Capabilities of the Australian steel industry to supply major projects in Australia

compiled by

the Australian Steel Institute

Version 2.1.4 – July 2020

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1. Introduction

Purpose

This document has been prepared by the Australian Steel Institute (ASI) on behalf of its members and the wider steel industry. It is a summary of the structure, capabilities and capacities of the Australian 'steel value chain' and provides a background into the business environment in which the industry operates. The main purpose of the document is to provide an overview of the industry and highlight the advantages of using Australian steel supply, fabrication and services for major projects in Australia.

This document describes the structure and capability of the Australian steel industry and provides information on the capacity of the Australian steel manufacturers and the fabrication sector as a reference document for major project proponents and their Front-End Engineering Design (FEED) and Engineering, Procurement, Construction Management (EPCM) contractors.

Context

The competitive advantages of using the Australian steel industry are outlined and a summary of the main industry sectors is provided as they relate to major projects. The applicable compliance requirements and standards applicable to construction in Australia are also explained.

ASI is of the view that early engagement with project teams will maximise the potential benefits that will flow to each project and local industry. The Australian steel industry is keen to work with project proponents and their downstream FEED/EPCM contractors from the outset to achieve optimum project outcomes and help ensure that local industry is provided with full, fair and reasonable opportunity to supply major projects within Australia.

2. Background of the Australian steel sector

Industry Structure

The Australian steel industry consists of two primary steel producers, supported by over 300 steel distribution outlets throughout the country and numerous manufacturing, fabrication and engineering companies.

Production, Employment and End Use Statistics

According to the Australian Bureau of Statistics, the Australian steel supply chain, from basic iron and steel production though to downstream users such as fabricators, employed nearly 110,000 Australians in 2017-2018[1] and generates annual revenue in the order of $29 billion. Table 1 below shows Australian iron and steel production for the period 2013 to 2018.

Table1 – Australian Iron and Steel Production (million tonnes)

Production	2013	2014	2015	2016	2017	2018
Pig Iron	3.477	3.282	3.594	3.642	3.758	3.882
Ingots	0.061	0.026	0.025	0.026	N/A	N/A
Crude Steel	4.688	4.607	4.925	5.259	5.328	5.689
Hot Rolled Products	4.400	4.092	4.307	4.693	4.606	4.680
Hot Rolled Long Products	1.850	1.679	1.679	1.954	1.603	1.603
Hot Rolled Flat Products	2.549	2.413	2.628	2.739	3.003	3.077
Railway Track Material	0.108	0.089	0.089	0.089	N/A	N/A
Hot Rolled Bars (excl. concrete reinforcing bars)	0.790	0.577	0.577	0.644	0.672	0.672
Wire Rod	0.690	0.720	0.720	0.927	0.931	0.931
Hot Rolled Coil, Sheet, and Strip (<3mm)	2.289	2.160	2.415	2.501	2.709	2.747
Other Metal Coated Sheet and Strip (excl. Tin Mill Products)	1.195	1.343	1.367	1.473	1.536	1.613
Non-metallic Coated Sheet and Strip	0.569	0.622	0.656	0.719	0.724	0.761
Tubular Products	0.190	0.155	0.155	0.155	N/A	N/A

Source: World Steel Statistical Yearbook 2019

Primary steel production occurs in NSW, Victoria and South Australia. Overall steel industry employment follows a similar pattern (see Figure 1). For more detail on steel manufacturing see Section 5A. The combined domestic crude steel production capacity exceeds five million tonnes annually (see Table 1). This compares to domestic crude steel consumption of some six to seven million tonnes per annum (see Table 2). Some specialised steel types, most notably stainless steel, and tinplate, are not manufactured in Australia. Markets for these products are serviced by imports. Specialised products produced locally include railway track and sleepers, pipe and tube, and plate. The majority of steel end use is in the building and construction sector (see Figure 2).

1 ABS 81550DO003_201718 Australian Industry, 2017-18 (Manufacturing Industry Data Cube)

Table 2 – Australian Apparent Steel Usage

Apparent Use	2013	2014	2015	2016	2017	2018
Apparent Crude Steel Use (million tonnes)	6.376	7.142	6.967	6.477	6.025	6.091
Apparent Crude Steel Use per Capita (kg)	274	303	291	267	245	245
Apparent Finished Steel Use (million tonnes)	5.757	6.449	6.291	5.849	5.441	5.500

Source: World Steel Statistical Yearbook 2019

The annual value of iron and steel exports typically ranges between A$0.6 billion and A$0.9 billion (see Table 3). During the same period, export volumes have risen steadily to nearly 1.0 million tonnes per annum.

Table 3 – Australian Steel Exports

Exports	2013	2014	2015	2016	2017	2018
Semi-finished and Finished Products (M tonnes)	0.631	0.683	0.841	0.776	0.979	0.998
Ingots and Semis (million tonnes)	0.028	0.059	0.049	0.041	0.018	0.095
Long Products (million tonnes)	0.099	0.099	0.128	0.119	0.087	0.110
Flat Products (million tonnes)	0.438	0.447	0.579	0.529	0.809	0.724
Tubular Products (million tonnes)	0.038	0.045	0.061	0.065	0.039	0.042
Total Value of Exports (A$B)	0.78	0.62	0.72	0.60	0.87	N/A

Source: World Steel Statistical Yearbook 2019, Office of the Chief Economist (Resources & Energy Quarterly September 2018)

Australian industry competes in a global market that has both significant capacity and widespread market access issues. The value of steel imports averages around A$3.5B for the period 2013-2018 (Table 4), with a notable drop-off from 2016 onwards associated with the closure of domestic automotive manufacturing.

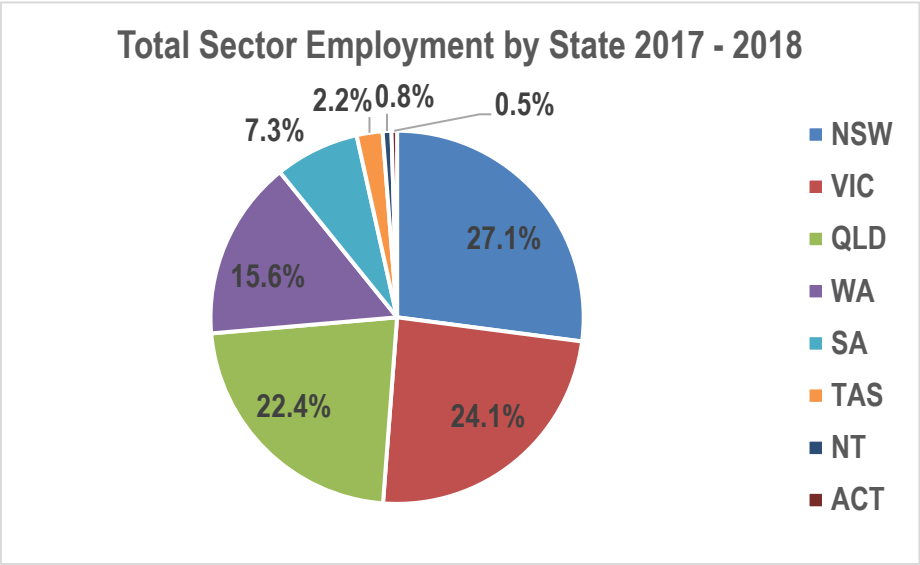
Table 4 – Australian Steel Imports

Imports	2013	2014	2015	2016	2017	2018
Pig Iron (million tonnes)	0.010	0.013	0.012	0.011	0.017	0.013
Semi-finished and Finished Products (M tonnes)	2.208	2.978	2.868	1.935	2.269	2.290
Ingots and Semis (million tonnes)	0.003	0.032	0.002	0.016	0.003	0.001
Long Products (million tonnes)	0.730	0.855	0.806	0.914	1.126	1.077
Flat Products (million tonnes)	0.629	0.808	0.714	0.634	0.671	0.661
Tubular Products (million tonnes)	0.844	1.281	1.344	0.369	0.465	0.549
Total Value of Imports (A$B)	3.48	3.64	4.39	3.14	2.45	N/A

Source: World Steel Statistical Yearbook 2019, Office of the Chief Economist (Resources & Energy Quarterly September 2018)

According to the World Steel Association, the top three steel producing countries in 2018 were China (928 million tonnes), Japan (104 million tonnes) and the India (106 million tonnes). Both domestic steel producers are multinational companies with international steelmaking operations. BlueScope was ranked the 63rd largest producer in the world in 2018 with production of 5.91 million tonnes, while Liberty Steel Australia produced 2.35 million tonnes during the same period.

Figure 1 – Total Steel Sector Employment by State

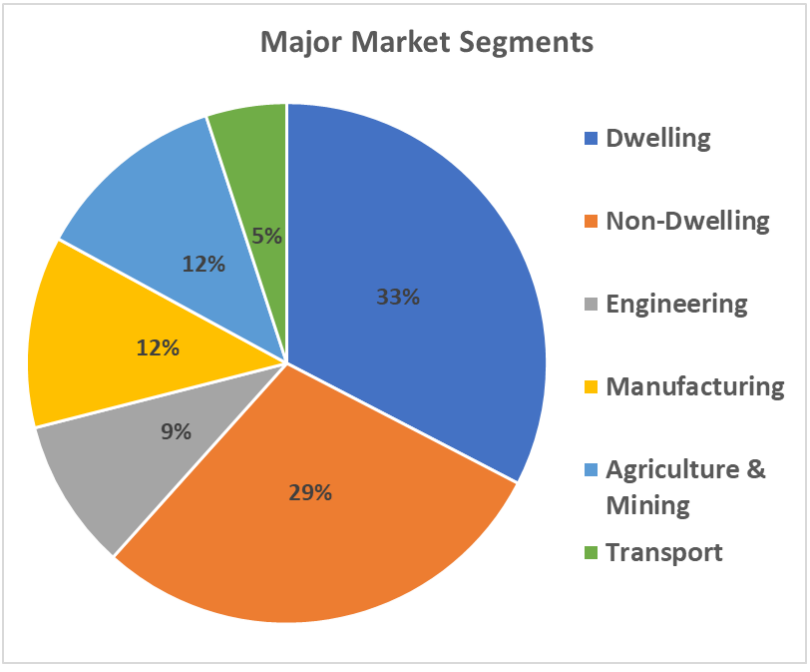


Source: ABS 81550DO003_201718 Australian Industry, 2017-18 (Manufacturing Industry Data Cube)

National employment in the steel industry is comprised as follows:

Segment	Employment
Primary steel production	22,320
Heavy fabrication	38,554
Medium fabrication and general manufacturing	48,952
Total	109,826

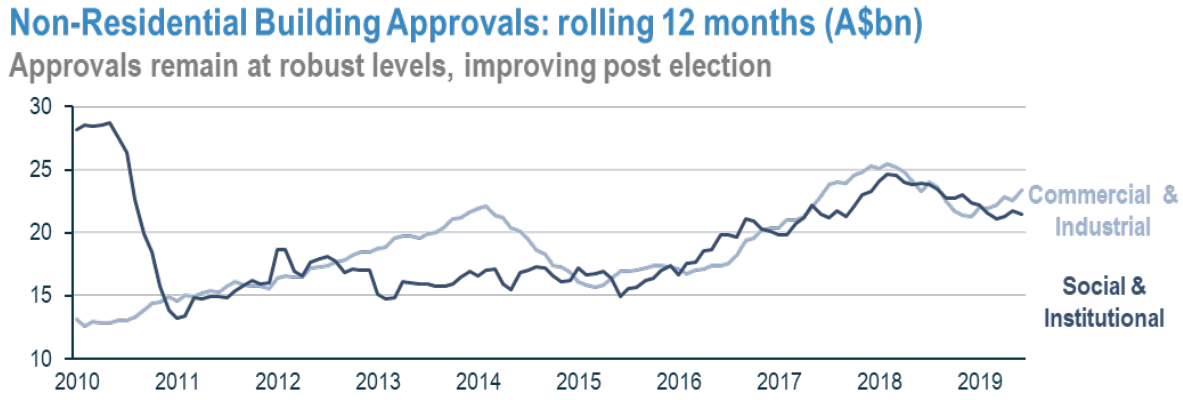
Figure 2: Major Market Segments 2017-2018



Source: BlueScope Steel FY2018 Results Investor Presentation

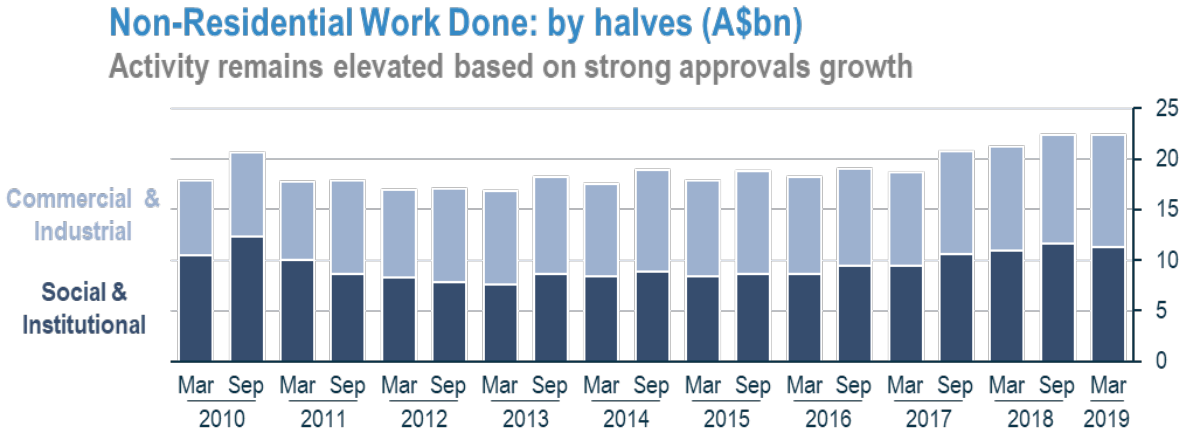
The underlying strength of the Australian steel market is shown in the figures 3 to 6 below.

Figure 3: Non-Residential Building Approvals 2010-2019



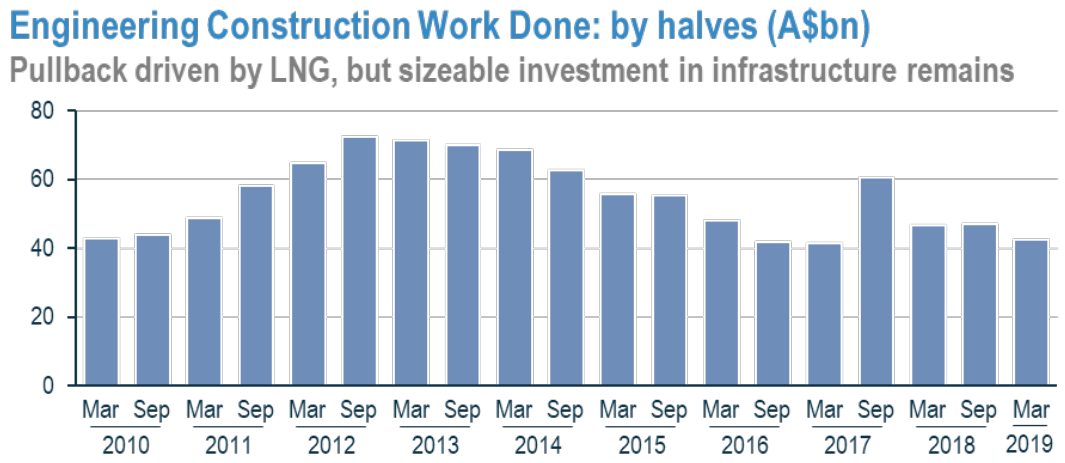
Source: BlueScope Steel FY2019 Results Investor Presentation

Figure 4: Non-Residential Work Done 2010-2019



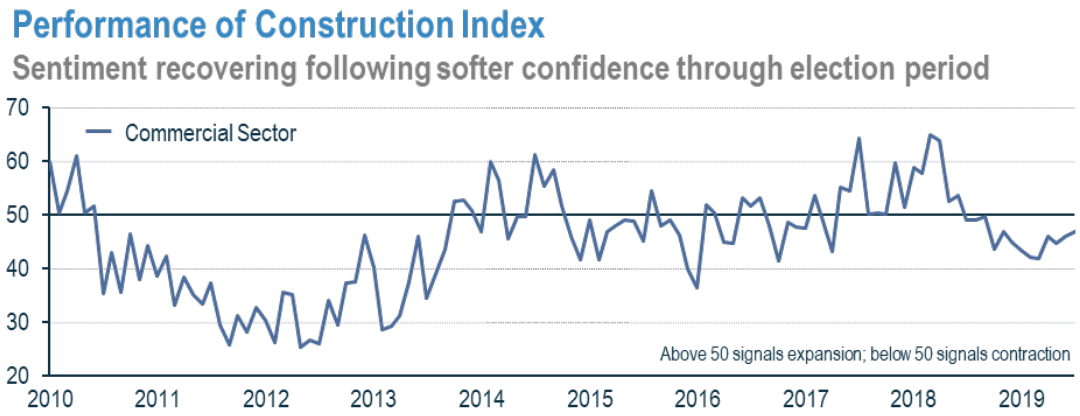
Source: BlueScope Steel FY2019 Results Investor Presentation

Figure 5: Engineering Construction Work Done 2010-2019



Source: BlueScope Steel FY2019 Results Investor Presentation

Figure 6: Performance of Construction Index 2010-2019



Source: BlueScope Steel FY2019 Results Investor Presentation

Australian steel supply chain

○ **Primary Steel Production**		
Sector	**Flat Products**	**Long Products**
Processes	- Cokemaking - Sintering - Ironmaking - Steelmaking (BOF) - Continuous Casting (Slab) - Hot Rolling (Plate / Strip) - Cold Rolling - Continuous Metal Coating - Continuous Coil Painting	- Cokemaking - Sintering - Ironmaking - Steelmaking (BOF/EAF) - Continuous Casting (Slab / Bloom / Billet) - Hot Rolling (Rod / Bar / Beam)
Common Products	• Hot Rolled Coil • Cold Rolled Coil • Plate • Metal Coated Strip • Painted Strip • Welded Beam	• Rail & Sleeper • Merchant Bar • Specialty Bar • Reinforcing Rod & Bar • Hot Rolled Structural
○ **Secondary Steel Production**		
Processes	- ERW Pipe and Tube Forming - Electro-galvanizing	- Wire Drawing - Metal Coating
Common Products	• Precision Tube • Structural Pipe • Galvanized Pipe	• Plain Wire • Barbed Wire • High Tensile Wire
○ **Distribution and Processing**		
Processes	- Slitting - Shearing - Cut to length - Machining	- Inventory Management - Warehousing / Stocking - Order Collation - Logistics
Common Products	• Mults / Slits • Sheets	• All Primary Products • All Secondary Products

Building and Construction Applications

○ **Construction Modelling**		
Outputs	- Detailed Design	- Component Drawings
○ **Fabrication**		
Processes	- Coping - Boring / Drilling - Machining - Cutting	- Welding - Hot Dip Galvanizing - Painting - Assembly and Transport
Common Products	• Beams • Columns • Girders • Gantries • Platforms	• Towers • Supports • Staircases • Rolling stock • Truck Chassis and Trailers
○ **Steel Reinforcing**		
Processes	- Welding - Cutting	- Drawing - Pressing
Common Products	• Mesh • Bolts	• Wire
○ **Roll-forming**		
Processes	- Profiling	- Folding and Bending
Common Products	• Roof Sheeting • Cladding • Rainwater Goods • Structural Decking	• Purlins and Girts • Framing • Culvert Pipe • Ductwork

Manufacturing Applications

Processes	- Machining - Punching - Pressing - Drawing - Forging / Upsetting - Hot Dip Galvanizing	- Seaming - Welding - Heat Treatment - Soldering / Gluing - Powder Coating - Enamelling
Common Products	• Ovens and Stoves • Air Conditioners • Water Tanks • Hot Water Heaters • Insulated Panels • Componentry and Brackets • Caravans • Trailers • Toolboxes	• Fasteners • Coil and Leaf Springs • Nail Plate • Furniture and Cabinets • Racking and Shelving • Cable Trays and Ladders • Pipe Hangers • Struts • Meter Boxes

3. About the Australian Steel Institute

The Australian Steel Institute (ASI) is the nation's peak body representing the entire steel supply chain from the manufacturing mills right through to end users in building and construction, heavy engineering and manufacturing.

