength. Additionally, higher interpass temperatures will generally provide a finer grain structure and improved Charpy V notch toughness transition temperatures.

Where toughness is of concern, close control and a limit on maximum interpass temperatures is specified in the application standards. Standards relating to structural steels (such as AS/NZS 1554.1 and AWS D1.1) do not set a limit on the maximum allowable interpass temperature. However, 30000C-35000C has been adopted as an industry norm to avoid the production of coarse-grained HAZ. Extra precautions may be required for Q&T steels to avoid overheating the HAZ and losing strength.

Toe grinding is done along the centerline of the weld toe. The recommended tool is a high-speed grinder with a tungsten carbide burr. Grinding is carried out normally to a depth of 0.8 – 1.0mm below the plate surface.

GTAW (TIG) dressing consists of locally re-melting the toe of the weld to a depth of approximately 2mm to produce a uniform rounded transition between the weld and parent metal.

Weld toe dressing cannot be assumed to be effective in the presence of any corrosive environment which can cause pitting in the dressed region.

References
1. Maddox, S.J. Fatigue Strength of Welded Structures
2. AWS D1.1 – Structural Welding Code: Steel
3. AS/NZS 1554.5:2015 Welding of steel structures subject to high levels of fatigue loading
4. WTIA Technical Note 11-04 – Commentary on AS/NZS 1554 Structural Steel Welding

What is the recommended maximum interpass temperature for carbon steel welding?

Interpass temperature refers to the temperature of the material in the weld area immediately before the second, and each subsequent, pass of a multiple pass weld.

Preheat temperature is the temperature of the weld joint just prior to being welded. This temperature must extend over a distance at least equal to the thickness of each part at the weld but not less than 75mm of both sides of the weld joint.

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References
2. Temper Bead Welding Technique [www.gowelding.com/met/temper.htm]
3. WTIA Guidance Note 6 – Post Weld Heat Treatment of Welded Structures

Please provide some details on temper bead techniques.

The temper bead technique utilises either the MMAW or the GTAW process, and was developed to ensure that toughness properties in both the heat affected zone and the weld metal were at least equal to the toughness properties of the original base material. There are different methods available for the temper bead technique, which is commonly applied on carbon and low-alloy steels.

The parent metal directly under the weld suffers grain coarsening and below this area experiences grain refinement. The aim is to produce tempering using several weld layers so that each subsequent layer penetrates the previous layer to develop overlapping temperature profiles.

To improve HAZ toughness, we need a welding technique that either reduces or eliminates this coarse region from the parent metal. After every pass, the top half of the weld bead is ground off before applying the next layer. The final bead of any welding sequence should be deposited in the middle of the cap, away from the parent metal.

Sometimes, different heat inputs are used for the first three layers, starting with a low heat input to minimise the extent of the heat affected zone in the parent material. The heat input for the second layer is increased to give a slightly thicker deposit whilst still re-transforming the parent heat affected zone, and the third layer is still thicker to ensure tempering only of the heat affected zone.

Low-alloy steel weldments for critical applications require a postweld heat treatment. This is done to temper and soften the hard regions in the HAZ and to relieve residual stresses. If repairs become necessary on-site after the component has been in service, PWHT is often not feasible. The heat of the arc can then be used to achieve the tempering function of PWHT by suitable spatial positioning and sequencing of the individual passes. Grain refinement in the HAZ is also sought to increase the toughness and thereby offset the harmful effects of residual stresses that would remain in the absence of PWHT.

The major advantage of the technique is that the toughness of the heat affected zone is considerably improved over conventional methods. Disadvantages include the fact that a considerable amount of grinding is required, and it must be accurate. Not only is this time consuming, but if too much material is removed from the first layer, the effects of the re-transformation may not be as successful as might be expected.

References
2. Temper Bead Welding Technique [www.gowelding.com/met/temper.htm]
3. WTIA Guidance Note 6 – Post Weld Heat Treatment of Welded Structures
For Your Diary

Upcoming Events

Whether you need to brush up on skills learnt years ago, want to try your hand at something new, or crave some networking opportunities, there is an industry event for you. For further information on any of the events listed below, or any WTIA events, please email events@wtia.com.au or phone +61 (0)2 8748 0100.

April 2016
9th International Conference on Advances in Resistance Welding
16 to 15 April, Miami
www.aws.org

10th International Conference of Ray Beam Technology
20 to 21 April, Halle
www.beamtec-conf.com

International Conference on Plastic Welding and Joining
25 to 27 April, New Orleans
www.aws.org

May 2016
International Thermal Spray Conference and Exhibition
10 to 12 May, Shanghai
www.asminternational.org

National Manufacturing Week
11 to 13 May, Sydney
www.nationalmanufacuringweek.com.au

4th European Conference JOIN-TRANS 2016
11 to 12 May, Halle
www.jointrans.eu

June 2016
19th World Conference
on Non-Destructive Testing
13 to 17 June, Munich
www.wcdt2016.com

30th International Conference on Surface Modification Technologies
29 June to 1 July, Milan
www.smt30.org

Event Spotlight

69th IIW Annual Assembly & International Conference 2016

The WTIA is honoured to host the premier annual event for the global welding and fabrication industry in 2016, the IIW Annual Assembly & International Conference. IIW 2016 will be held from 10 to 15 July in Melbourne. For more information and to register, visit: www.iiw2016.com

The theme of the 2016 International Conference is From Concept to Decommission: The Total Life Cycle of Welded Components. The Conference will bring together the international welding community, fostering long-term collaborative professional relationships.

Together, attendees will explore the importance of the life cycle of welded components, with a particular focus on: welding as part of the manufacturing process, welding automation, fitness for purpose and repair and life extension. This will be supported by a robust program of off-site technical visits and exciting social events.

Set to be the best IIW Annual Assembly & International Conference yet, this is a unique opportunity for professionals from all around the world to meet, mingle with, and learn from experts in the field of welding technology.

With representatives from most of the 59 IIW member countries and various technical experts expected to attend, the event will delve into the most important issues facing the welding industry today.

To ensure that you don’t miss out on this exciting opportunity, register now via www.iiw2016.com.

Latest Certified AICIP Personnel

The goal of AICIP is to encourage and facilitate the provision of inspection personnel, enabling the safe, cost effective use of engineering plant throughout its lifecycle. It is with great pleasure that we list AICIP renewals and congratulate all new In-Service and Senior In-Service Inspectors. For information, visit: www.aicip.org.au.

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I am the dependable force in cored wire welding. I weld the ships, trucks and trains that roam seas and continents. I connect the rigs, pipelines and wind turbines that supply the world’s energy. I make robots weld relentlessly. I make welders proud.

My impenetrable seamless mantle keeps any moisture out of my core and shields your weld from hydrogen cracking. My mantle is stiff and my surface copper-coated for smooth and stable feeding. My core is packed with decades of know-how and engineered to bring you productivity, weld quality and – above all – more profit.

I am the world’s number one seamless cored wire – from voestalpine Böhler Welding.