Our Vision: To influence profitable growth for the complete Australian steel value chain.

Our Mission: To deliver increased use of Australian steel and improved industry competitiveness in construction and other strategic markets.

Leadership

The ASI provides marketing and technical leadership to promote Australian-made steel as the preferred material to building, construction and manufacturing industries and policy advocacy to government. Steel is the backbone of Australia's construction, infrastructure and manufacturing sectors. It is a vital and sustainable source of innovation, employment and capability in our cities and our regional communities.

The ASI exists to represent the Australian steel industry, to support its growth in the future, maintaining and creating jobs and income for Australia, supporting Australian steel producers, distributors and manufacturers, fabricators and detailers, builders and constructors and city and regional communities by providing the highest-quality certified steel products for Australians.

Advocacy

The ASI achieves this by ensuring that political and policy decision makers, industry, consumers, allied industries and professions and other key stakeholders continue to recognise the strength, beauty and versality of Australian steel, and the importance of maintaining and growing a strong steel industry sector.

Coordination

The ASI acts as the focal point for the steel industry providing leadership on all major strategic issues impacting the industry, particularly focusing on economic, environmental and social sustainability. A member-based organisation, the ASIs activities cover and promote advocacy and support, steel excellence, standards and compliance, training, events and publications. The ASI works with government, the media and other associations to provide an independent voice for industry representation across vital issues such as promoting the advantages of local content procurement in the nation's interest, both to the client and to government.

Technical Support

In the design area, the technical support arm of the ASI organises events for technical training at both industry and undergraduate level, case study seminars and awards, and publishes journals (based on latest research).

The technical references provided through the electronic online resources and library are proudly the best in the southern hemisphere and with longstanding links to global research and other steel industry associations such as the World Steel Association, the ASI can offer a truly international solution.

4. Competitive advantages of the Australian Steel Industry

Australia has a highly skilled, well-equipped steel supply chain that has evolved over many years. Thousands of businesses throughout the country provide steel manufacture, design, detailing, fabrication, surface treatment and construction services. These industry players have a long history of successfully working together to deliver major projects in Australia, providing clients with seamless, efficient, cost-effective steel solutions.

Choosing to partner with the Australian steel supply chain will ensure optimum mitigation of risks associated with the cost, quality, supply surety, compliance and safety of all steelwork used in a project.

Cost Containment

By engaging with the Australian steel supply chain in the early stages of a project, proponents and their partners may derive cost savings that can be built into a project at the initial concept design stage. Quick response and the capacity of the industry to get a project started can lead to significant cost reductions.

The need for fixed or predictable pricing for the duration of the project may be accommodated, so lessening exposure to the highly unpredictable price fluctuations of the global steel industry. Pricing in Australian dollars has the added advantage of not being exposed to volatile exchange rates.

The fact that the steel supply chain is *local* can provide multiple, additional cost benefits:

- Through the implementation of a number of practices, contractors (and therefore the project owner) benefit through cash flows being 'protected'. For example, reducing handling of components, lower onsite inventory levels and pre-production work can free up cash for alternative activities.
- Onsite inspection costs can be significantly reduced where the personnel involved are resident in the region.
- Chances of misinformation and mistakes in interpreting site plans, local regulations and environmental matters can be minimised, providing a significant financial benefit by reducing the need for re-work.
- By meeting certified standards, exacting specifications and having a 'right first time' culture, Australian suppliers further eliminate the need for costly re-work.

- Inspection costs can be significantly reduced, compared to alternate supply of fabricated steel, which may require many overseas visits.

- There are savings to be made in various administration costs such as bank and other associated costs compared to the imported alternative.

- 'Whole of life' costs, including equipment maintenance and service costs are reduced when local subcontractors are part of the construction team and remain available on completion of the major works. Local companies have the ability to source replacement parts (or parts that may need to be re-engineered to certain specifications) and service a project's ongoing needs.

Supply Surety

Fabricated steelwork is often on the critical path of major projects, with supply and construction schedules usually tight. Delays or site rectification of the steelwork typically has serious ramifications for the project as a whole. Working together, the Australian steel supply chain can overcome many obstacles that negatively impact on-time delivery of steel components to a project:

- The likelihood of having to make design changes either at short-notice, or at a late stage in a complex project is high. The ability of locally-based companies to be innovative and respond to changing conditions or variations to the original planning and design work is easily accommodated. Regular face-to-face contact between the fabricator and detailer ensures that when design or site erection schedule changes arise, delays are minimised. Additionally, the industry is serviced by a network of steel distribution centres throughout Australia that stock a depth and range of all steel products thus enabling fabricators to quickly source material to respond quickly and cost-effectively to any changes. Australian steel distributors can also supply processed steel to fabricators to further speed production schedules.

- The high rate of productivity of Australian fabricators, coupled with high integrity quality of workmanship that underpins the industry's 'right first time' culture, ensures on-time, short lead-time, completion of all steelwork.

- Robust and flexible transportation strategies for fabricated steelwork are essential to ensure the overall project schedule is not at risk. Locally fabricated steelwork can take advantage of road, rail or local sea transportation, maximising flexibility and economy in meeting delivery schedules and ensuring that project schedules are met.

- The availability of suitable global shipping vessels and the associated timing of departures with the completion of overseas fabricators work, can also pose a high risk to the construction schedule.

- The ability of the local steel supply chain to, if required, provide phased or 'just-in-time' deliveries that dovetail with a project's construction schedule is superior, when compared to alternative fabricated steel supply options.

Input Quality

Poor quality fabricated steelwork can create multiple risks, not only during construction but also for future plant operations. These risks may be heightened by the remoteness of a particular project's location.

From steel manufacture to coatings application, a broad range of independently developed, administered and audited Australian Standards exist, each tailored to regulate specific processes undertaken by each member of the Australian steel supply chain. Compliance to these Australian Standards is the foundation for building input quality for any project. Additionally, the systems rigour and traceability requirements that adherence to these quality standards demand, can facilitate seamless input to any QA requirements of a project. Specifically, the following practices contribute to input quality by the local steel supply chain:

- The size, scale and breadth of Australian steel manufacturers' capabilities contribute to their ability to successfully deliver quality steel solutions to their customers. The industry is able to produce special steel grades and control quality through the full production chain – from steelmaking to rolling. Regardless of the specific product or grade required, all steel is manufactured in accordance with Australian Standards. These standards address such matters as inherent attributes of the steel itself, product testing, certification procedures and dimensional tolerances. Australian steel manufacturers guarantee the quality of the steel products they manufacture by certifying compliance with these independently established Australian Standards. Additionally, local steel manufacturers hold ISO Quality Management System Accreditation (ISO 9001), third party quality accreditation.

- Domestic steel manufacturers have technical teams with significant experience and expertise in working with other members of the steel supply chain and their clients, to provide input to the design process or optimise existing designs by ensuring the most suitable quality grades of steel are chosen for particular applications, or offer advice on Best Practice for steel processing.

- A highly skilled workforce, trained in the latest steel fabrication techniques and welding processes characterises the Australian fabrication industry. This team, coupled with

investment in the latest plant and equipment, such as plate roll forming equipment, CNC beam lines, angle lines and plasma cutting lines, provides a robust platform on which to fabricate steel of exacting quality. Design, fabrication and erection of fabricated steelwork is governed by Australian Standards AS4100 and welding by AS1554 (read more about these in sections 6 and 7 of this document) which lead to reduced instances of onsite rectification due to poor quality, inaccurate or incomplete fabrication.

- The local steel industry has become accustomed to satisfying the demands of project proponents and their partners for quality records and traceability. Provision of documentation is not limited to that governing traceability and compliance of steelwork. It includes materials for cleats and fitments, bolts and welding consumables as well as welding records, NDT records, and fabrication inspection records. Without such traceability a project may not only be at risk of compromising quality and being unable to meet reporting requirements, but also risk schedule delays associated with achieving compliance.

Safety Secured

The Australian steel supply chain demonstrates a strong commitment to work, health and safety (WH&S), believing that all injuries, occupational illnesses and incidents are preventable. Steel manufacturers enjoy global-industry-low, benchmark levels for Lost Time Injury Frequency Rates (LTIFR) and Medical Treatment Injury Frequency Rates (MTIFR). This safety performance is underpinned by wide-scale safety improvement plans, driven by executive leadership from the local steel manufacturers. This approach to safety as a cultural norm throughout the Australian steel supply chain means that projects are less likely to be negatively impacted by WH&S incidents.

Proven Track Record

Australia's large mining and processing industries have over many decades spawned a competitive steel construction industry capable of servicing major projects and delivering quality. The track record of the industry is one of continual improvement in all facets of fabricated steel supply to large projects resulting in optimum risk mitigation for project proponents and their partners.

5.A. Steel manufacturing

Australian steel is recognised around the world for its quality and product consistency. The annual capacity of Australian steelmakers is 5.3 million tonnes of which about 1.6 million tonnes is structural steel used for industrial, commercial and residential buildings, bridges, towers and masts, maritime structures, mining and materials handling projects[2].

The integrated Australian steel chain typically holds more than two million tonnes of inventory, made available through distributors located at over 300 sites across the country[2].

Australia is well served by three steel manufacturers who operate an array of modern steelmaking mills across the country**,** **BlueScope Steel** (which mostly produces flat steel products), **Liberty** (making mostly long steel products) owned by Liberty House Group, and Molycop (making grinding media, railway products, and niche forgings) owned by American Industrial Partners.

BlueScope Steel

BlueScope Steel Limited is an international steel solutions company with a manufacturing and marketing footprint that spans Australia, New Zealand, Asia and North America. It employs more than 14,000 people and operates 91 manufacturing plants in 17 countries around the world.

Manufacturing Facilities

BlueScope Steel has vertically integrated operations for flat steel products in Australia and New Zealand including steel slab, hot rolled coil, cold rolled coil, steel plate and value-added metallic coated and painted products.

It is also a designer and manufacturer of pre-engineered steel buildings and building solutions products. The Australian Steel Products division employs around 6,000 employees at more than 50 facilities and over 50 distribution centres in Australia. It incorporates:

- Port Kembla Steelworks - an integrated steelmaking operation with an annual production capacity of approximately 3.0 million tonnes of crude steel. It is the largest manufacturer and supplier of flat steel in Australia by volume and manufactures slab, hot rolled coil and plate products.
- Metallic coating facilities located in Springhill, NSW (three lines; 825kt/a capacity) and Western Port, VIC (three lines; 830kt/a capacity).

2 https://www.steel.org.au/about-us/our-industry/

- Steel painting facilities located in Springhill, NSW (one line, 200kt/a), Western Sydney, NSW (one line;120kt/a), Western Port, VIC (two lines, 330kt/a) and Acacia Ridge, QLD (one line; 95ktpa).
- Export trading offices based in North America, Europe, the Middle East and Asia.

Through its focus on cost efficient manufacturing and strong brand recognition for products such as COLORBOND® steel and ZINCALUME® steel, the company enjoys a strong reputation in each of the Australian and New Zealand sectors in which it operates, serving customers in the building and construction, engineering construction, manufacturing, automotive and transport, agricultural and mining industries.

Its flat steel product range is produced to exacting standards with products being manufactured to Australian and International Standards providing a known level of quality with full traceability. All manufacturing facilities have quality management systems accredited to ISO 9001:2008. This accreditation is actively maintained and audited, ensuring a mature and fully functional system. BlueScope Steel is committed to the principles of quality assurance, thereby increasing customers' confidence of the project being delivered to the required quality standards.

BlueScope Steel Port Kembla Hot Strip Mill finishing stands control room.

Customer Service

BlueScope Steel also operates a national network of service centres and steel distribution sites throughout Australia. BlueScope Distribution can fill customers' material needs from its Australian network of more than 70 processing and distribution sites.

Products stocked include steel plate, sheet and coil, reinforcing fabric, bar and building products, merchant bar, structural steel, tubular, engineering steel and aluminium products. It offers quality processing services which range from simple length-based cutting of bar and tube products to complex multiple precision processing on world standard CNC controlled beam line and plate line installations. Providing customers with metal in the form they need helps reduce customers' costs, lead-times and waste.

For steel-intensive projects, BlueScope Steel collaborates with both BlueScope Distribution and other ASI-affiliated steel distributors as well as steel fabricator customers to provide 'flowed' deliveries of steel to meet project production schedules to reduce project costs by minimising sorting, handling and storage. The need to 'jump-start' projects is also easily accommodated given the ready availability of its standard product range from the Australia-wide steel distributor network or on short lead times from mills for non-standard products.

BlueScope Steel has an experienced technical team that supports projects by providing advice regarding the 'best-fit' steel grade for a particular application from its current product range, advice on international equivalent steel grades that BlueScope Steel can produce, or even working with project proponents to develop new, modified steel grades, tailored to provide optimum application performance.

To simplify the process of ordering steel and doing business with BlueScope Steel, its e-commerce trading hub www.bluescopesteelconnect.com provides online access 24 hours a day, seven days a week. Its *OrderIntegrator* system for single point data entry delivers time savings, productivity enhancements and reduced error potential while giving more control over orders

Safety and the Environment

BlueScope Steel's fundamental belief is that all injuries can be prevented. The company is committed to its goal of Zero Harm for all its employees and contractors, anywhere in the world. The company's injury levels are at World Best standards with its Lost Time Injury Frequency Rate (LTIFR) at 0.62 and Medically Treated Injury Frequency Rate (MTIFR) at 5.4 as of FY 2018[3].

3 FY2018 FINANCIAL RESULTS PRESENTATION

BlueScope Steel is committed to caring for the environment and choosing to do what is right. It takes action within its businesses and works with partners to continually improve its environmental footprint. The company has adopted comprehensive environmental governance arrangements and management systems to ensure it achieve those goals. In addition to its compliance obligations, BlueScope Steel has undertaken a range of initiatives to reduce the company's environmental footprint (refer *11-Environmental Sustainability*).

Liberty

A member of the GFG Alliance, an international group of businesses combining some of the world's leading industrial, natural and financial resources working together towards the delivery of a common industrial strategy, Liberty is Australia's largest manufacturer of steel long products, the largest distributor of steel and reinforcing products, and operates a leading metals recycling business. Liberty's businesses include Liberty Steel, Liberty Reinforcing, Liberty Metalcentre, Liberty Primary Steel, Liberty Recycling. Together Liberty businesses service customers throughout Australia's infrastructure, commercial and residential construction, manufacturing, mining rail and agriculture sectors.

Liberty employs 4,900 people across Australia, New Zealand, Asia, the Pacific and the United States.

Liberty Primary Steel

Liberty Primary Steel's Whyalla Steelworks, located in Whyalla, South Australia is an integrated steelworks with current capacity of approximately 1.25Mt/a of cast steel and hot rolled products. It is Australia's only manufacturer of special grade billet and steel long products.

Liberty Primary Steel's Coke Oven complex, Blast Furnace, Basic Oxygen Steelmaking plant and Heavy Section Structural and Rail Mill supplies semi-finished steel billet to Liberty Steel and produces custom made hot rolled structural, rail and sleeper products for internal and external customers.

Magnetite pellet feed, hematite lump and coking coal are sourced by Liberty Primary Steel from GFG's SIMEC Mining.

Liberty Steel

At its manufacturing sites in Victoria and New South Wales, Liberty Steel operates two electric arc furnaces with steel production capacity of approximately 1.4Mt/a, four rod and bar rolling mills and three wire mills. Steel billet is also sourced from Liberty Primary Steel.

Liberty Steel is Australia's largest manufacturer of rod, reinforcing bar and wire products for construction applications, merchant bar for general applications, fencing for rural applications, and specialty bar and wire for manufacturing applications in Australia.

All of Liberty's outputs are manufactured to the highest level of Australian and New Zealand Standards and are independently accredited by the Australasian Certification Authority for Reinforcing and Structural Steels (ACRS).

Liberty Recycling specialises in the safe handling, collection and processing of more than 1.4Mt/a of ferrous and non-ferrous scrap metal every year, distributing it to Liberty Steel's Australian steel mills and international customers. Liberty Recycling operates nationally from 22 locations in Australia as well as several in Asia and across the globe.

The recycling business is a significant contributor to the raw material requirements of Australia's steel industry and provides a sustainable alternative to landfill, capturing the full value-in-use of the materials recycled.

As a member of the GFG Alliance, Liberty's high levels of self-sufficiency in key steelmaking inputs make it unique in the world of steel. From mineral extraction to the generation and supply of sustainable, low-cost and reliable energy from renewables, and from the collection and supply of scrap steel and non-ferrous metals recycling to the processing, distribution and delivery of product and service solutions, Liberty services over 30,000 customers globally from its range of some 40,000 products through over 75 Liberty outlets and a network of retailers.

Customer Service

Liberty's products and services are distributed through a comprehensive network of Liberty Reinforcing and Liberty Metalcentres with more than 75 distribution centres in Australia that are close to local markets.

The products supplied by Liberty include hot rolled structural steel, rod and bar, reinforcing, wire, tube, pipes and hollow sections, fittings, valves, and recycled metals. Liberty's products are used across industries including construction, manufacturing, housing, resource, mining and agriculture.

The company's capabilities span the supply of product to the management and delivery of complete packaged solutions.

Liberty has standardised product identification and scanning processes to dramatically improve productivity and customer quality outcomes. Working with global leaders in supply chain tracking GS1, Liberty has developed and implemented GS1's DataMatrix barcode and

product identification tagging technology across its manufacturing sites nationally to deliver globally unique identification of products at a bundle level.

By using this identification technology, Liberty can demonstrate the compliance certification and sustainability credentials of a large volume and wide variety of products, plus ensure certainties of cost and reliability of on-schedule delivery directly to site. It can also reduce the impact of construction projects on communities by accurately scheduling and minimising truck movements to sites. It does all this with a scrupulous attention to safety for the workforce and the general public.

To assist industry, Liberty Steel has developed its EzyCommerce® solution. EzyCommerce® is a suite of internet-based solutions to provide transactional information to its customers in a simple and efficient manner. By working to industry standards, we want to make it as easy as possible to do business together – 'Electronic Commerce Made Ezy'.

This is achieved through three integrated approaches:

1. The EzyCommerce® Web Site – where approved users may carry out queries and extracts on a variety of business documents.
2. EzyCommerce® B2B solutions – full integration of customers' business transactional systems with those of Liberty Steel.
3. The Liberty Steel Product Tag – our product tag that 'glues' all the transactions.

Liberty Metalcentre's state-of-the-art processing equipment and expert teams ensure the accuracy, tolerance and repeatability of processing. The company's integrated supply chain enables the sourcing of an extensive range of complementary products and the scheduling of deliveries to meet customers' schedules.

Liberty Metalcentre has significant expertise in working with customers to provide engineering and design optimisation to minimise risk while reducing waste and cost. Optimising material use can also aid in the sustainability credentials needed for awarding Green Star steel credit points.

Liberty Reinforcing distributes a comprehensive range of reinforcing product and accessories, and has extensive prefabrication and customisation capabilities, with innovative prefabricated products including PROPILE, PROCAGE, CUSTOMCAGE, BAMTEC® and BARMATTM. Liberty Reinforcing's prefabricated solutions comply with all relevant Australian Standards.

The company leverages its in-house product development, engineering support and project management capability to optimise engineering design and manage the sourcing, fabrication and logistics of solutions for its customers in resources, mining and construction industries.

Liberty has significant experience and expertise in working in partnership with its customers to provide input into the design process or to optimise an existing design for efficient manufacturing, reduced waste, reduced risk and ultimately reduced cost.

Liberty's engineering and technical personnel have a long history of working with the ASI on the Australian Standards committee for the relevant Australian steel and safety standards. The engineering team have an in-depth understanding of these and other standards associated with structural and reinforcing steel and design.

Liberty personnel contributed to a range of standardised steel connections published by the ASI. A significant focus of the company's involvement with these publications was to provide the industry with a range of practical and economical standard connections. As an objective in design is to utilise the available member strengths to a high degree, the connections were developed to achieve the maximum strengths possible (subject to bolt capabilities), while at the same time minimising component sizes for optimum economy. Having a range of connections designed in accordance with the current standards and the latest design models eliminates a great deal of detailed and time-consuming engineering work. These connections have been developed based on Liberty's hot rolled and welded universal beams and cover many practical situations. With their involvement in this area, Liberty's engineers are able to assist customers to apply those connections and develop suitable solutions for alternative design situations, where they arise. This can provide significant efficiencies during design and fabrication.

Safety and Sustainability

Liberty's core values of Family, Sustainability and Change demonstrate the depth of commitment within the organisation to achieving the highest performance in occupational health and safety, with the aim of creating and maintaining a safe and healthy work environment throughout its businesses.

Liberty believes that the use of sustainable materials in modern Australian building construction is no longer a negotiable. Structurally efficient buildings that maximise resources and make the most of usable space now have an essential role to play in creating green cities that citizens can use now and into the future.

Liberty is committed to the role played by steel in the circular economy, including the promotion of the recovery, reuse and recycling of steel and other products. The company is dedicated to conducting its business to global environmental, social and commercial standards.

Molycop

Molycop Australasia is part of the Molycop Group, which is the largest supplier of mining consumables in the world. Group installed manufacturing capacity is in excess of 1.8 million tonnes per annum from twelve locations. In Australia, Molycop produces forged grinding media, a wide range of bar products, railway products, and specialty forgings. Primary steel production is carried out at Waratah, NSW. Grinding media production facilities are located at Waratah, and Bassendean, WA.

Production Facilities

The Waratah, NSW plant includes Electric Arc Furnace (EAF) steelmaking, continuous casting, ingot casting, and bar mill facilities. Grinding media is produced using both roll-forming and upset forging processes. The Railway products plant takes large ingots and converts them into finished wheel and axle sets using a fully integrated manufacturing process. Ingots of up to 56 tonnes can be cast in the specialty products plant. The specialised steelmaking facilities are complemented by equipment for steel degassing, fine composition adjustment, and a wide range of ingot mould, as well as forging and heat treatment capabilities.

The Bassendean, WA plant produces forged grinding media and specialty fasteners for mineral processing applications such as SAG mill liner bolts.

Products and Brands

In the grinding media sector, SAG Balls are produced from 4 inch to 6.25 inch diameter, whilst Ball Mill Balls are available from 1 inch to 4 inch diameter. Rod Mill Rods are produced in a similar diameter range. After considerable in-house and in-field testing Molycop has recently developed a superior, high performance SAG ball – ‘Molycop NG’. The ball is manufactured using an innovative, proprietary manufacturing process that has resulted in a tougher SAG Ball, with higher impact and spalling resistance.

Specialty fasteners are sold under the Donhad Fastener brand.

Railway products are sold under the Comsteel brand. Comsteel produces forged and rolled railway wheels to international standards for all classes of rolling stock. In particular the company is at the forefront in developing products for higher axle loading. New materials and designs for specific applications such as high hardness and wear resistant wheels have been developed by Comsteel. These wheels deliver improved performance in heavy haul, freight, passenger and locomotive applications.

Grade Capability

Molycop has the ability to produce almost any grade of steel including all grades covered by the following Australian Standards:
AS3679 – Hot-rolled Structural Steel Bars and Sections.
AS1442 – Carbon Steels and carbon-manganese steels – Hot–rolled bars and semi-finished products.
AS1444 – Wrought Alloy Steels – Standard, hardenability (H) series and hardened and tempered to designated mechanical properties.
AS4671 – Steel Reinforcing Materials (ACRS D-bar accredited).
BS5892 – Part 3 British Standard Railway Wheels
AAR M1003 – Association of American Railways - Quality Assurance
AAR M107 / 208 – Association of American Railways - Railway Wheels
EN13262 – European Railways Accreditation

Quality Assurance

ISO 9001 – 2015 Quality Management System
NATA approved Chemical and Mechanical Laboratory

Orrcon Steel

Orrcon Steel is a manufacturer and distributor of steel tube and pipe in Australia owned by BlueScope Steel. Orrcon Steel's distribution centres are strategically located in Queensland, New South Wales, Victoria, South Australia, Northern Territory and Western Australia, providing a national distribution network, which is complimented by the rural products focussed Metalcorp branch network, as well as an extensive spread of distributors and stockists in metropolitan and rural Australia.

Manufacturing Locations and Scope

• **Brisbane** – Structural tube and pipe mills with inline painting, 30T coil slitter and electro-galvanizing plant. Providing ready-primed and zinc coated ERW product, manufactured for structural and low-pressure applications. This includes Orrcon Steel's own range of ALLGAL®, as well the ULTRASPEC-GAL® range of zinc coated Z275 (ZB135) products to meet the National Construction Code.

• **Adelaide** – Precision tube mill manufacturing cold rolled, hot rolled, zinc, and aluminium coated ERW steel tubing rolled to precise sizes and wall thicknesses. The MECSPEC-GAL® tube product range provides a local source of pre-galvanized mechanical tube and a viable alternative to imported HDG pipe in low through to moderate corrosive environments.

Additional Products available through Orrcon Steel & Metalcorp distribution

- Merchant bar (e.g. flats, rounds, squares and angles)
- Hot rolled structural (Columns, Beams, Channels)
- Hot Dip Galvanized Pipe
- Fencing, wire, welding products, mesh, sheet, gates and roofing.
- Metalcorp's Australian made Cattle Crushes, Ramps, Panels, Grids and Feeders.

Quality Management Systems and Product Standards

Orrcon Steel's Quality Management System is certified to ISO 9001, and the Brisbane site testing facility is NATA accredited to ISO 17025. Tubular products are manufactured, inspected and tested to comply with one or more of the following Standards or schemes:

- Structural – AS/NZS 1163 Cold-formed structural steel hollow sections.
    - Third party certified by ACRS
- Low pressure pipe - AS 1074 - Steel Tubes and tubulars for ordinary service.
- ALLGAL® standard AS4750 Electro-galvanized (zinc) coating on ferrous hollow and open sections.

    - Additional zinc coatings as per applicable Standards, AS4792, AS1397
- ORRFIRE® range of CSIRO ACTIVFIRE® certified sprinkler and hydrant pipe
- Precision – AS 1450 Steel tubes for mechanical purposes, made to meet the demands of industry in all aspects of the product.

For further information and complete product range information, visit www.orrcon.com.au.

Austube Mills

With a history dating back to the 1930s, Austube Mills has evolved from the knowledge and experience of respected Australian steel businesses Stewart & Lloyds, Tubemakers, Palmer Tube Mills, Smorgon Steel, British Tube Mills and most recently, Onesteel (Arrium).

They have also developed a range of world-class DuraGal and DuraPrimed coatings designed to meet the needs and conditions of Australia. With manufacturing facilities in Acacia Ridge (QLD) and Newcastle (NSW), they are well equipped to service domestic steel pipe and tube markets in Australasia.

They are supported by more than 200 distribution networks across Australia and New Zealand.

For further information and complete product range information, visit www.austubemills.com.au/

Australian Pipe and Tube (APT)

Australian Pipe & Tube is a privately owned, Australian company, specialising in the manufacture of the highest quality (to Australian Standards) tubular steel products. APT's state-of-the-art tube mill in Victoria specialises in manufacturing RHS, CHS & SHS tubular steel products.

Australian Pipe and Tube hollow structural sections are manufactured in full compliance with Australian Standard AS1163 which is one of the world's most advanced standards. Used in industries ranging from mining to agricultural, APT Painted and APT Galv are certified to Australian standards and backed by local technical support.

For further information and complete product range information, visit auspipetube.com.au/

Bisalloy Steels

Bisalloy Steels is Australia's only manufacturer of high-tensile and abrasion-resistant quenched and tempered steel plate used for mining, armour, structural and wear-resistant steel applications. Bisalloy supply manufacturers and end-users in a vast array of industries including mining, construction, quarrying, general fabrication and buildings, pressure vessel and defence. Products which are marketed under the brand name BISALLOY® are supplied both direct to customers and through an extensive distribution network across Australasia, Indonesia, Thailand, Peoples Republic of China, South Africa and the Middle East.

Product Range

- BISALLOY® WEAR steel is the number one performance steel choice of countless industries because of its remarkable hardness and ability to withstand the toughest wear and tear.
- BISALLOY® STRUCTURAL steel can enable manufacturers, engineers, industrial designers and architects to deliver size, weight and cost savings while still achieving required levels of strength and performance.
- BISALLOY® ARMOUR steel has become the first choice in defence applications here and abroad and is specified for hulls in Armoured Personnel Carriers (APC), Light Armoured Vehicles (LAV) and the Bushmaster Infantry Mobility Vehicles in Australia, along with many APCs and LAVs worldwide.
- BISALLOY® PROTECTION steel range offers tested and certified, lighter weight plate products with superior ballistic performance to suit a wide range of applications for the protection of life, valuables and property.

Technical Assistance

Bisalloy has a range of technical and product data available to support its range of Australian made high performance steel products. With locally based technical experts and its own NATA accredited laboratory, Bisalloy can provide personalised, value-added technical support to all customers in every state. Bisalloy has the capacity to manufacture hard wearing and specialty steels to suit your applications and environment.

Sustainability

Bisalloy Steels is proud to know its performance steel grades are also delivering lighter, stronger and more sustainable steel options which, by their very nature, are increasing energy savings.

Bisalloy Steels also takes a tough approach to protecting the environment in all their steelmaking processes. They are passionate about the environment and continually measure the environmental performance of their plant. Energy consumption and carbon emissions have been regularly reported to the Clean Energy regulator since 2009. Rainwater is harvested for quenching processes, waste furnace gasses are utilized to preheat plates entering the heat treatment process, and they actively promote the limitless recycling opportunity of products throughout their lifecycle.

For further information and complete product range information, call 1300 BISALLOY or visit www.bisalloy.com.au

5.B. Roll-forming

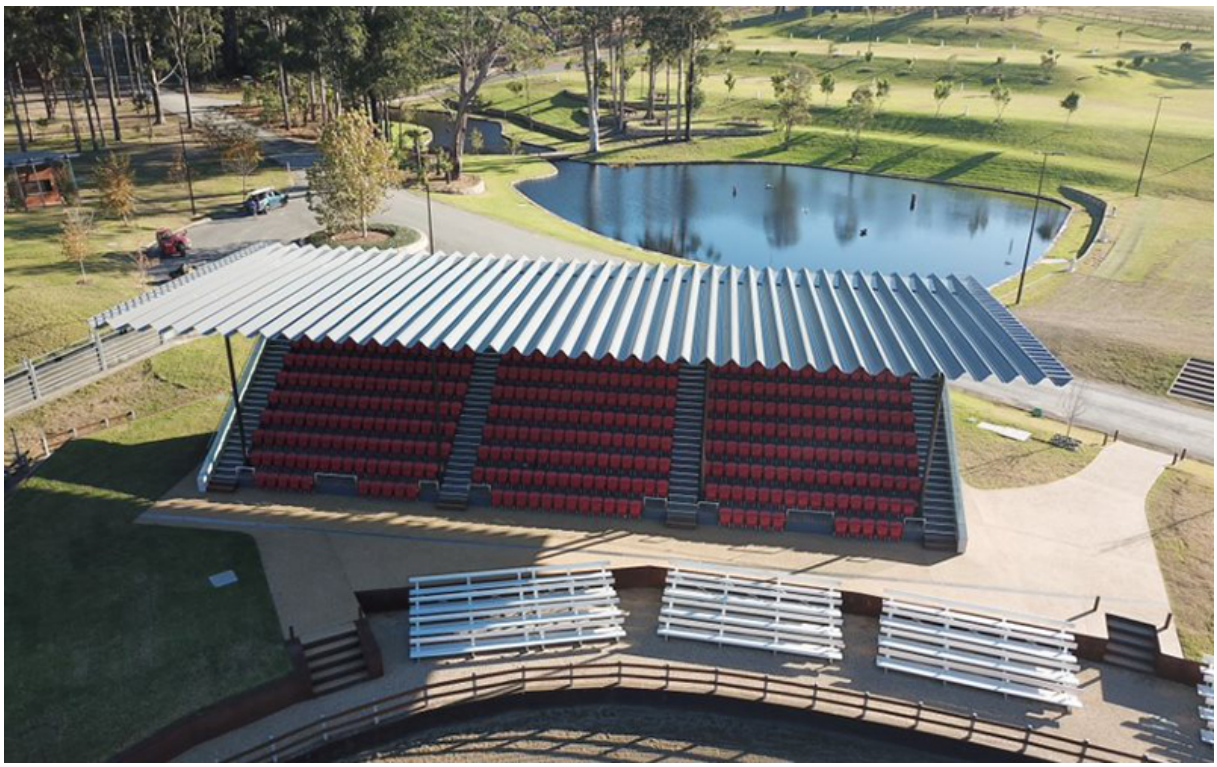
Cold-formed light gauge steel members and profiled sheeting are produced from steel strip usually supplied in coil form from the steel mill. In Australia, BlueScope Steel Limited is the predominant manufacturer of steel strip. Cold-rolled coil is usually supplied in the range 3.5mm to 0.3mm in thickness and is generally metal coated, either galvanized or ZINCALUME®. Additional continuous coating processes, such as painting, may be applied after metal coating.

The coils of steel strip begin the process of being turned into cold-formed steel sections and profile sheet with being uncoiled, slit into appropriate widths and then cold-formed into the required final profile shape, usually by a continuous process passing through a number of roll stages to form the final product shape. These processes are undertaken by **roll formers**, who may work as contract businesses tooling up and producing a range of specialist section shapes for various clients, or at dedicated facilities working in-house with manufacturers of specific product lines for purlins, girts, structural framing, profiled sheeting or metal decking.

The final cold-formed light gauge steel products have any secondary finishing processes applied (e.g. cutting, punching) and then are packaged for delivery to either distribution centres, stockists or builders.

Roll forming machine operation. Image courtesy Enduroframe®.

For certain product types it is logistically easier and more economical to roll the product on site and then directly install onto the final structure. In this case, the roll forming machinery is usually truck mounted and brought to site.



ARAMAX wide span roofing is rolled on site. Image courtesy Bay & Coast Metal Roofing.

5.C. Distribution

A network of steel distribution facilities exists across Australia with state-of-the-art processing and stock control systems to support demanding project schedules. These businesses carry large stocks throughout the branch network giving excellent availability of the full range of steel products.

Leading distributors include InfraBuild Steel Centre, BlueScope Distribution (Sheet Metal Supplies), Southern Steel Group (Brice Metals, Southern Sheet & Coil, Surdex), United Steel, Mesh & Bar, and Coil Steels. These all have a national footprint and providing the full range of steel products to resellers and end–users including merchant bar, pipe and tube, structural steel sections, steel plate, angles, channels, flat sheet, reinforcing steel, sheet steel and coil, roofing and rainwater goods, purlins, battens and studs. Some distributors also carry a range of stainless steel, aluminium products and pipe fittings and valves.

Reinforcing businesses process, fabricate and coordinate the distribution of reinforcing bar and mesh throughout Australia for the construction, mining and oil and gas industries (refer section 8 for more information).

The integrated Australian steel channel typically holds in excess of two million tonnes of inventory providing project proponents with confidence that the industry can promptly and effectively respond to a project's steel requirements when and where they need them. Local availability dramatically reduces the need for projects to maintain large inventories onsite and greatly reduces the schedule risk for a project.

Not only do Australian distributors offer large stocks, but they also offer steel processing on equipment which includes CNC beam lines, angle lines, band saws and cropping lines capable of processing the full range of structural steel, merchant bar, pipe and tube products. Plate processing capabilities include laser, plasma and oxy-fuel cutting, drilling, counter-

sinking, boring, bevelling and marking of the biggest available plate. By using these processing facilities customers are able to substantially increase their productivity allowing them to take on larger projects, finishing them faster and within budget. They also benefit from reduced handling, the elimination of mistakes and the reduction of waste.

Australian steel distributors are accustomed to working closely with project designers, steel fabricators and other contractors to ensure that the optimal steel product, compliant with all relevant standards and fully traceable, is available where and when it is required. Consequently, unnecessary and costly delays can be avoided.

Distributors add considerable value to the management of projects by:

- Maintaining significant stocks of steel.
- Advising on the best use of steel lengths and plate sizes for minimum yield loss, thereby maximising cost savings.
- Supplying quality processing as needed to customers' exact requirements.
- Providing timely deliveries, coordinated to projects' construction schedules and in cooperation with other suppliers.

Australian distributors are located at over 300 sites across the country and offer a depth and breadth of range, coupled with logistics, supply chain, processing capability and expertise to facilitate fast, flexible and reliable delivery of product to all Australian steel users.

For further information, visit:

BlueScope Distribution

InfraBuild Steel Centre

Southern Steel Supplies

Coil Steels

United Steel

Mesh and Bar

Horan Steel

Vulcan

5.D. Fabrication

Fabrication Overview

The Australian structural fabrication industry is characterised by a very large number of fabricators with a total output capacity of approximately 1.6 million tonnes per annum, including some product used in repetition manufacturing, lintels, truck body and trailer fabrication[4]. One of the largest the steel industry sectors, Australian structural steel fabricators have committed heavily to new technology in recent times to meet the demands of new resources and infrastructure investments head on.

There has been a real increase in capability, capacity and competitiveness to take on major projects. The Australian Bureau of Statistics notes that $23 million was invested in 2016-2017 by Australian Fabricators[5].

This investment takes in the latest technology in new overhead cranes, plate rolling equipment, CNC beam lines, angle lines and plasma cutting lines. The fabricators are increasing their capability and capacity and investing in Australia's future not only by installing new plant but also by keeping skills in Australia to build and maintain a sustainable steel manufacturing sector.

This investment has seen the fabrication steel processing capacity increase by close to 30 percent. The sector has ample capacity in reserve and is more cost competitive due to this recent investment in automation.

General Fabrication

The medium and larger fabricators (2,000 to 20,000 tonnes per annum capacity) process approximately 1.1 million tonnes annually with a large shift from labour-based fabrication to CNC, beam lining, angle lines and plasma and gas profile cutting. A trend is for fabricators to invest in detailing or to have close liaison with detailers to enable the benefits of computer files to drive their CNC equipment. Automotive style processing is progressively being applied to plate profiling, line marking, identification marking, drilling and tapping and where required, weld preparation.

A characteristic of steel fabrication in recent years has been the move to introduce technology throughout the steel value chain, including processing facilities at distribution level.

4 https://www.steel.org.au/about-us/our-industry/
5 ABS 81550DO002_201617 Australian Industry, 2016-17 (Table3)

New and innovative business models are being developed with better interface in the technology areas between engineers and detailers, and the fabricator. Flowing from the UK experience, we are seeing an emergence of the Design and Construct Steel Contractor assuming an increased share of design and erection for the entire steel component.

This market segment includes portal frame buildings such as factories and warehouses and commercial buildings such as offices, shops, schools, health and civic facilities. Steel brings advantages in speed of construction, lightweight and reduced foundation costs and a smaller manufacturing footprint to the construction site as most fabrication is off-site in more secure and safer manufacturing environments.

The Australian fabrication industry capacity is extended by the outsourcing of some functions to specialist processors and coaters. A community of specialist subcontractors augment the fabrication capacity in:

- Steel detailing
- Blast cleaning
- Painting
- Hot dip galvanizing
- Non-destructive testing
- Grating and handrail manufacture
- Bending
- Transportation

Fabricators will often specialise in structural steel, pipe fabrication, plate fabrication or mechanical fabrication. This has served the industry well, maintaining capability, cost effectiveness and flexibility. In fact, fabricators often specialise in certain market segments which makes them more competitive and profitable in these segments.

This paper assumes that reference to ’fabricators’ covers all these disciplines. Refer to the Australian Fabricator Listing with approximate capacity tonnes indicated in the following pages.

The leading fabrication firms are equipped with state-of-the-art CNC automated fabrication equipment and are adept at utilising electronic information direct from the Engineer or Detailer to run fabrication machines. This improves cost and quality and enables ‘just in time’ processing and erection.

Fabricator Quality

The Australian steel industry is based around the integrated nature of Australian Standards. For example, the material specifications of Pipe and Tube (AS1163) and the structural sections Specification (AS3678) feed into the design requirements of AS4100 and AS3600 which are called up in the Building Code of Australia.

Significant to this structure is the welding code, AS1554. For special purpose welds, the welder needs to be qualified and tested and the equipment used calibrated and approved through the production of tested samples.

Australian fabricators maintain a system of apprenticeships to renew and update the skill levels in this country and to ensure training so that the skill sets to the relevant standards are maintained.

Similarly, the importance of a steel structure is dependent on the coating scheme which must be applied onsite or handled well to the site. These requirements defray significant on-costs from avoiding not getting the specification requirements right the first time.

Australian Fabricator Listing

New South Wales

Business name	Website	Capacity
Precision Oxycut	www.steelcutting.com.au	>10,000
S&L Steel Fab Pty Ltd	www.slsteel.com.au	>10,000
Adua Engineering Aust	www.adua.com.au	2,000-10,000
Alfabs Engineering Group Pty Ltd	www.alfabs.com.au	2,000-10,000
Algon Steel	www.algonsteel.com.au	2,000-10,000
Allmen Engineering Services Pty Ltd	www.allmen.com.au	2,000-10,000
Amarcon Group	www.amarcon.com.au	2,000-10,000
Beltor Engineering Pty Ltd	beltorengineering.com.au	2,000-10,000
Bosmac Pty Ltd	www.bosmac.com.au	2,000-10,000
Brolton Group Pty Ltd	www.brolton.com.au	2,000-10,000
CDE Structures	www.centraldesign.com.au	2,000-10,000
Combell Steelfab Pty Ltd	www.combell.com.au	2,000-10,000
Coolamon Steelworks	www.coolamonsteel.com.au	2,000-10,000
Cullen Steel Fabrications	www.cullensteel.com.au	2,000-10,000
DALABAM Holdings Pty Ltd	www.belmoreengineering.com.au	2,000-10,000
DME Engineering Services	dmegroup.com.au	2,000-10,000
E.R. Curtain Pty Ltd	www.erc.com.au	2,000-10,000
F3 Industries Pty Ltd		2,000-10,000
Ficogi Engineering Pty Ltd	www.ficogi.com.au	2,000-10,000
Flame-Cut Pty Ltd	www.flame-cut.com.au	2,000-10,000
Halley and Mellowes (HMA)	www.hmagroup.com.au	2,000-10,000
Industrial Building Systems	www.industrialbuildingsystems.com.au	2,000-10,000
Metwest Engineering Pty. Ltd.	www.mwe.com.au	2,000-10,000
Protective Fencing	www.profence.com.au	2,000-10,000
Saunders International Limited	www.saundersint.com	2,000-10,000
Universal Steel Construction Pty Ltd	www.universalsteel.com.au	2,000-10,000
WGE Pty Ltd	www.wgegroup.com	2,000-10,000
Aardvark Steel Constructions Pty Ltd	www.aardvarkengineering.com.au	<2,000
Ace Construction Australia	aceaustralian.com.au	<2,000
Align Constructions and Engineering	www.alignconstructions.com.au	<2,000
Aljen Engineering Pty Ltd	www.aljen.com.au	<2,000
Allthread Industries	www.allthread.com.au	<2,000
Armidale Romac Engineering		<2,000
AWI Steel Pty Ltd	www.awisteel.com.au	<2,000
Borg Manufacturing	www.borgs.com.au	<2,000
C & V Engineering Services Pty Ltd	www.cvengineering.com.au	<2,000
Charles Heath Industries	www.charlesheath.com.au	<2,000
Cooma Steel Co. Pty Ltd	www.coomasteel.com.au	<2,000
Cosme-Australia Stainless Steel Fab	www.cosme.com.au	<2,000
CSG Resource Supplies Pty Ltd	www.7steel.com.au	<2,000
D&L Engineering Service Pty Ltd	www.fabinox.com.au	<2,000
D.A.M. Structural Steel	www.damsteel.com.au	<2,000
Davebilt Industries	www.davebilt.com.au	<2,000

Business name	Website	Capacity
Designed Building Systems	www.designedbuildingsystems.com.au	<2,000
Edcon Steel Pty Ltd	www.edconsteel.com.au	<2,000
Engineering Fabricators Newcastle Pty Ltd	www.efnewcastle.com.au	<2,000
Hard Bakka Pty Ltd	www.hardbakka.com.au	<2,000
Hayman Industries	www.haymanindustries.com.au	<2,000
HF Hand Constructors Pty Ltd	www.hfhand.com.au	<2,000
Hutchins Bros	hutchinsbros.com.au	<2,000
ILB NSW Pty Ltd	www.ilbsteel.com.au	<2,000
Juan Fabrellas	www.fabrellasindustries.com	<2,000
K H P Steel Fabrications	www.khpsteel.com.au	<2,000
Kaydee Engineering Pty Ltd	www.kaydee.net.au	<2,000
Mario & Sons Steel Fabrication Pty Ltd		<2,000
McColl Fabrications		<2,000
Mecha Design & Fabrication	www.mechasteel.com	<2,000
On Time Fabrication	www.ontimefab.com.au	<2,000
Pacific Steel Constructions Pty Ltd	www.pacificsteel.net	<2,000
Piper & Harvey Steel Fabrications Pty Ltd	www.piperharveysteelfab.com.au	<2,000
Precision Metal Group Aust Pty Ltd	www.precisionmetalgroup.com	<2,000
Pro Industries Pty Ltd	www.proindustries.com.au	<2,000
Rambler Welding Industries Pty Ltd	www.ramblerwelding.com.au	<2,000
Redispan Conveyors Pty Ltd		<2,000
Riton Engineering Pty Ltd	www.riton.com.au	<2,000
Rivtec Engineering	www.rivtec.com.au/about-rivtec-australia	<2,000
Snow Contractors Pty Ltd	www.snowcontractors.com.au	<2,000
Spartan Steel	spartansteel.com.au	<2,000
Steel Fabrication Services Pty Ltd	steelfabservices.com.au	<2,000
Stronghold Fabrications Pty Ltd	www.strongholdfab.com.au	<2,000
Structural Steel Group Pty Limited	www.strgrp.com.au	<2,000
Sydney Maintenance Services Pty Ltd		<2,000
Tasman Tank Company	www.tasmantanks.com.au	<2,000
Tenze Engineering	www.tenzeengineering.com.au	<2,000
TTM Engineering Pty Ltd	www.ttmengineering.com.au	<2,000
Tubular Steel Manufacturing Pty Ltd		<2,000
Walpett Engineering Pty Ltd		<2,000
Weldcraft Engineering (ACT) Pty Ltd	www.weldcraft.com.au	<2,000
Weldmark Pty Ltd	www.worldmark.com.au	<2,000
AllShelter	www.allshelter.com.au	
Intercon Engineering Pty Ltd	www.interconengineering.com.au	
NEPEAN Engineering & Innovation	www.nepean.com	
Stripes Engineering Services Pty Ltd	www.stripes.net.au	
Klondu	www.klondu.com.au	
Leussink Engineering	www.leussink.com.au	
Programmed	www.programmed.com.au	
Snare Fabrications	www.snarefab.com.au	
WGE Group	www.wgegroup.com	

Victoria

Business name	Website	Capacity
Alfasi Steel Constructions		>10,000
Shearform Pty.Ltd	www.shearform.com.au	>10,000
Thornton Engineering Australia Pty Ltd	www.thorntoneng.com.au	>10,000
Aus Iron Industries	www.ausironindustries.com.au	2,000-10,000
Continental Steel Pty Ltd	www.continentalsteel.com.au	2,000-10,000
GFC Industries Pty Ltd		2,000-10,000
GVP Fabricators Pty Ltd	www.gvpfabricators.com.au/	2,000-10,000
J. Furphy & Sons Pty Ltd	www.furphys.com.au	2,000-10,000
Keppel Prince Engineering	www.keppelprince.com	2,000-10,000
Page Steel Fabrications Pty Ltd	www.pagesteel.com.au	2,000-10,000
Stilcon Holdings Pty Ltd	www.stilcon.com.au	2,000-10,000
Structural Challenge Pty Ltd	www.structuralchallenge.com.au	2,000-10,000
Plinius Engineering Pty Ltd	www.plinius.com.au	2,000-10,000
AllRange Steel Fabrications		<2,000
Apex Welding & Steel Fabrication	www.apexwelding.com.au	<2,000
Aplus Steel Fabrication Pty Ltd	www.aplussteelfabrication.com.au	<2,000
Barra Steel (Vic) Pty Ltd	barrasteel.com	<2,000
Best Fab Pty Ltd	www.bestfab.com.au	<2,000
Brunton Engineering & Construction	www.brunteng.com	<2,000
Conductix	www.conductix.com.au	<2,000
Ferroustek Group	www.ferroustek.com.au	<2,000
Grandame Nominees Pty Ltd	www.cpeconstruction.com.au	<2,000
Fabcon Structural	www.fabcon.com.au	<2,000
ICE Engineering (Vic) Pty Ltd	www.iceengineering.com.au	<2,000
Jord Bellows International Pty Ltd	www.jord.com.au	<2,000
Kelson Enterprises Pty Ltd		<2,000
Kingco Engineering	www.Kingcoengineering.com	<2,000
MaddisonWright Engineering	www.maddisonwright.com.au	<2,000
Minos Structural Engineering Pty Ltd	www.minosstructural.com	<2,000
P&T Weldings Vic Pty Ltd		<2,000
PacifiCO (Aust) Pty Ltd	www.pacificosteel.com.au	<2,000
S T Fab Pty Ltd	www.stfab.com	<2,000
SGA Engineering (Aust) PTY LTD	www.sgaengineering.com.au	<2,000
SJ & TA Structural Pty Ltd	www.sjta.com.au	<2,000
Skrobar Engineering Pty Ltd	skrobareng.com.au	<2,000
Steelwork Bendigo Pty Ltd	www.steelworkbendigo.com	<2,000
Sutcliffe Engineering Pty Ltd	www.sutcliffe.com.au	<2,000
JBI Engineering	www.jbiengineering.com.au	<2,000
The Yobson Trust		<2,000
Tieco International (Aust) P/L	www.tieco.com.au/Tieco/Tieco.html	<2,000
Uptime Services Management	www.uptime.com.au	<2,000
Australian Rollforming Manufacturers	www.ausrollform.com.au	
GASCO Pty Ltd	www.gasco.net.au	

Business name	Website	Capacity
John Beever Australia Pty Ltd	www.beever.com.au	
Metalform Structures Pty Ltd	www.metalform.com.au	

Queensland

Business name	Website	Capacity
Beenleigh Steel Fabrications Pty Ltd	beenleighsteel.com.au	>10,000
Hutchinson Builders	www.hutchinsonbuilders.com.au	>10,000
Sun Engineering (Qld) Pty Ltd	www.suneng.com.au	>10,000
ATW Group Pty Ltd	www.atwgroup.com.au	2,000-10,000
Austin Engineering	www.austineng.com.au	2,000-10,000
Cairns Steel Fabricators	www.csfsteel.com.au	2,000-10,000
Casa Engineering Pty Ltd	www.casaeng.com.au	2,000-10,000
Central Engineering Pty Ltd	www.ceng.com.au	2,000-10,000
David Seymour Family Trust	www.seymourengineering.com.au	2,000-10,000
DWW Engineering Pty Ltd	www.dww.com.au	2,000-10,000
Hitec Welding Pty Ltd	www.hitecwelding.com.au	2,000-10,000
Hosken Site Steel Pty Ltd	www.hoskensteel.com.au	2,000-10,000
Sencova Steel Fabricators	www.sencova.com	2,000-10,000
Steel Fabrications Australia Pty Ltd	www.steelfabau.com.au	2,000-10,000
Taringa Steel P/L	www.taringasteel.com.au	2,000-10,000
Thomas Steel Fabrication	www.thomassteel.com.au/	2,000-10,000
W D T Engineers Pty Ltd	wdtengineers.com.au	2,000-10,000
Watkins Steel	www.watkinssteel.com.au	2,000-10,000
3 Metals Pty Ltd	www.3metals.com.au	<2,000
Austweld Engineering Pty Ltd	www.austweldengineering.com.au	<2,000
Belconnen Steel Pty Ltd	belconnensteel.com.au	<2,000
Bettabuilt Fabrication	www.bettabuilt.com	<2,000
Brezac Constructions	brezac.com.au	<2,000
C R Engineering Steel Fabrications Pty Ltd	www.crengineeringsteelfab.ypsitesmart.com.au	<2,000
Compliant Steel	www.compliantsteel.com.au	<2,000
Craig Douglas	www.craigseng.com	<2,000
Engineering Applications Pty Ltd	www.engapp.com.au	<2,000
Everything Metal Pty Ltd	www.emetal.com.au	<2,000
GM Poles Pty Ltd	www.gmpoles.com.au	<2,000
Howell Davies Welding Pty Limited	www.howelldavies.com.au	<2,000
HSF Australia	www.hsfaust.com.au	<2,000
Idec Solutions	www.idec.com.au	<2,000
KDT Fabrications Pty Ltd	www.groupkdt.com	<2,000
KG Fabrication Pty Ltd	www.kgfabrications.com.au	<2,000
Logan Steel Pty Ltd	www.logansteel.com.au	<2,000
Mass Products Pty Ltd	www.massproducts.com.au	<2,000
Metro Fabrication Pty Ltd		<2,000
Morton Steel Pty Ltd	www.mortonsteel.com.au	<2,000
Noosa Engineering & Crane Hire	neach.com.au/	<2,000
Norfab (QLD) Pty Ltd	www.norfab.com.au	<2,000

Business name	Website	Capacity
Pacific Coast Engineering	www.pcge.biz/	<2,000
Partners Engineering	www.partnerseng.com.au/	<2,000
Pierce Engineering Pty Ltd	www.pierceengineering.com.au/	<2,000
Pryde Fabrication P/L	www.prydefab.com/	<2,000
PSF QLD Pty Ltd		<2,000
Quality Assured Bolt & Steel Fabrication	qualitybolt.com.au/quality/	<2,000
Ramscope Steel Fabrications Pty Ltd	www.ramscopesteel.com.au	<2,000
SSS Manufacturing Pty Ltd	www.sssmanufacturing.com	<2,000
Stewart & Sons Steel	www.sssteel.com.au/	<2,000
Stradle Pty Ltd		<2,000
Tobin Projects Pty Ltd		<2,000
Uprite Steel Fabrications	www.upritesteel.com/	<2,000
Vancisco Industries Unit Trust	www.vanciscoindustries.com.au	<2,000
Weldfield Site Services	www.weldfield.com.au	<2,000
Widgee Engineering	www.widgeeengineering.com.au/	<2,000
Brosco Enterprises Pty Ltd	www.brosco.com.au	
Colemans Group (Aust) Pty Ltd	www.colemansgroup.com.au	
CS GAS Pty Ltd	www.csgas.com.au	
Eastcoast Development Engineering Pty Ltd		
Ford Brothers Fencing	www.fbfencing.com.au	
Global Manufacturing Group	www.gmqld.com.au	
HVAC Queensland Pty Ltd	www.hvac.com.au	
Lazco Fabrications	lazcofabrications.com.au/	
Maxworthy Fabrication P/L		
Mechanical Engineers Australia	www.mecheng.com.au	
Mineforce Australia	www.mineforce.com	
Neumann Contractors Pty Ltd	www.neumanncontractors.com.au	
PCD Steel Processing (Qld) Pty Ltd		
Piping Solutions Pty Ltd	www.pipingsolutions.com.au	
Shamrock Civil Engineering Pty Ltd	www.shamrockcivil.com.au	
Tagline Constructions	tagline.com.au/	
Team Engineering Services Pty Ltd	www.teameng.com.au	
Wasco (Australia) Pty Ltd	www.wascoenergy.com.au	
Xatech International Pty. Ltd	www.xatech.com.au	
Zined Group	www.zined.com.au	

South Australia

Business name	Website	Capacity
Ottoway Engineering Pty Ltd	www.ottowayengineering.com.au	>10,000
Ahrens Group	www.ahrens.com.au/	>10,000
Samaras Structural Engineers	samarasgroup.com	>10,000
SA Structural Pty Ltd	www.sastructural.com.au	2,000-10,000
Port Adelaide Construction	www.ptadelconst.com.au	2,000-10,000
Macweld Industries Pty Ltd	www.macweld.com.au	2,000-10,000
Bowhill Engineering Pty Ltd	www.boweng.com.au	2,000-10,000
Advanced Steel Fabrications	www.advancedsteel.com.au	2,000-10,000
S J Cheesman	sjcheesman.com.au	2,000-10,000
Stevens Structural	www.stevens-group.com.au	2,000-10,000
Tali Engineering Pty Ltd	taliengineering.com.au	2,000-10,000
Williams Metal Fabrication Pty Ltd	www.williamsmetalfab.com	<2,000
Ultimate Engineering	www.uems.com.au	<2,000
Lincoln Engineers Unit Trust	www.lincolnengineers.com.au	<2,000
Krueger Engineering Pty Ltd	www.krueng.com	<2,000
JMA Engineering	www.jmaeng.com.au	<2,000
Gant and Sons Pty Ltd	www.gantandsons.com.au	<2,000
DMK Engineering Pty Ltd	www.dmkengineering.com.au	<2,000
RC & ML Johnson Pty Ltd		<2,000
The Trustee For Quantum Sheds & Structures Unit Trust		<2,000
York Civil Investments Pty Ltd		<2,000
BGI Building Group	bgibuildinggroup.com.au	<2,000
Gadaleta Steel Fabrication Pty Ltd	www.gadaletasteel.com.au/contact.html	<2,000
Tri-metal Engineering Pty Ltd	trimetal.com.au	<2,000
SA Steelworks Pty Ltd	sasteelworks.com.au	<2,000

Western Australia

Business name	Website	Capacity
AGC Industries	www.agc-ausgroup.com	>10,000
Alloy & Pipe Specialists	www.alloyandpipe.com.au	>10,000
Bradken	www.bradken.com.au	>10,000
Civmec Construction and Engineering Pty Ltd	www.civmec.com.au	>10,000
Fremantle Steel Fabrication Co.	www.fremantlesteel.com.au	>10,000
Pacific Industrial Company (PIC)	www.pacind.com.au	>10,000
Taylors Engineering and Welding Services	www.taylorsengineering.com.au	>10,000
Transfield Services Pty Ltd	www.transfieldservices.com	>10,000
UGL Limited	www.ugllimited.com	>10,000
Alltype Engineering Pty Ltd	www.alltypeengineering.com.au	2,000-10,000
Bossong Engineering Pty Ltd	www.bossong.com.au	2,000-10,000
Cays Engineering	www.cays.com.au	2,000-10,000
CCR Group Pty Ltd	www.ccrgroup.com.au	2,000-10,000
Delta Engineering Pty.Ltd.	www.deltaen.com	2,000-10,000
Goodline	www.goodline.com.au	2,000-10,000
Hotshore Investments (MPI Engineering)		2,000-10,000
Inter-Steel Pty Ltd	www.intergroup.net.au	2,000-10,000
Italsteel W.A.	www.italsteel.com.au	2,000-10,000
Jebray Pty Ltd t/a Vale Steel Construction	www.valesteel.com.au	2,000-10,000
Metro Lintels	www.metrosteelwa.com.au	2,000-10,000
Murray Engineering Group Pty Ltd	www.murrayengineering.com.au	2,000-10,000
Perna Engineering	www.pernaengineering.com	2,000-10,000
Petroleum & Mining Engineering	www.pame.com.au	2,000-10,000
Wenco Pty Ltd	www.wenco.com.au	2,000-10,000
Allstruct Engineering		<2,000
Arch Engineering	www.archengineering.com.au	<2,000
Austline Fabrications	www.tfggroup.com.au	<2,000
Bailbro Pty Ltd (t/as Southern Steelworks)	www.southernsteelworks.com.au	<2,000
Chess (WA) Pty Ltd	www.chessindustries.com.au	<2,000
CS and JM Travia Family Trust	www.weldtechos.com.au	<2,000
EMICOL	www.emicol.com.au	<2,000
GF Engineering	www.gfengineering.com.au	<2,000
Goodwill Engineering	www.goodwillengineering.com.au	<2,000
H'var Steel Services Pty Ltd		<2,000
Level Steel Engineering and Construction	www.levelsteelconstruction.com.au	<2,000
LGM Industries Pty Ltd	www.lgmindustries.com.au	<2,000
Mentis Australia Pty Ltd	www.mentis.com.au	<2,000
MetalworkWA Pty Ltd	www.metalworkwa.com.au	<2,000
Mintrex Pty Ltd	mintrex.com.au/contact-us/	<2,000
National Lintels	www.nationalsteel.com.au	<2,000
P&A Welding Pty Ltd	www.pawelding.com.au	<2,000
RAWR Pty Ltd	www.jasmat.com.au	<2,000
Scenna Constructions	www.vectorlifting.com.au	<2,000

Business name	Website	Capacity
Uniweld Structural Co Pty Ltd		<2,000
WBS Group	www.wheatbeltsteel.com.au	<2,000
Binder Group	www.bindergrp.com	
PIHA Pty Ltd	www.piha.com.au	
SinoStruct Pty Ltd	www.sinostruct.com	
WA Cutting Services (Southern Steel Group)	www.wacutting.com.au/	

Tasmania

Business name	Website	Capacity
Haywards Steel Fabrication & Construction	www.haywards-steel.com	>10,000
Russell Allport & Co		<2,000
Dynamic Welding and Engineering Pty Ltd	www.dynamicwelding.com	<2,000

Australian Capital Territory

Business name	Website	Capacity
ACT Steelworks Pty Limited	www.actsteelworks.com.au	<2,000
Baxter Engineering Pty Ltd	www.baxterengineering.com.au	<2,000
Oz Metalwork Pty Ltd	www.ozmetalwork.com.au	<2,000

Northern Territory

Business name	Website	Capacity
Tristar Industries Pty Ltd	www.tristarindustries.com.au	>10,000
Jakes Steel & Welding Pty Ltd	www.jakessteel.com.au	<2,000

This Fabricator Listing was compiled from ASI and ProjectConnect information

5.E. Construction Modelling

Construction modelling or detailing is closely associated with Building Information Modelling (BIM). BIM uses three-dimensional, real-time, dynamic building modelling software to increase productivity in building design and construction, taking account of building geometry, spatial relationships, geography as well as quantities and properties of building materials.

Australian detailers are widely sought after and internationally recognised for application of advanced technologies and tight management with established relationships built from work in the US, Canada, East Asia, the UK and Africa. Benefits that have been realised from Australian detailers contributing to large resource infrastructure projects include:

Project schedule and cost savings

Australian-based detailers keep projects on-time and on-budget through:

- Parallel managing of design and modelling stages.
- Delay mitigation during modelling ahead of construction.
- Project efficiencies through use of advanced BIM systems.
- Construction efficiencies by developing designs that avoid extra rework.
- Applying powerful multidiscipline inspection and clash detection tools.
- Achieving efficiencies through optimising use of datacentric information.
- Maximising workloads offsite.
- Using BIM tools to mitigate construction issues like RFI management.

Improved safety

Australian detailers enhance safety during project developments by:

- Employing visualisations for training, inductions, construction sequencing and project scope to anticipate potential site hazards.
- Minimising onsite work commotion by maximising offsite preassembly.
- Deploying powerful intelligent multi-disciplined clash detection to ensure better design for more responsible construction and operating plant.

Environmental care

Steel detailers in Australia help to safeguard the environment through:

- Better planning that reduces site needs for lay-down areas.
- Facilitating improved site handling and less material wastage.

Experience and quality

Australian detailers are typically independent dedicated specialists who bring a higher level of expertise than a typical detailer associated with a fabricator. They generally have a higher level of industry experience due to the high portion of resource projects than commercial type work and this experience provides resource clients with risk mitigation by providing a more professional design verification process.

With close familiarity with advanced 3D systems, Australian detailers mitigate delays and site rectification costs.

With modularisation becoming more popular, steel supply and fabrication is typically falling on the critical path and owners are therefore engaging detailers that have high productivity rates, efficiencies and quality to mitigate typical engineering delays and maintain schedule.

Technology

One of the reasons why Australian detailers lead the implementation of BIM technologies is due to their advanced knowledge of various 3D modelling technologies as required to maintain a competitive edge against low-cost centres.

EG: *Iconstruct*

Iconstruct was developed by PDC Consultants of WA with detailing skills covering pipework, heavy mechanical equipment, conveyors and structures. The system provides new tool sets to project teams and consultants to manage construction information for various industry segments, from design engineers to construction managers, and integrate that intelligence into a single 3D model displayed in *Autodesk's Navisworks*. *iConstruct's* extended range of tool sets allow users to extract information that is required at different stages in the construction process. This enables better planning and more informed decisions. The information can also be extracted from the model and presented through a variety of flexible reporting tools which can then be disseminated and distributed to relevant stakeholders.

Australian Detailer listing

Company name	State	Website
EDC Consultants	NSW	http://www.edcgroup.com.au/
WAI Engineering	NSW	http://www.wai.com.au/
CCD Drafting Group	NSW	http://www.ccddrafting.com.au/
Elmasry	NSW	http://www.elmasry.com.au/
Jem Drafting	NSW	http://www.jembuildingdesigns.com.au/
PEA	NSW	http://www.ellsmore.com.au/
Demcox	NSW	http://www.demcox.com.au/
Australian Steel Detailers	SA	http://www.asdetailers.com.au/
ICM Integrated Construction Modelling	SA	https://integratedcm.com.au/
Horncastle Drafting	SA	https://www.horncastle.com.au/
Iron Ink Drafting	SA	http://www.ironinkdrafting.com.au/
SASTEEL	SA	http://www.sasteel.com.au/
Austruct	WA	http://www.austruct.com/
BIM Drafting	WA	https://www.bimdrafting.com.au/
CDS Structural Steel Detailing	WA	http://www.structuraldetailing.com.au/
Cadds Group	WA	https://www.cadds.com.au/
Minstruct	WA	http://www.minstruct.com.au/
Multiplan	WA	http://www.mddwa.com.au/
PDC Group	WA	http://www.pdcwa.com.au/
Universal Drafting	WA	http://www.universaldrafting.com.au/

Company name	State	Website
Westplan Drafting	WA	http://www.westplan.com.au/
Abel Drafting Services	TAS	http://www.abeldesign.com.au/
Applied	VIC	http://www.appliedsteeldesign.com.au/
Atex	VIC	http://www.atexsteel.com.au/
Baigents	VIC	http://www.baigents.com.au/
Coadata	VIC	https://coadata.com.au/
Ingen	VIC	http://www.ingen3d.com.au/
NV	VIC	http://www.nvdrafting.com.au/
Planit	VIC	http://www.planitdesign.com.au/
Steelforce	VIC	http://www.sfis.com.au/
Van der meer	VIC	http://www.vandermeer.com.au/
Xtech	VIC, WA	http://www.xtechdrafting.com.au/
Barra Steel	VIC	https://www.barrasteel.com/
Newsteel Pty Ltd	VIC	http://www.newsteel.net.au/
3D STRUCT	QLD	http://www.3dstruct.net/
BDS VirCon	QLD	http://www.bdsvircon.com/
BIMTek	QLD	http://bimtek.com.au/
Cadtech	QLD	http://www.cadtech.com.au/
Coutts Drafting	QLD	https://www.couttsdrafting.com/
Draftech Designs Pty Ltd	QLD	http://www.draftechdesigns.com.au/
Draftology P/L	QLD	http://www.draftology.com.au/
Idetail 3D	QLD	https://www.idetail3d.com.au/
Industrial Design Solutions	QLD	http://www.industrialdesignsolutions.com/
Jackson Roxborough Pty Ltd	QLD	http://jrdetailers.com.au/
JBD Steel Detailing Pty Ltd	QLD	http://www.jbdsteeldetailing.com.au/
Roberts Engineering and Drafting	QLD	http://www.robertsengineering.com.au/
Steelcad Pty Ltd	QLD	http://steelcad.com.au/
TD Drafting Services	QLD	http://www.tddrafting.com.au/
Tekcon Services Pty Ltd	QLD	https://www.tekconservices.com.au/

5.F. Hot Dip Galvanizing

Hot dip galvanizing with a history of over 180 years, commands an unrivalled reputation as a cost effective, sustainable, and efficient system of corrosion protection for steel assets. In Australia, there are examples of hot dip galvanizing that have managed to survive in the harshest conditions for over 130 years. Hot dip galvanizing is prepared off-site in controlled conditions to reduce labour costs, minimise maintenance and ensure environmental cleanliness. Lead times for hot dip galvanized structures are often significantly less than other protective coating systems. In most cases, this gives hot dip galvanizing a cheaper first cost and life cycle cost in comparison to other high-performance corrosion protection systems.

The hot dip galvanizing industry in Australia is experienced in the delivery of large infrastructure and resources projects and most of the plants offer large galvanizing baths and state-of-the-art processes by global standards. Hot dip galvanizing of steel structures for large infrastructure and process plant has become more common in recent years and this gives Australian galvanizers proven expertise in the delivery of such projects. The industry is active in global innovation and technology exchange through the Galvanizers Association of Australia (GAA). Members of the GAA have access to technical expertise on corrosion issues, case studies and are part of an international network. The GAA can also supply estimates on durability through their on-line and free durability estimator. All of this backup can be utilised by project managers and asset owners in the delivery of their projects. GAA members can provide end users and specifiers access to the independently accredited industry-wide Environmental Product Declaration (EPD) for hot dip galvanized steel. This EPD provides an opportunity to improve the sustainability claims for all projects.

The services provided by the Australian hot dip galvanizing industry include assistance in the design of steelwork and detailing to meet the requirements of superior corrosion protection including the most effective methods of venting and draining work, and designing for maximum corrosion protection through initial product design.

Due to the large distances often encountered in Australia, the hot dip galvanizing industry has developed proficiency in overcoming logistical challenges. Experience in transport coupled with the geographical distribution of the hot dip galvanizing plants (including in regional areas) gives the industry outstanding coverage and capability in meeting the requirements of all major projects.

The selection of materials for use in all industries and applications requires innovative design and selection. Infrastructure assets not only need to withstand the rigours of everyday use, they also need to reduce their economic and environmental impact by reducing maintenance

and also their environmental footprint. Designers are beginning to appreciate the fact that hot dip galvanized steel is a material with superior corrosion resistance, abrasion and mechanical resistance and environmentally friendly qualities.

Hot dip galvanizing provides a robust protective finish and minimises site work and ongoing maintenance. Its robustness and ability to withstand 'rough' handling also provides security during transport that reduces or eliminates the requirement for final dressing and touch up on site to maintain corrosion protection integrity prior to erection and installation – a significant factor when dealing with the remoteness of many Australian locations. Hot dip galvanizing and steel combine to produce a cost-effective sustainable building material that is totally recyclable and which is proven through a long list of successful local case studies, along with the independently accredited EPD.

Capability of Australian Galvanizing Industry

A conservative estimate of the capability of the Australian galvanizing industry is 67,000 tonnes per month.

This is approximately distributed regionally as below:

State	**Capacity (tonnes per month)**
Western Australia	12,300
South Australia / Northern Territory	5,500
Queensland	15,300
New South Wales	14,500
Victoria	19,400

Galvanizers Directory

Listed below are the galvanizing members of the Galvanizers Association of Australia along with their location and bath sizes (length x width x depth). **Full details are available here.**

Business	Location	Bath Size
New South Wales		
Albury Galvanizing	Jindera	9.5 x 1.5 x 2.6m
Galserv (part of Nepean Building & Infrastructure)	Yagoona	10.3 x 1.85 x 2.3m
	Coffs Harbour	8.1 x 1.38 x 1.7m
Galvatech	Padstow	9.5 x 1.5 x 2.6m
Valmont Coatings	Hexham	14.2 x 1.8 x 2.6m
	Girraween	12.5 x 1.7 x 2.4m 6.7 x 1.24 x 1.64m (centrifuge)
	Port Kembla	(depot)
Sydney Galvanizing	Prestons	Centrifuge Specialists
Northern Territory		
Darwin Galvanizing	Berrimah	10.5 x 1.5 x 2.6m
Queensland		
Australian Professional Galvanizing	Townsville	12.5 x 1.6 x 2.8m
Fero Group	Narangba	13.0 x 1.8 x 3.0m 3.0 x 1.2 x 1.5m (centrifuge)
Valmont Coatings	Carole Park	12.2 x 1.8 x 2.2m 4.5 x 1.2 x 1.6m (centrifuge)
	Pinkenba	10.2 x 1.8 x 2.2m
	Townsville	9.2 x 1.5 x 1.9m

Business	Location	Bath Size
South Australia		
Adelaide Galvanizing Industries	Cavan	9.5 x 1.3 x 2.8m
Korvest Galvanizers	Kilburn	14.0 x 1.6 x 2.2m 4.0 x 1.25 x 1.6m (centrifuge)
Tasmania		
Valmont Coatings	Launceston	6.5 x 1.05 x 1.4m
Victoria		
Furphy Galvanizing	Shepparton	8.5 x 1.5 x 2.2m
GB Galvanizing Service	Bayswater Dandenong South	9.5 x 1.8 x 2.6m 13.7 x 1.8 x 2.95m
Geelong Galvanizing	Corio	9.5 x 1.5 x 2.6m
Kingfield Galvanizing	Somerton	12.8 x 1.6 x 3.5m
Valmont Coatings	Campbellfield	12.5 x 2.0 x 2.95m 6.0 x 1.2 x 1.8m (centrifuge)
Western Australia		
Fero Group	Kewdale	15.0 x 2.2 x 3.6m 4.0 x 1.5 x 2.4m (centrifuge)
Hartway Galvanizers	Canning Vale	12.6 x 1.4 x 2.7m 3.5 x 1.0 x 1.8m (Centrifuge)
	Naval Base, WA	12.6 x 1.4 x 3.0m
MGalv	Landsdale	9.2 x 1.6 x 2.7m

5.G. Protective Coatings

Coatings are essential to protect steel substrates from the natural process of corrosion and to ensure the design life of structures is reached with minimum maintenance, cost and risk.

Annual corrosion costs in Australia are generally accepted to be between two to five percent of Australia's GDP. According to the Australasian Corrosion Association (ACA), that cost was estimated to be around $45 billion in 2018.

What is Corrosion?

There are many definitions of corrosion, however, two common ones are:

Corrosion is the deterioration of a material, (usually steel), because of a reaction with its environment.

and

The destruction of steel by an electrochemical process that is recognised by the formation of rust or pits.

These two definitions bring together the idea of an *environment* and the *electrochemical process* which are fundamental in understanding corrosion in terms of why it occurs and how it can be prevented.

Consequences of corrosion

As steel corrodes, it deteriorates as more iron oxide is produced. This causes a reduction in the steel's structural integrity in terms of its fundamental properties which make it such an ideal cost effective and reliable construction material (i.e. tensile strength, toughness and flexibility).

A good way to look at the consequence of corrosion is:

Corrosion = **Steel Metal Loss** = Reduced Steel Structure Design Life

Steel Metal Loss = Maintenance Costs

Reduced Steel Structure Design Life = **Potential for lost Revenue**

Consider steel constructions such as offshore structures, stadiums and bridges that must support the weight of extreme loadings and provide a safe working environment and the catastrophe of potential structural failure due to corrosion. What price has the loss of life?

This simple, very natural, electrochemical process can be very costly! The latest figures (2017) for the USA suggest that corrosion costs approx. $590 Billion per year!

Specifications for Major Projects

The onset of corrosion can be effectively controlled by a protective coating specification which outlines a paint system being a product or combination of products as well as appropriate surface preparation methodologies.

Consideration of the specifications at the early stages of a major project will assist in determining the most cost-effective coatings solutions for the life of the asset.

In selecting a coating system, it is important to understand the:

- Construction of a structure.
- Environment and location.
- Profile of the project and aesthetic requirements.
- Expected lifetime of the structure prior to first major maintenance.

To ensure correct specification and advice is received, certain Australian paint manufacturers can offer ACA and NACE International qualified personnel to minimise risk and costs associated with the potential onset of corrosion.

Credentials

A credible Australian paint manufacturer should hold the following accreditations:

- Quality Management System Standard: AS/NZS 9001:2000.
- APAS Recognised Manufacturer.

- NATA Accredited Laboratory ISO/IEC 17025.
- Environmental Management System Standard: AS/NZS 14001:2004.
- Health, Safety and Environment.
- Product Stewardship.

Product

Protective coating products should be tested to industry standards including NACE, ISO, NORSOK, NSF and more. Australian manufacturers should have products which follow these standards:

ISO 12944 Paints & Varnishes – Corrosion Protection of Steel Structures by protective paint systems (parts 1-8). ISO 12944 is intended to assist engineers and corrosion experts in adopting best practice in corrosion protection of structural steel at new construction.

AS 2312.1 - Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings – Part 1: Paint coatings.

Products unique for major steel projects are passive fire protection, ultra-high build epoxies, antifouling coatings, high temperature resistant systems (including under insulation), abrasive resistant coatings, tank linings, aesthetics, zinc rich coatings and maintenance coatings.

Paint products in Australia are free from lead due to local legislation.

Maintenance and Repair

Essential maintenance painting can be a costly and disruptive process. In the oil and gas industry, structures must be adequately maintained to extend life and reduce the hazards that can result from corrosion.

A comprehensive, proactive maintenance plan which identifies priority areas and specifies maintenance systems tailored individually for the asset should be in place to minimise downtime and reduce spend over the life of a project.

Regulatory Bodies

In Australia, there are recognised regulatory bodies that manage and assist the protective coatings industry, including:

Australian Paint Manufacturers' Federation (APMF)

The APMF was established in 1947 to represent the interests of Australian paint manufacturers. It was incorporated in New South Wales in 1986. Its objectives are to:

- Advance the theory and practice of paint technology in Australia.
- Promote efficiency and safe work practices.
- Foster international cooperation and standards.
- Advance, encourage and protect the interests of its members.

Australian Corrosion Association Incorporated (ACA)

The ACA is a not-for-profit, membership Association which disseminates information on corrosion and its prevention or control by providing training, seminars, conferences, publications and other activities. Ultimately to ensure corrosion is managed sustainably and cost effectively to ensure the health and safety of the community and protection of the environment and assist society to manage the impact of corrosion on asset durability.

5.H. Grating and Handrails

ASI members, Webforge and Nepean Building and Infrastructure, manufacture grating in numerous combinations of load bar depth and thickness, load bar pitch and cross rod pitch.

Load bearing bars incorporated in grating are produced from steel which conforms to the equivalent standards: AS3679, BS4360 Grade 43A and ASTM A36.

Steel grating is suited to many applications, from light-duty applications (maintenance floors, occasion usage), though light/medium duty applications (residential, light industrial occasional public usage), medium duty applications (mining and commercial, regular or medium industrial usage), heavy duty applications (heavy industrial, mining and trolleys and industrial equipment), and extra heavy-duty applications (frequent impact from trolleys).

Both companies supply a complete range of mild steel grates in compliance with the load and permanent set requirements specified in AS3996. Conformance certificates can be supplied upon request. They are also capable of custom manufacturing Mild Steel Grates and Frames to suit specific client applications and load test according to AS3996 if required.

They also have an extensive range of handrail products in compliance with Australian Standards AS1657. These handrail systems can be transported and erected economically in all applications and locations. Complete systems can be supplied, including stanchions, rails, bends, kick-plates, grating and stair treads as required.

For further information on both companies, visit:

www.webforge.com.au

www.nepean.com/

6. Quality and Standards

Australia's two fully integrated steel manufacturers Liberty and BlueScope Steel have a long and proud history of manufacturing structural steel in Australia. Both steel companies manufacture product to Australian and International Standards, providing a known level of quality with full traceability.

Over the years, the Australian Standards used for structural steel design have developed, reflecting improved understanding of material performance, structural behaviour and design processes.

Sites producing steel in Australia have a quality policy to guide process control to ensure product quality. All manufacturing facilities have quality management systems accredited to ISO 9001:2008. This accreditation is actively maintained and audited, ensuring a mature and fully functional system. Manufacturers are committed to the principles of quality assurance, thereby increasing the customers' confidence of the project being delivered to the required quality standards. Steel manufacturers are active in the development of improved product, fabrication and steel design standards. AS 4100 Steel Structures, Australia's main structural steel design, fabrication and erection standard, has been developed in conjunction with the steel manufacturers.

Australian manufactured products produced to the material standards AS 1163, AS/NZS 3678, AS/NZS 3679.1 and AS/NZS 3679.2 provided the statistical data used to calibrate the capacity factors and notch toughness defined in these standards. The quality and consistency of Australian manufactured products was recognised with prequalification of these materials to allow their use in structures without additional procedures. Therefore, Australian produced structural steel is inextricably linked to the structural and materials standards used in steel design.

In welded fabrication, statistical data associated with Australian manufactured steels was used in the calibration of standard AS/NZS 1554 Structural Steel Welding (specifically Parts 1 and 5). Control and consistency of chemistry in the Australian manufactured materials allows a large range of joint configurations to be prequalified for use without or with minimal additional weld testing necessary. Both AS4100 and AS/NZS1554.1 require the verification of steels produced to other standards or sourced from other suppliers, prior to use in design and fabrication. This may require a review of statistical data provided by the manufacturer or additional testing by the fabricator.

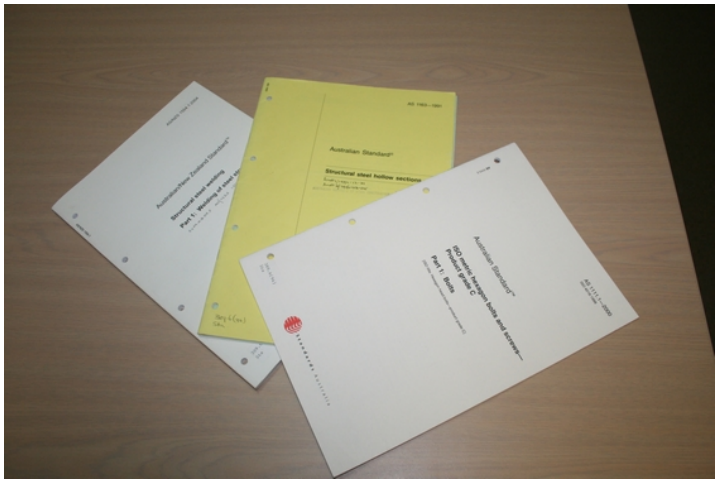
Technical expertise in standards, material, structural design and fabrication is provided by all Australian steel manufacturers. The ASI also has an extensive Library for reference and

many technical publications available from its bookshop. Assistance with specification, design and fabrication of steel products is available to members on request. Should any quality incidents arise, full technical backup of the products is provided.

All products manufactured are provided with documentary evidence of the inspection and testing performed. Laboratories used for performing these procedures have internationally recognised accreditation with the National Association of Testing Authorities (NATA) and the International Laboratory Accreditation Cooperation (ILAC). Prior to ordering, the customer can request additional testing and inspection procedures and documentation. The inspection and test documents will be supplied to the customer with the product order. In addition, the steel manufacturer archives this documentation. Products are branded with unique identification allowing traceability to the production facility linked to the manufacturing conditions for each item. All relevant product processing information is reviewed by the steel manufacturer to ensure conformance to its governing Australian Standard (as appropriate) and the results are archived for future reference.

If requested, third party product certification is available at various mills. This can incorporate factory production control (FPC) certification to ensure technical competence to produce the product and ensure continuing compliance with the provisions of the technical specification throughout the order production. FPC is a permanent internal control of production exercised by the manufacturer requiring the elements, requirements and provisions adapted by the manufacturer be documented in a systematic manner in the form of written policies and procedures. The FPC takes into account the process of the related production line from the raw material to finished product and storage of the product.

Assurance of total commitment to quality is backed up by ensuring that the manufacture of steel products is carried out in facilities with certified environmental (ISO 14001 compliance) and world-leading OH&S performance.



National Structural Steelwork Compliance Scheme

The supply of an unacceptable degree of non-conforming, unsuitable and often-faulty building products is increasingly being seen in building, infrastructure and resources projects in Australia, ranging from small local developments to major projects involving international teams.

Image courtesy Structural Challenge.

A 2013 Australian Industry Group (AiG) survey reported that **95% of respondents surveyed in the steel product sector reported non-conforming product in their supply chain**.

While our Standards suite in general, and AS/NZS 5131 in particular, provide a technically sound foundation, and the National Structural Steelwork Specification (NSSS) provides a robust implementation of AS/NZS 5131 in project process, the checking and auditing of deliverables is vitally important to achieve the quality and risk-minimised outcomes our community expects and our regulatory system requires.

Unfortunately, it is not straightforward to properly check the deliverables from the steel fabrication or erection process. Documentation requirements are substantial (as would be expected) and many processes such as welding are considered ‘special processes’,

meaning the outputs cannot be readily checked without destroying the component. Hence, the inputs must be controlled and managed to ensure fit-for-purpose outcomes.

The ASI developed the **National Structural Steelwork Compliance Scheme (NSSCS)** to help manage and control the fabrication and erection process, hence ensuring fit-for-purpose deliverables. Industry association-led compliance schemes are commonplace in the UK, US, Canada and Europe. In Europe there is, in addition, a legislated mandatory construction products regulation. New Zealand has joined Australia in developing an industry-led compliance scheme based on AS/NZS 5131.

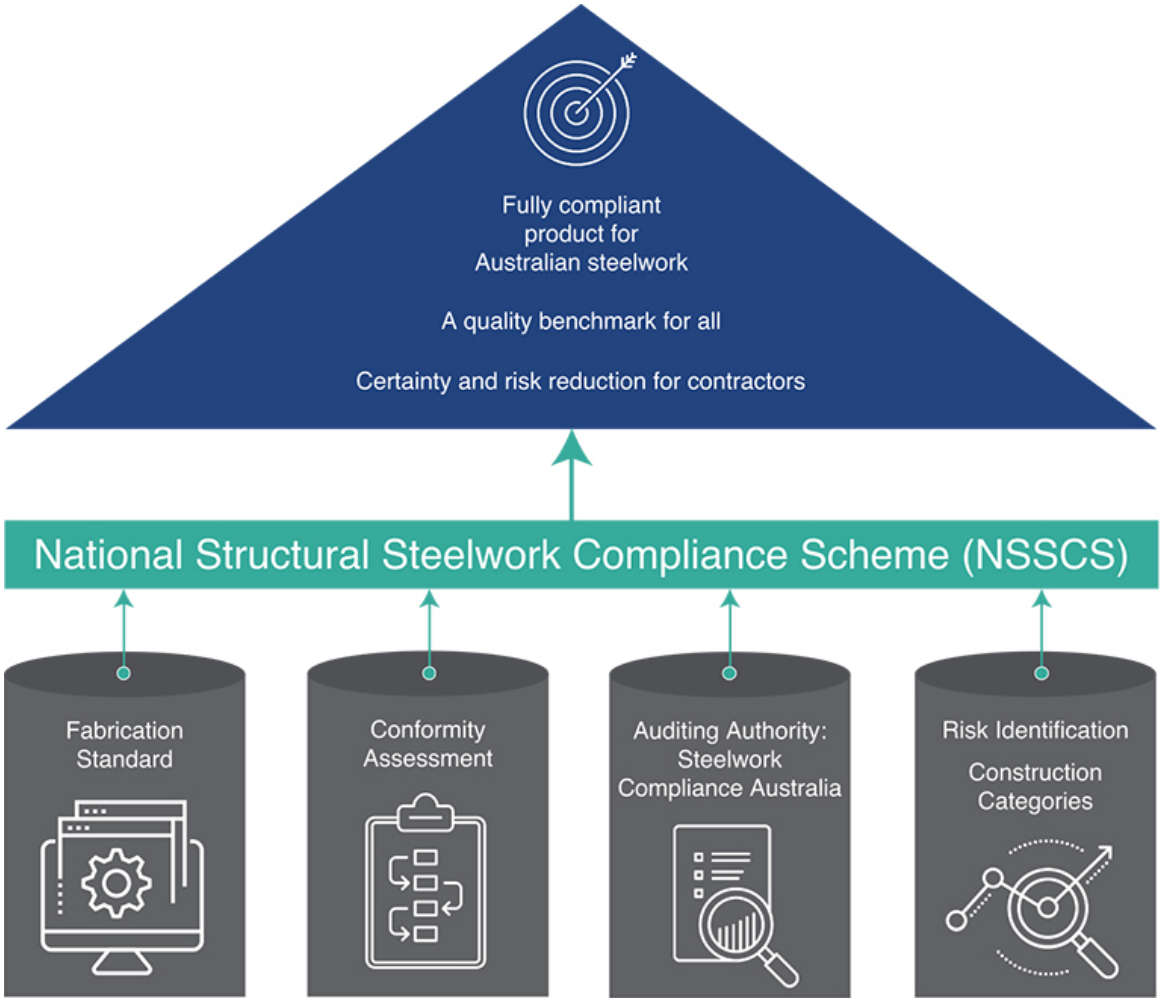
Scope of the NSSCS

The ASI NSSCS is an independent third-party quality compliance and certification system for supply, fabrication and erection of structural steelwork in Australia. The technical basis for the NSSCS is founded on AS/NZS 5131 Structural steelwork – Fabrication and erection and is applicable to structures designed to AS 4100 (structural steelwork), AS 5100.6 (bridges) and supporting Australian Standards, including those for welding, bolting and corrosion protection.

Structure of the Scheme

The NSSCS comprises four supporting pillars:

- AS/NZS 5131 as the technical foundation;
- Risk assessment and engineer selection of the Construction Category for the particular project;
- Conformity assessment to the requirements of AS/NZS 5131;
- Auditing and certification of fabricators to one of the Construction Categories through the separate body Steelwork Compliance Australia (SCA).



The NSSCS in project process

For engineers:

- Engineer designs the structure and creates the specification, ideally using the NSSS as template;
- Specification calls up AS/NZS 5131, Construction Category and project-specific selections.

For fabricators and erectors:

- Undertake a web-based audit with Steelwork Compliance Australia (SCA) to establish current level of conformity;
- If needed, work with ASI and accredited trainers to fill any gaps;

- Obtain SCA certification via an audit;
- Maintain certification with annual audits.

For builders:

- Client/builder selects fabricator, who works to requirements in AS/NZS 5131;
- Best outcomes with a fabricator independently certified by Steelwork Compliance Australia (SCA) under the NSSCS.

For building certifiers:

- Requires engineer to provide confirmation of review against full requirements of Australian Standards;
- Independently audits and approves basis of documentation from engineer;
- Confirms fabricator certified under NSSCS, or;
- Performs detailed review of supply chain documentation.

NSSCS and JAS ANZ accreditation

Responding to market demands particularly in the Government sector, for independent accreditation of the Scheme, ASI is working towards having the Scheme accredited under JAS ANZ.

ShedSafe

ShedSafe® promotes Australian-manufactured steel products used in construction of cold-formed shed structures, such as sheds and garages and promotes steel shed industry compliance in the design, supply and construction principally of those types of structures.

This is achieved by pursuing portable building compliance with Australian Standards (Building Code of Australia) and developing documentation formats that conform to local government and certifier requirements. Achieving industry compliance is linked to improving the credibility and sustainability of the industry.

The ShedSafe was formed as a representative group for the shed industry to:

- ensure that buildings comply with all relevant Australian standards;
- improve credibility and sustainability for the steel shed industry;
- have shed designs / documentation that conform to local government requirements.

ShedSafe works towards the promotion of Australian-manufactured steel products and Australian capability in the efficient design, supply and construction of cold-formed shed structures. It provides an independent industry forum for awareness, code position representation, government lobbying, industry education and technical representation, presentations and seminars. Membership consists of a broad range of shed manufacturers, roll-forming companies and industry suppliers. ShedSafe also guarantees that members have undergone ShedSafe training and submit to regular reviews of the manufacturer's design principles and processes. More information is available at the **ShedSafe** website.

7. Welding and Testing

Welding is an economical method of joining materials, enabling transmission of large critical loads which may be static and/or dynamic under various conditions (high/low temperature, etc). The welding and related testing industry in Australia is highly sophisticated and is on par, if not exceeds the service requirements and outputs of many similar industries around the world. Industrial applications in Australia are well serviced by specialist and general welding and testing contractors including experienced and qualified structural steel fabricators, boilermakers, pressure piping and mechanical contractors. Such contractors have been successfully engaged in many and various complex and high-profile welding applications both in Australia and abroad.

Complex and economical welded fabrication has been readily achieved with Australian welding contractors. Such positive outcomes have been due to rigorous welding, certification, testing and inspection as embraced by the local industry via Standards Australia, International Institute of Welding (IIW), International Standards Organisation (ISO) and other national standards (ASME, etc). The development and utilisation of such standards has taken place for many years.

Australian welding and related testing contractors generally have third-party certification to ISO 9001 and other relative certification for their specialist areas.

The evolution of much of the welding and testing standards used in Australia are based on many years of ongoing calibration with welding and inspection processes, personnel, equipment, consumables and materials with the correlation to design assumptions. Such has been the success that should welding contractors use such standards, their testing and compliance requirements are significantly minimised.

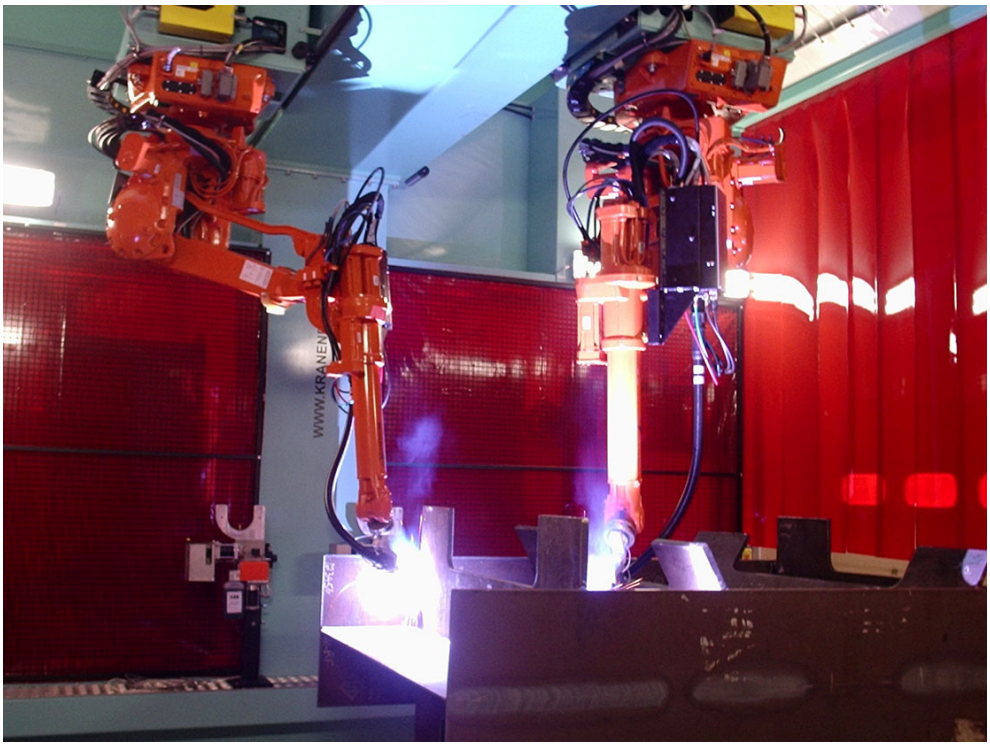
In welded fabrication, statistical data associated with Australian manufactured steels are used in the calibration of standard AS/NZS 1554 Structural Steel Welding (specifically Parts 1 and 5). Control and consistency of chemistry in the Australian manufactured materials allows a large range of joint configurations to be deemed pre-prequalified for end-use without or with minimal additional weld testing necessary. Both AS 4100 (design) and AS/NZS 1554 (welding) require the verification of steels produced to other standards or sourced from other suppliers, prior to use in design and fabrication. This may require a review of statistical data provided by the manufacturer or additional testing by the fabricator. Hence, the use of Australian welding contractors and their sophisticated welding standards helps to reduce the risk of non-compliance in this area.

Further support for addressing Australian welding, testing and inspection issues can be readily obtained from the:

- Weld Australia (WTIA).
- Australian Steel Institute (ASI).
- Australian steelmaking and finished steel manufacturing companies, BlueScope Steel and Liberty.

This backup includes assistance in standards, materials, structural design and fabrication. Should any quality incidents arise, full technical support of the products is provided.

Coupled with cost effectiveness, embracing Australian welding and related testing contractors increases confidence in such critical areas as welding and testing. The success of the industry in such areas over many years further validates this situation.



8. Steel reinforcing

About Steel Reinforcement Institute of Australia

The Steel Reinforcement Institute of Australia (SRIA) is a national non-profit organisation providing a high-quality technical support and information service to the Australian building industry on the use of reinforcing steel in concrete, primarily reinforcing bar (Rebar) and reinforcing mesh (Reomesh). SRIA is funded and supported by the vast majority of the manufacturers and suppliers of steel reinforcing used in Australian construction. The SRIA offers practical solutions to meet the diverse and ever-changing needs of the Australian building industry. The organisation actively supports and encourages the use of Australian capability and quality in the processing and use of reinforcing steel in concrete in an increasingly competitive global market.

SRIA Processor Members

SRIA Processor Members are established Australian companies responsible for subsequent processing of reinforcing steel supplied by a steel producer in Australia or from overseas which significantly changes the shape and properties of the steel. They are processors of steel reinforcement in Australia, meet recognised technical standards and keep production and financial records. Processors provide the market with a one-stop processing shop or fabrication of steel reinforcement to AS 3600, AS 5100 and AS 2870 in compliance with the relevant Australian Standard AS/NZS 4671:2001 *Steel reinforcing materials*. Steel reinforcing is often packaged with a range of complementary products supplied by SRIA Associate members.

SRIA Associate Members

SRIA Associate members (Accessories Suppliers, Machinery Suppliers and Steel Mills) are established Australian and International companies who have aims and objectives similar to those of SRIA. They strive for quality and compliance with the relevant standards, maintain quality assurance and implement workplace health and safety. They service Processor Members through supply of ancillary products providing the end user with a complete solution, supply of steel reinforcing feed materials to processors or processing equipment. SRIA Processor members commonly package in-house a range of Associate Member complementary products for delivery of a complete steel reinforcing solution.

Quality Assurance and Traceability

SRIA Processor members strive for compliance with the relevant standards that apply to the reinforcement industry and this professionalism is demonstrated in one of two ways:

a *Third-Party Product Quality Certification to AS/NZS 4671 and AS 3600*

ACRS certification will satisfy this criterion but this is not exclusive.

b *Documented Quality Management System plus Authority Product Approvals*

The ISO 9000 family of standards for quality management systems plus multiple product approvals from State and/or Federal Government Construction Authorities.

Mill Feed Materials

SRIA processors purchase their feed materials from quality Australian and overseas mills. A list of third-party accredited mills can be found at www.acrs.net.au.

Capability – Tonnage and Footprint

The combined industry capacity of all SRIA Processor members is in excess of 1.5 million tonnes per annum of steel reinforcing supplied into resource, engineering construction, commercial and residential projects. This comprises both cut and bent reinforcing bar or manufactured reinforcing mesh. SRIA Member companies source, schedule, process and distribute packaged solutions to meet clients' procurement strategies and project plans.

The SRIA Processor footprint spreads across all states of Australia providing a reliable and efficient just-in-time supply chain. Steel reinforcing traditionally has very short lead times measured in hours to days. Members understand the customer needs and the importance of service and delivery performance on the project plan. SRIA Members efficiently control and manage risk in reinforcement supply. Engaging the professional members of the supply chain will turn potential risk into opportunity. With early SRIA processor member involvement on major and often the more remote projects, customers can confidently build in these shorter lead times after the issuing of final construction documentation.

Sustainability

The SRIA promotes a program of steel stewardship, seeking to engage the whole steel reinforcement supply chain in adopting more environmentally sustainable practices. SRIA Processor Members have an Environmental Sustainability Policy (ESP) encompassing the industry's environmental, social and economic performance. This is a continual process of benchmarking, monitoring and measuring progress. The SRIA has established and

maintains global networks to deliver improvement programs in responsible Best Practice to the local steel reinforcing sector.

Workplace Health and Safety

The SRIA promotes industry wellbeing and a safe and healthy working environment. The SRIA records trend data and monitors national industry statistics on lost time injuries (LTIs) and medically treated injuries (MTIs), from participating Processor members. This data enables each company to compare and benchmark their safety record against the national industry values for continuous improvement of their Safety Policy or Safety Management System. Consistent improvement and performance are a reflection of the safety conscious companies the SRIA represents. The ultimate aim is to achieve an accident free workplace with zero harm to all steel reinforcing industry employees and contractors.

The SRIA National Safety Group meets quarterly around the country at member's manufacturing premises. This group comprises the Safety Managers from each member Processor company and is chaired by SRIA's Executive Director. Members work together to share their collective knowledge to ensure the member companies have a consistent approach toward a safer work environment and awareness of safety issues within the reinforcement processing industry.

Standards

SRIA Processors benchmark both locally and internationally to sustain world's Best Practice across design, specification, production and supply. The SRIA Membership strives to achieve quality and continuous improvement and is actively involved in Standards Australia, with representation on the following Committees:

BD-002 Concrete structures (AS 3600)
WD-003 Welding of structures (AS 2214)
BD-006 Structural design actions (AS 1170)
BD-025 Residential slabs and footings (AS 2870)
BD-066 Tilt-up concrete construction (AS 3850)
BD-084 Steel reinforcing materials (AS/NZS 4671)
BD-090 Bridge design (AS 5100)
BD-098 Pavements

Leaders in Reinforcing Steel Processing

Processor Member	Capability Details
Active Steel	www.activesteel.com.au/
AKZ Reinforcing	http://www.akz.com.au/
ARC - The Australian Reinforcing Company	www.arcreo.com.au
Ausreo	www.ausreo.com.au
Best Bar Reinforcements	https://www.bestbar.com.au/
Bianco Reinforcing	https://www.bianco.com.au/
Mesh & Bar	www.meshbar.com.au/
NatSteel Australia	www.natsteel.com.au/
Neumann Steel	www.neumannsteel.com.au
Liberty Reinforcing	https://www.libertygfg.com/
VicMesh	www.vicmesh.com.au
Wire Industries	http://www.wireind.com.au/contact

Leaders in Reinforcing Steel Accessories Supply

Accessories Supplier Member	Capability Details
Ancon	https://www.ancon.com.au/
aSa Australia - Applied Systems Associates	https://www.asahq.com/
Connolly Key Joint	https://www.connollykeyjoint.com/
Danley Construction Products	https://www.danley.com.au/
Erico Products Australia	https://www.erico.com/default.asp
Modfix	http://www.modfix.com.au/
Reid Construction Systems	https://reid.com.au/

For further information visit the SRIA website at www.sria.com.au

9. Whole of industry cooperation

Working together

The steel value chain has a long and successful history of cooperation and banding together to get the job done in the most efficient way. The value chain is strongly linked from manufacturer to distributor to fabricator as customers and suppliers, each of whom works seamlessly with the various other associated links including, engineers, architects, design detailers, painters, galvanizers, erectors and others to ensure that a solution is delivered to the satisfaction of the end-user.

The ASI has long established links with a number of key industry bodies that support the steel industry including; Engineers Australia, the Architects Institute of Australia, the Australian Industry Group, the Building Products Industry Council, and other key associations who interact with the steel industry.

The ASI and the industry in general also work closely with the trade unions that work within the steel sector including the Australian Workers Union, Australian Metal Workers Union, National Union of Workers and the Construction Forestry Mining and Energy Union.

Building Products Industry Council

The Building Products Industry Council (**BPIC**) is the national body representing Australia's building product associations who support Australia's building product manufacturers and suppliers. BPIC's members and associated member companies directly employ over 200,000 Australians with more than 470,000 employed indirectly. Their collective industries are worth over $54 billion annually to the Australian economy.

The Council's prime objective is to provide unified and coordinated representation of the building products industry to Government and regulators while providing a forum for discussion and information sharing between manufacturers.

BPIC's mission is to promote the most efficient and innovative use of building products within a nationally consistent regulatory environment and regards the Building Code of Australia as the pre-eminent national regulatory framework for building.

The Council works to fulfil this aim by sourcing and delivering practical and current industry information to regulators on behalf of its members. This industry-wide approach to responding to codes and standards helps to ensure all levels of government hear a unified voice when changes are proposed that will affect Australia’s building product manufacturing and supply industries.

BPIC works to ensure the regulatory framework supports a viable and efficient building products industry in Australia, recognising that this extends beyond Australia to the global market for building materials. BPIC also encourages investment in skills formation, product development and industry research by helping to identify and remove regulatory impediments to innovation. They participate in research into technical codes, standards and regulations as well as matters of mutual interest to the building products industry. The Council is governed by a Board of Directors comprising representatives from the member organisations.

10. Industry Participation Plans and Local Content Procurement

Australia has a range of Federal and State Government legislative frameworks in place designed to encourage the creation of local jobs in association with major project investment. These frameworks apply principally to large government funded one-off projects such as transport infrastructure or recurrent spending on items such as public buildings e.g. hospitals, gaols, schools.

Federal Government

Australian industry participation

Australian Industry Participation (AIP) requirements ensure full, fair and reasonable opportunity for Australian industry to compete for work. This includes work in major public and private projects in Australia, and procurements or projects receiving Australian Government funding of $20 million or more.

The Australian Industry Participation National Framework commits the Australian Government and state and territory governments to adopting a consistent national approach to maximise Australian industry participation in major projects in Australia and overseas. Each jurisdiction also has its own industry participation policies aimed at increasing Australian industry participation.

Legislation

The Australian Jobs Act 2013 (the Jobs Act) requires proponents of major projects with capital expenditure of $500 million or more to provide opportunity for Australian industry to bid to supply key goods and services.

Australian Industry Participation Authority

The AIP Authority:

- provides guidance on the obligations under the Jobs Act, including if and when an AIP plan is required;
- can assist with development of an AIP plan;
- approves AIP plans;
- publishes AIP plan summaries;

- provides guidance on how to report against your implemented AIP plan;
- monitors and enforces compliance with the Jobs Act.

The Guidelines for Jobs Act Compliance Monitoring and Enforcement detail the compliance process.

Australian Industry Participation plans

AIP plan requirements are applied to:

- major public and private projects with capital expenditure of $500 million or more;
- Australian Government procurements of $20 million or more;
- Australian Government grants of $20 million or more;
- Australian Government payments of $20 million or more to state and territory governments for large infrastructure projects;
- investments from the Clean Energy Finance Corporation and Northern Australia Infrastructure Facility of $20 million or more.

State Governments

New South Wales

NSW Government Small and Medium Enterprise and Regional Procurement Policy

The policy is designed to increase participation of SMEs and regional businesses in government procurement of goods and services, **excluding construction procurement**, through a range of initiatives, including:

- Making it easier to buy from small businesses for values up to $50,000
- Making it easier to buy from SMEs for values up to $250,000
- Making it easier to engage SMEs to do proof-of-concept testing or outcome-based trials valued up to $1,000,000
- Considering SME participation in all procurements valued above $3 million through a new evaluation criteria.

SME First

Where a government agency is permitted to directly purchase goods and/or services from a supplier, or directly negotiate with a supplier to provide goods and/or services, the agency must first consider purchasing from an SME. This initiative applies to all direct

procurements, including from prequalification schemes and panels, up to a maximum value of $250,000.

SME and sustainability criteria

For all procurements valued above $3 million, agencies must include a non- price evaluation criteria of at least 15 per cent, which considers how potential suppliers will support the government's economic, ethical, environmental and social priorities of which a minimum of 10 per cent must be allocated to SME participation consistent with relevant exemptions in IPAs.

For procurements valued at less than $3 million, where an agency seeks more than one quote, agencies are encouraged to include a non-price evaluation criteria that addresses these government priorities. The SME and sustainability criteria must be applied to all government procurement arrangements where the total cost is estimated to be more than $3 million.

Queensland

Queensland Government Charter for Local Content

This charter aims to provide all businesses with full, fair and reasonable opportunities to tender for Queensland Government procurements. The Queensland Charter for Local Content and Agency Guidelines are designed to support government agencies to incorporate the principles of the charter into their procurement processes and procedures. Additionally, the Queensland Charter for Local Content Tenderers Guidelines has been designed to assist managing contractors delivering projects for the Queensland Government that fall within the charter.

Local Benefits Test

This forms part of Queensland Government Procurement Policy and is administered by the Queensland Department of Housing & Public Works. The Queensland Government Procurement Strategy provides more details.

South Australia

Industry Participation Policy

The South Australian Industry Participation Policy (SAIPP), which was revised in March 2018, is the high-level framework for delivery of the requirements of section 4 of the Industry Advocate Act 2017 including promoting:

- government expenditure that results in economic development for South Australia;
- value for money in public expenditure;
- the economic development of the steel industry and other strategically important industries for South Australia; and
- capable businesses based in South Australia being given full, fair and reasonable opportunity to tender and participate in government contracts.

The Policy has effect on the following Government of South Australia expenditure:

- Procurement of goods and services including infrastructure and construction.
- Public Private Partnership projects to which the SA Government is a party.
- Federally-funded infrastructure and construction projects managed by the Government of South Australia.
- Private sector projects receiving significant Government of South Australia monetary support or value-in-kind.
- Grants to the private sector.

Steel Industry Plan

The SA Steel Industry Plan was created in 2017. The key elements of the SA Steel Plan under the SAIPP are:

- All steel content must meet Australian Standards under ACRS (Australian Certification Authority for Reinforcing Structural steel);
- The OIA stipulate they have a steel surveillance program for Government projects;
- All steelwork fabricators must be certified to the relevant Construction Category in accord with NSSCS (SCA Compliance program);
- SA Government has mandated the use of certified Australian Standard steel in all tax payer funded projects.

RGAs must seek at least one quote from SA based businesses for any Government procurement over $33k. An IPP Plan needs to be completed and signed off for all projects over $4 million.

Industry Advocate Act

The Industry Advocate Act provides the Industry Advocate with the ability to recommend reforms to State Government procurement practices and ensure commitments made by contractors through Industry Participation Plans are acted upon. The Office of Industry Advocate (OIA) monitors compliance of the SA Steel Procurement Policy on steel purchases for State Government projects.

The Act sets out the objectives of the South Australian Industry Participation Policy and confirms the South Australian Government's commitment to the establishment and maintenance of the policy. It also establishes the Industry Advocate as a statutory position with specific functions and powers to further the objectives of the South Australian Industry Participation Policy.

Tasmania

Industry Participation Plans

Tasmanian Industry Participation Plans (TIPP) are strategic documents aimed at improving opportunities for local SME businesses in Government funded or resourced projects.

Agencies request suppliers to provide a TIPP when a procurement process for the purchase of goods, services or construction is valued over predetermined thresholds or where the Head of an Agency, at their discretion, has determined one is required. The threshold values apply to:

- procurements valued at over $5 million; or
- procurements valued at over $2 million up to, and including, $5 million, where the Head of Agency, at their discretion, has determined that a TIPP is required.

A TIPP is also required from proponents of private sector projects valued at over $5 million that receive support, including in-kind support, valued at or greater than $500 000 from the Government. The Plan must be approved before the project proponent enters into relevant procurement arrangements.

Information on when a TIPP is required and approved TIPPs (or executive summaries) for all agencies, including Treasury, are located on the Purchasing website at Industry Participation Plans (IPP)

Victoria

The Victoria Government's local jobs policies came into law in August 2018 with the passing of the *Victorian Industry Participation Policy (Local Jobs First) Amendment Bill*. The Bill mandates minimum local content on major projects, including a 90 per cent minimum on construction projects. It is closely associated with the Victorian Industry Participation Policy and the Major Projects Skills Guarantee.

The legislation also establishes the Local Jobs First Commissioner, who will advocate for businesses and workers, so they get a greater share of government projects. The Commissioner will also oversee compliance of local content and workforce commitments. Part of the Bill includes reforms to industry participation including reducing the Strategic Projects threshold from $100 million to $50 million. Local Jobs First applies to the full range of government goods, services and construction activities that meet the financial criteria. The policy applies to all Victorian Government departments and agencies, as well as contractors delivering or supplying into Victorian Government projects. For more information, visit www.localjobsfirst.vic.gov.au.

Victorian Industry Participation Policy (VIPP)

VIPP improves opportunities for local suppliers to compete for work on all types of government contracts, helping to create and sustain opportunities for Victorian businesses and workers. This policy is about local industry development. More information on how VIPP works for suppliers can be found at www.localjobsfirst.vic.gov.au/industry-guidance/supplier-guidelines

Major Projects Skills Guarantee (MPSG)

MPSG gives focus to providing opportunities to Victorian apprentices, trainees and cadets to work on high value government construction projects. This policy is about growing the next generation of skilled workers in Victoria.

Western Australia

The WA State Government's Plan for Jobs outlined a number of strategies to create a more vibrant and diversified economy during a time of transition in resource investment and slowing in the residential building sector. One of the priority strategies was to ensure the $27

billion spent annually on State Government procurement supported local industry and retained or created new jobs for Western Australians.

To support this strategy, the *Western Australian Jobs Act 2017* (WA Jobs Act) was passed on 7 December 2017. Following this, the Western Australian Industry Participation Strategy (WAIPS) was developed to give effect to the objectives within the WA Jobs Act.

Legislation which encourages the use of local industry participation, is being progressed on another of the Plan for Jobs priority initiatives in the Local Jobs Bill. The intention of this Bill is to ensure benefits from major projects within the Mining, Construction and Oil and Gas industry sectors flow through to local business, essentially creating more jobs and business opportunities for West Australians. The Bill aims to maximise local content across private sector infrastructure and resources projects within the State and will be developed in line with the principles of providing a full, fair and reasonable opportunity to WA based businesses.

A central feature of this approach will be the inclusion of Skilled Work Agreements which will outline a project's potential employment, skilling and contractual opportunities. The ASI has an MOU with the WA Government Department of Jobs, Tourism, Skills and Innovation, and is well placed to assist in understanding state requirements for industry participation and local content.

WA Industry Participation plans

https://industrylink.wa.gov.au/about/western-australian-industry-participation-strategy

There is financial support available to assist with meeting certification to the National Structural Steelwork Compliance Scheme.

11. Logistics

Steel Industry Logistics Safety

Australian Steel Industry Logistics Safety Code

The Australian Steel Industry Logistics Safety Code (ASI LSC) is designed to ensure that all participants are aware of their responsibilities in the supply chain when they control or influence the safe and legal carriage of freight.

The purpose of the Code is to provide guidance to the Australian Steel Industry in relation to:

- controlling, managing, operating and auditing of Heavy Vehicle road transport freight movements;
- minimising the risk along the steel supply chain associated with freight movements;
- complying with the Chain of Responsibility legislation, which imposes liability for Heavy Vehicle offences on all people and/or businesses whose actions, inactions or demands influence conduct on the road as well as on-road parties such as drivers and carriers.

Chain of Responsibility (CoR)

The Heavy Vehicle National Law (HVNL) prescribes certain requirements and obligations to ensure compliance and safety for all parties in the transport supply chain. The Chain of Responsibility (CoR) laws within the HVNL also outline a requirement to have safety systems and controls in your operations to identify, assess and manage risks as they relate to your business and activities within the supply chain. Through a series of practical questions, the CoR Gap Assessment Tool enables you to examine your business practices and systems controls against known risks and recognised best practice.

Australian Logistics Council

This website provides guidance tools and links including load restraint, time slot and queueing principles and other logistics-related information.

Off-site Fabrication

Fabrication is the process used to manufacture steelwork components that will, when assembled and joined, form a complete frame or structure. The frame generally uses readily available standard sections that are purchased from the steel manufacturer or steel distributor, together with such items as protective coatings and bolts from other specialist suppliers.

Although a wide range of section shapes and sizes are produced, the designer may find that the required section size is not available. In this case, built-up plate girders may be fabricated from steel plate. Sections and plate girders may also be strengthened by stiffening the web or flanges depending upon the load to be carried.

Most modern steelwork fabrication shops have computer-aided design and detailing (CAD), which is linked directly to factory floor computer numerically controlled (CNC) machinery, creating a genuine seamless CAD/CAM environment. The accuracy of the computer-generated details being transmitted directly to the CNC machinery increases the quality standards of production. Fabrication is an important component of the evolving innovative digital construction process that is currently underway, improving speed, accuracy and safety for the complete supply chain.

Erection

Planning for erection should start at the very beginning of the design process. Such planning should consider the construction sequence, the design factors that affect buildability and site practice in terms of typical erection plant.

In the broader design and planning context, there are three planning factors that affect the buildability of steel structures:

1. **Practical erection sequence**: the location of both temporary and permanent bracing systems or other means of maintaining structural equilibrium are crucial here;
2. **Simplicity of assembly**: simply assembled connections are the main factor here;
3. **Logical trade sequences**: which will affect the development of the master contract programme as the pre-tender plan metamorphoses into the construction plan.

Steelwork erection must also focus on workplace health and safety. The ASI has worked closely with Brookfield Multiplex to produce the Practical Guide to Planning the Safe Erection of Steel Structures. This Guide sets out practical guidance for the erection of multi-element steel structures.

12. Work Health and Safety

Overview

Heavy industrial processes, such as many of those involved in the steel supply chain, carry with them some level of inherent risk. However, those risks are manageable and with proper process and attention to detail, the industry can move 'towards zero harm'.

The ASI believes that all injuries can be prevented and it is the responsibility of every single person in the supply chain, from those on the shop floor to those in upper management and boardrooms to exercise their duty of care to ensure that every single worker comes home safely to their families at the end of their work day.

The ASI is committed to working with our members in the steel supply chain and the industries that we serve to continually and unrelentingly improve safety performance through a range of initiatives, including the following:

- Awareness of best practice safety performance
- Promotion and reward for demonstrable improved safety outcomes
- Education and training
- Issue specific direct engagement utilising targeted safety groups
- Workplace Health and Safety alignment
- Safety alerts.

The ASI welcomes participation from industry through joining groups and providing feedback and information that will assist the supply chain to work safely together.

Workplace health and safety principles

The principles we apply, and we expect the industry to apply, mirror the Worldsteel Association health and safety principles. These principles are as follows:

1. All injuries and work-related illness can and must be prevented
2. Managers are responsible and accountable for safety and health performance
3. Employee engagement and training is essential
4. Working safely is a condition of employment
5. Excellence in safety and health drives excellent business results
6. Safety and health are integrated into all business management processes.

Solutions and tools

The ASI provides support to industry with a number of specific safety-related initiatives, including:

Steel industry logistics safety

Loading, transport and unloading of steel and fabricated steelwork components presents challenging logistical and safety issues. The ASI has been actively involved with a range of initiatives in this area, including:

- Chain of Responsibility (CoR) legislation
- ASI Logistics Safety Guides
- Loading, unloading exclusion zones
- Australian steel industry Logistics Safety Code and Master Code
- Australian Logistics Council
- Steel transport safety network
- Logistics Safety & Environment awards.

National Health & Safety Committee

The National Health & Safety Committee consists of ASI member company professionals and aims to cultivate a healthier and safer steel industry through promotion and education support. The National H&S Committee engages the State Safety groups to comment and assist with health and safety programs and activities.

Health and Safety Excellence Awards

The Health and Safety Excellence Awards are an initiative of the ASI National Safety Committee to recognise steel industry companies and individuals for high achievements in health and safety, innovation in equipment and process improvements.

Workplace Health and Safety (WHS) Regulation

We engage regularly with State WHS regulators and have a range of information and support material available to help you understand your ‘duty of care’ and the shared responsibility the steel supply chain has for safe compliant outcomes.

13. Environment and Sustainability

Sustainable development is a worldwide priority. Through efficient use of resources, intelligent design of products and their uses, and reduction of greenhouse emissions and water use, the Australian steel industry seeks to lower the impact of climate change.

Steel is the world's most important engineering and construction material that underpins almost every aspect of our lives – buildings, transport, infrastructure, home appliances and lifestyle goods. It can be recycled again and again.

The steel industry has made immense efforts to limit environmental pollution in the last decades. Producing one tonne of steel today requires just 40% of the energy it did in 1960 (worldsteel, 2018).

Sustainable futures are predicated on innovation. Flexibility, innovation, collaboration and communication are fundamental to an environmentally sustainable future for steel manufacturing specifically and the steel supply chain in general. Australian industry understands that it must invest in more productive and efficient practices and embrace innovation.

There are three primary focus areas that can help us move towards a true circular economy:

Responsible steelmaking

Environmentally aware steelwork fabrication and processing

Steel as environmentally responsible design solution

Opportunities for sustainability

We have a clear mandate from our community and the opportunity to promote a cleaner and healthier environment by working together towards improving the environmental sustainability of the entire steel supply chain, from steelmaking and construction to recycling and reuse, implementing innovative technology and best practice sustainable design.

We have the responsibility to our and future generations to set in place the solutions and tools that enable improved performance and reduced environmental impact, moving towards a life cycle perspective and what we think of as a circular economy.

Solutions and Tools

Our industry and the ASI have taken responsibility to create and provide the solutions and tools to help action the circular economy for steel and the fundamental principles of reduce, reuse, remanufacture and recycle.

Steel's natural characteristics make it a great sustainable choice in terms of its almost endless recyclability, the ability to futureproof structures to be modified or extended later, the reuse of steel sections and the option to design in high-strength steel to reduce mass, to name a few.

The ASI believes that innovation is of key importance and that we must learn and share ideas with our peers both locally and internationally. To enable sharing and cooperation among all sectors of the industry and with universities and research hubs, the ASI has underwritten the development of the new ASI Steel Innovation Portal. Head to the portal and explore the many innovative steel solutions under current development that will help us move towards a more sustainable future.

ASI Environmental Sustainability Charter

Established in collaboration with the Green Building Council of Australia (GBCA), the ASI Environmental Sustainability Charter (ESC) has been able to drive meaningful improvement in the environmental footprint of its certified steelwork fabrication companies.

The ESC was set up by the ASI in 2011 to fulfil the need to create a mechanism for construction companies to determine and identify a sustainable steelwork supplier. It also provides a tool for fabrication companies to demonstrate their commitment to reducing their environmental footprint and to work towards this in a continuous and structured way.

Charter-certified fabricators can be used in projects by regulators, environmental rating bodies like the GBCA (Green Star), state authorities such as rail and road, and any other body wanting to demonstrate environmental improvement in their project through their contracting process.

Charter membership is designed for downstream steel enterprises associated with steelwork fabrication or processing, demonstrates a company's commitment to environmental improvement and is of particular importance where a company is required to achieve an accreditation as a contractual requirement. This commitment is audited and certified once a year by an ASI nominated auditor.

Any company applying for ESC certification must operate a structural steelwork fabrication or processing facility in Australia.

A GBCA building project can gain a point towards its Green Star rating by the use of an ESC-certified steelwork fabricator (ref. GBCA Mat-5). This provides reassurance to the constructor that steelwork is being fabricated by leaders in the environmental sustainability field.

Resources

Infrastructure Sustainability Council of Australia (formerly AGIC)

Australian Life Cycle Assessment Society (ALCAS)

BlueScope Steel – Sustainability

BPIC – Building Products Innovation Council

Green Building Council of Australia

Liberty Steel – Sustainable development

Responsible Steel

Steel Construction Institute (UK)

Steel Recycling Institute

World Steel Association (worldsteel) – Sustainability

BlueScope's sustainability successes

BlueScope believes that sustainability is integral to the long-term growth of the company, and that steel plays a critical role in supporting a sustainable society. The company takes a life-cycle approach, seeking to improve the performance of its products over their entire lifecycles, with a focus on the four principles of a circular economy: reduce, reuse, remanufacture and recycle.

In 2017, BlueScope engaged with a wide cross section of its stakeholders, including investors, customers and employees, and identified five sustainability topics considered most material to its business: safety, health and wellness; climate change and energy; diversity and inclusion; governance and business conduct; and supply chain sustainability. These topics form the foundation for BlueScope's sustainability disclosure, including its annual Sustainability Report, which follows the core option of the Global Reporting Initiative (GRI).

BlueScope's Board oversees sustainability matters, with day-to-day responsibility resting with management teams. The Board has a Risk and Sustainability Committee (separate from the Audit Committee), which has oversight of the company's environmental, social and governance (ESG) responsibilities and reporting. This includes reviewing and recommending to the Board the annual Corporate Governance Statement and the Sustainability Report. The Committee also works with other Board committees to ensure sustainability matters have appropriate oversight and are integrated with BlueScope's strategy.

BlueScope has a reputation for industry leading safety performance and has maintained a Lost Time Injury Frequency Rate of less than 1.0 injury per million hours worked, for the 14 years to financial year (FY) 2018. Encouraged as it is by this performance, the company is acutely aware that people are still harmed at work, and so continues to pursue its goal of zero harm.

BlueScope supports the Paris climate change agreement and the individually determined national targets of the countries in which it operates. The company believes that climate change presents both risks and opportunities for its operations and stakeholders. It recognises that investors, customers and the communities in which it operates are increasingly demanding that the company disclose these risks and opportunities, and take action to improve its greenhouse gas emissions and energy efficiency. Accordingly, the company publicly reports in accordance with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). BlueScope has also set a public target for the year-on-year reduction in the greenhouse gas intensity of its three steelmaking plants

globally, and is implementing a pipeline of energy efficiency projects. The company is also implementing renewable energy projects where it is commercially viable.

More broadly, the company is committed to reducing its environmental footprint by reducing consumption, reusing materials and recycling. BlueScope has found many innovative ways of creating valuable products by reusing material originally considered waste. At its Port Kembla Steelworks, the company has a 97 per cent material efficiency rate (recovery and reuse of by-products). Scrap steel (the most recycled material in the world) remains a very important raw material for its steelmaking operations, with scrap comprising about 20 per cent of the steelmaking feed at Port Kembla.

BlueScope is committed to the UN Guiding Principles on Business and Human Rights, and has undertaken a significant project to review its supply chain, and ensure that all its suppliers operate in accordance with legal requirements and the values expressed in BlueScope's company charter, *Our Bond*.

In recent years, BlueScope has increased its emphasis on diversity, focussing initially on improving gender balance. In FY2018, one in three new recruits in operating roles was female, and the company has doubled the rate of hiring women to all roles across its operations. Women comprise 33 per cent of the company's Board and Executive Leadership Team.

Many of BlueScope's products are registered under the Australian environmental product declaration program, which provides detailed information about their environmental performance, can assist in determining the environmental impact of buildings and infrastructure that use these products, and can help earn points for Green Star building projects.

Liberty's environmental advances

Liberty's polymer injection technology follows three years of close collaboration between Liberty and the University of NSW to replace some of the coke used as a slag foaming agent in Electric Arc Furnace (EAF) steelmaking with polymers, including recycled rubber and plastic. When injected, the coke/polymer blend improves slag foaming properties for more efficient use of electrical energy and to potentially reduce carbon consumption produced by coal-fired power stations. Polymers that are often diverted to landfill are recycled into value-added steel products. Liberty has the exclusive right to take this technology to the world market.

Liberty's commitment to the environment includes optimising the eco-efficiency of our products through the product life-cycle. Liberty is taking action by increasing resource and energy efficiencies and the use of sustainably generated energy from GFG Alliance's SIMEC Zen Energy in the production and distribution of its products, and during the use of steel products.

Liberty's Environmental Product Declarations (EPDs) are independently verified and recognise customers' need and the increasing demand for standardisation and greater transparency around environmental performance.

Liberty has five EPDs:

- Hot Rolled Structural and Rail
- Reinforcing Rod, Bar and Wire
- Reinforcing Bar and Mesh (Liberty Reinforcing)
- Reinforcing Bar and Mesh (ARC)
- Hot Rolled Structural Products (Liberty Metalcentre)

Liberty's EPDs comply with the requirements of a valid EPD recognised in the Green Star Design Rating Tool (Green Building Council of Australia) and the IS® Rating Tool (Infrastructure Sustainability Council of Australia).

14. Case Studies

Star Event Centre

Star Event Centre, Sydney: Multi-faceted geometry made possible by steel

Situated on the rooftop of The Star casino complex in Sydney and offering views over Sydney Harbour and city skyline, the Star Event Centre is notable for its complex geometry.

Project Details

Architects: JPW Architects

Client: Echo Entertainment Group

Contractor: Brookfield Multiplex

Structure: Taylor Thomson Whitting

Steelwork Project Manager: ICMP Steel Structures

Steel detailer: Elmasry Steel Design & Detailing

Steel suppliers: Southern Steel, BlueScope, Liberty Onesteel

Fabricators: S&L Steel, Pacific Steel, Cullen Steel, Sebastian Steel

The 7,800m^2 event centre extends over 16 metres above the roof of the existing casino building, which was built in the mid-1990s. One of the largest construction projects undertaken in Sydney during the middle of the Global Financial Crisis, it was delivered on time and within budget.

The $80 million complex exhibits a custom-designed glass facade that replicates the multi-faceted geometry of a gem and which can be backlit at night to create a striking light feature. The design also includes double-layered acoustic walls that meet performance requirements by absorbing high sound energy across all acoustic bands.

Principal contractor Brookfield Multiplex had a team of 35 working on the project to ensure its construction within 16 months. Among the many challenges faced were the need to install componentry in a sequenced order, a lack of storage on site requiring just-in-time delivery of materials, and the constraints of working within a confined inner-city district.

The development of the complex geometric structural steel frame meant the need for a close working relationship between builder and structural engineers Taylor Thomson Whitting (TTW). By using steel framing, TTW were able to minimise the number of columns and footings requiring strengthening. This offered two advantages: a saving in cost relative to that of strengthening a large number of columns; and, because the immediate vicinity around a column requiring strengthening must be untenanted during construction, the ability for the casino site to continue operation.

The resulting structure utilises a simple hierarchy of elements, which combine to form a steel structural box that is essentially supported on eight structural columns.

A total of 800 tonnes of structural steel was used in the construction of the centre.

Gold Coast Light Rail

Helensvale Light Rail Station, Gold Coast: Smart, safe link between rail modes

Steelwork is the predominant material being used to construct the interchange between the Queensland Gold Coast new light rail and conventional heavy gauge railway at Helensvale for speed of erection during short railway shutdowns, aesthetics for what is expected to be a busy transit hub and to accommodate large-span requirements common to passenger rail buildings.

Project Details

Client: GoldlinQ

Architecture: Cox Architecture

Structural Engineering: AECOM

Steel Fabricator: Brezac Constructions

Steel Detailer: INNOVATUZ

Hot-Dip Galvanizing: Fero, National Galvanising Industries

Transport and Onsite Erection: Brezac Constructions

ASI Steel Manufacturers: BlueScope, Liberty

Steel Distributors: BlueScope Plate Supplies, Locker Group, Lysaght, OneSteel Metalcentre, Rhino Grating, Southern Queensland Steel, Stramit Building Products, Tekframe, Vulcan Steel

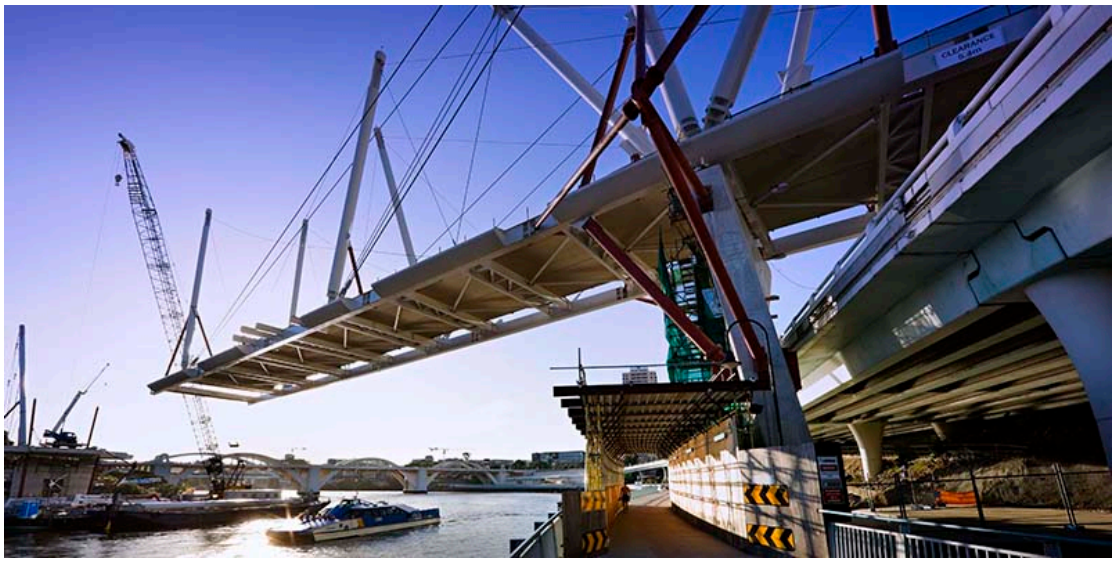
The upper roof structure comprises z-purlins spanning north to south supported by long-span continuous steel beams spanning east to west. The structure is braced to stability elements with tensile rods and SHS struts in the plane of the primary steel beams. Steel purlins are supported on the top flanges of the primary steel beams to allow cantilevering of the southern end of the roof. The lower roof is formed in lightweight steel trusses spanning east to west supported by primary steel beams spanning north to south as well as the blockwork walls of the amenities/staff building.

The overpass structure is a trussed bridge with composite steel joists supporting a concrete deck on sacrificial metal deck formwork with a lightweight steel roof. The full-height trusses were designed with a splice at quarter span and hot-dip galvanized prior to transport to site as separate sections. The bridge is supported by a concrete portal frame on the eastern side designed to resist impact loads specified by Queensland Rail (QR) and AS 5100.2-2004. It is supported on the western side by the existing QR station structure.

Given the nature of the transport hub, the overpass was also designed for collision loads. The solution was to design a heavily reinforced slab on metal formwork and spanning this between two heavy-welded WC beams either side of the overhead lines clearance zone.

Brezac Constructions' Director Peter Brezac, who manages the complete steelwork package for the project under contract, said the work is primarily driven by quality and the ability to deliver on-schedule. Brezac has supplied approximately 143 tonnes of steelwork for the project comprising steel plate, angled sections, rectangular hollow sections (RHS), universal columns and beams, welded columns and beams, pipe, mesh and purlins.

Kurilpa Bridge, Brisbane



Kurilpa Bridge, Brisbane: New bridge to link healthy loop for legs

Brisbane's $63.3 million steel-supported Tank Street Bridge provides the city with a pedestrian and bicycle crossing that completes a pedestrian and bicycle loop linking the CBD and South Bank via the Goodwill Bridge.

Project Details
Client: Queensland Government Department of Public Works
Architect: Cox Rayner Architects
Structural Engineer: Arup
Head Building Contractor: Baulderstone Hornibrook
Steel Fabricator: Beenleigh Steel Fabrications
Steel Detailer: Online Drafting Service

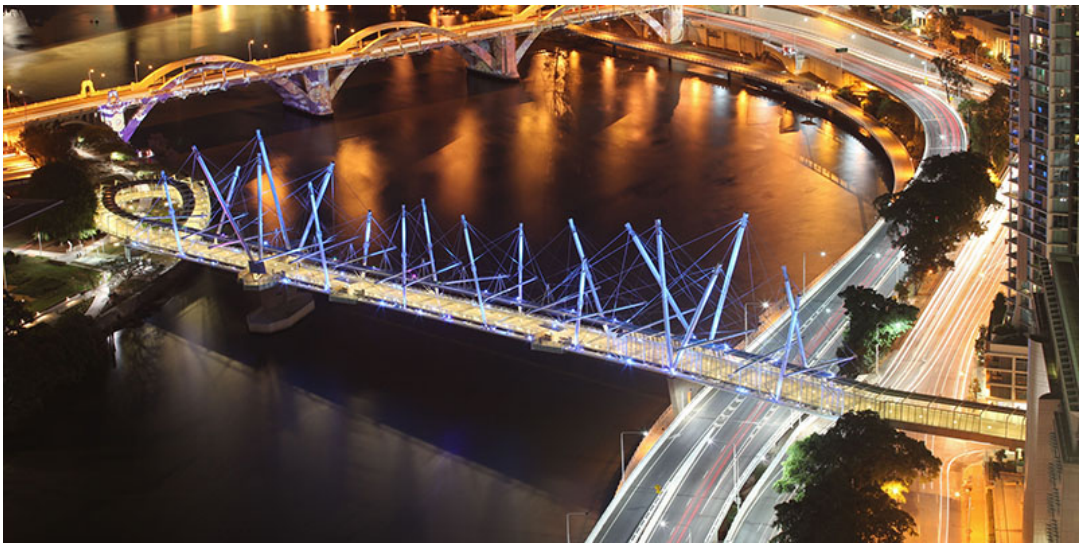
The Kurilpa Bridge stretches from the North Quay end of Tank Street in the city to Kurilpa Point in South Brisbane, adjacent to the award-winning Queensland Gallery of Modern Art where the CBD Reach and the Milton Reach of the river meet. The multiple-mast, cable-stay design for the bridge showcases an array of cables and flying struts that have been designed to recall the ropes and spars of sailing ships.

The project's lead contractor, Baulderstone Hornibrook Queensland, designed and constructed the bridge with Cox Rayner Architects and Arup Engineers on the design team. The bridge design is based on principles of 'tensegrity', an architectural and engineering system in which the structural integrity is a synergy between balanced tension and

compression components to achieve a lightweight, yet strong and stable structure offering expansive views of the river.

Steel provided the slim-line effect in the deck to meet the many physical constraints of the original brief such as spanning the Riverside Expressway, North Quay and the Brisbane River by maintaining the minimum vehicle and maritime traffic envelopes required without obstruction.

The development embraces similar sustainability measures as the other footbridges in the ‘loop’, including a preference for use of recycled materials and energy-efficient, low-maintenance lighting, water recycling during construction and for landscaping, and a high-specification corrosion protection paint system to minimise maintenance. The bridge features two large viewing and relaxation platforms, two rest areas and a continuous all-weather canopy spanning the entire length of the bridge.



15. Acknowledgements

The ASI would like to thank the following organisations for their assistance in putting together this Steel Industry document:

- BlueScope Steel
- Liberty
- Galvanizers Association of Australia (GAA)
- Australasian Corrosion Association (ACA)
- Steel Reinforcing Institute of Australia (SRIA)
- Building Products Industry Council (BPIC)
- Australian Construction Modellers Association (ACMA)
- World Steel Association (worldsteel)
- Australian Bureau of Statistics (ABS)
- Australasian Certification Authority for Reinforcing and Structural Steels (ACRS)
- Australian Industry Group (ai Group)