

GALVANIZE

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HOT DIP HERO: Galserv's Shore Brace 400

The 2023
Sorel Award
Edition

Sorel Award
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From the CEO



Welcome to the 86th edition of Galvanize with an all-new layout and sections featuring new projects, reminders of some historical projects and technical discussions on common issues. In each of the upcoming issues of galvanize we will include this new technical section from our extensive library on the use and durability of hot dip galvanized steel, all of which are available free from our [website](#).

This edition features five recently completed projects showcasing the versatility and durability of hot dip galvanizing. Three of these projects are from the infrastructure segment, ranging from a hydraulic bracing solution that delivers an extended lifespan unique in the for-hire market while two significant railway tunnel projects in Sydney and Melbourne highlight how hot dip galvanizing provides very long maintenance free, yet often hidden, solutions for these major projects. Our other two projects from Western Australia are very different – one is for the younger generation or the young at heart which shows how a modular structure can be easily designed, fabricated and assembled for future relocation and the other features a stunning HDG exoskeleton providing an elegant solution for a cold storage and logistics facility.

As a reminder of our past, we also celebrate 50 years of the Sydney Opera House, the 21st birthday of Federation Square in Melbourne, and around 50 years of light poles along Melbourne's iconic Eastern Freeway. All with very low maintenance, and all with lots more to give to their communities.

We also briefly cover the changes to the Building Code of Australia which, especially in residential housing, provide the first genuinely durable and codified solutions for Australians and promise to reduce the number of early failures due to corrosion.

I hope to enjoy the new layout and look forward to your feedback.

A handwritten signature in blue ink that reads "P.J. Golding". The signature is fluid and cursive, with a long horizontal stroke at the end.

Peter Golding
CEO
Galvanizers Association of Australia





WINNER 2023

galvanizers
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Hot Dip Hero: Galserv's Shore Brace 400 Story

In the competitive landscape of Australian construction, the Shore Brace 400 is testament to engineering excellence. Hot dip galvanized for Shore Hire by the experts at Galserv, this hydraulic bracing system isn't just built for the now – it delivers an extended lifespan that is unique in the for-hire market.

The Shore Brace 400 is a modular hydraulic bracing system comprising various sized extension beams. It features double-pinned joints for increased capacity and incorporates double-acting hydraulics for smooth operation in extension and retraction. This is complemented by hydraulic lock-off valves for unparalleled control and safety.

On the ground, the Shore Brace 400 is a force to be reckoned with. The system can support rectangle, square or multi-sided excavations up to 20m without cross supports. From cofferdams to complex basement constructions, it can shore up large tank and pipeline installations as well as substantial building foundations.

With a fleet that now weighs in at around 250 tonnes, the Shore Brace 400 system is a formidable player in the structural support game – and the only Australian made product of its kind.

Research and Development

Designed and developed by Shore Hire, the Shore Brace 400 was first conceived in 2018 and was followed by five years of rigorous R&D to ensure their product would meet the requirements of long life for a tough application.

Internationally, similar systems are typically painted, produced as one-offs or made in smaller sizes with additional bracing required. With multiple accidents and fatalities every year linked to workers standing in un-shored trenches, it was evident that new, innovative shoring practices and equipment were needed to provide a safe place for operators to work.

As a result, the Shore Brace 400 was engineered to meet a growing market need for a reusable hire system suitable to substantially large projects, eliminating the need for multiple cross struts or additional complexity in installation and extraction sequence.

The Shore Brace 400 was designed to provide an Australian Made heavy-duty solution with all extension beams and components hot-dip galvanized to give the for-hire product a long and robust life.

To achieve this, the Shore Brace 400 had a complex design with exacting specifications, leaving no room for quality issues. The coating had to be durable enough to withstand repeat wear and tear experienced during the excavation and hire process. Galvanizing was the best option.

According to Joshua Nolan (General Manager, Galserv), “This is the sort of application where galvanizing is far superior over other coatings like paint. The Shore Brace 400 system is designed to be installed in pits – by its very nature, the steel will get wet, be bumped by excavators, and get damaged. Shore Hire really wanted to manufacture this product in Australia. Galvanizing is the best possible choice for both long-term durability, and local manufacture.”

Meeting Shore Hire’s Design Needs

Over the course of five years of research and development, Galserv (particularly account manager Adam Chessell) supported Shore Hire with technical, durability and performance advice.

As Adam Chessell explained, “Each component in the Shore Brace 400 range was designed with a highly complex connector point, with holes for pins and interlocking fingers, along with internal crossbar sections for strength.”

“Shore Hire moved away from the idea of a painted shore bracing product to a product that was hot dip galvanized. The reason for this was that a painted system was inadequate. It was simply not robust enough to perform in the demanding, harsh construction site environment,” said Chessell.

Galserv formulated a specific process to achieve the required finish when components are assembled. Each lot of bracing follows this process consistently, with Galserv continuously testing and quality checking, to ensure technical, logistical and quality aspects are delivered each time.

Technical and Engineering Innovation

Each component had engineering restrictions on where drainage holes could be placed for hanging in order to ensure a seamless system connection with no failure points when installed. Galserv worked with Shore Hire’s engineers to propose, draw and test holes for hanging across several design iterations.

Sections of the Shore Brace 400 are incredibly bulky but include areas of tight tolerance where pieces connect, such as the pins, pivot points and fingers. Galserv had to ensure that all these areas had the correct drainage to eliminate the build-up of zinc in conformance with AS/NZS 4680.

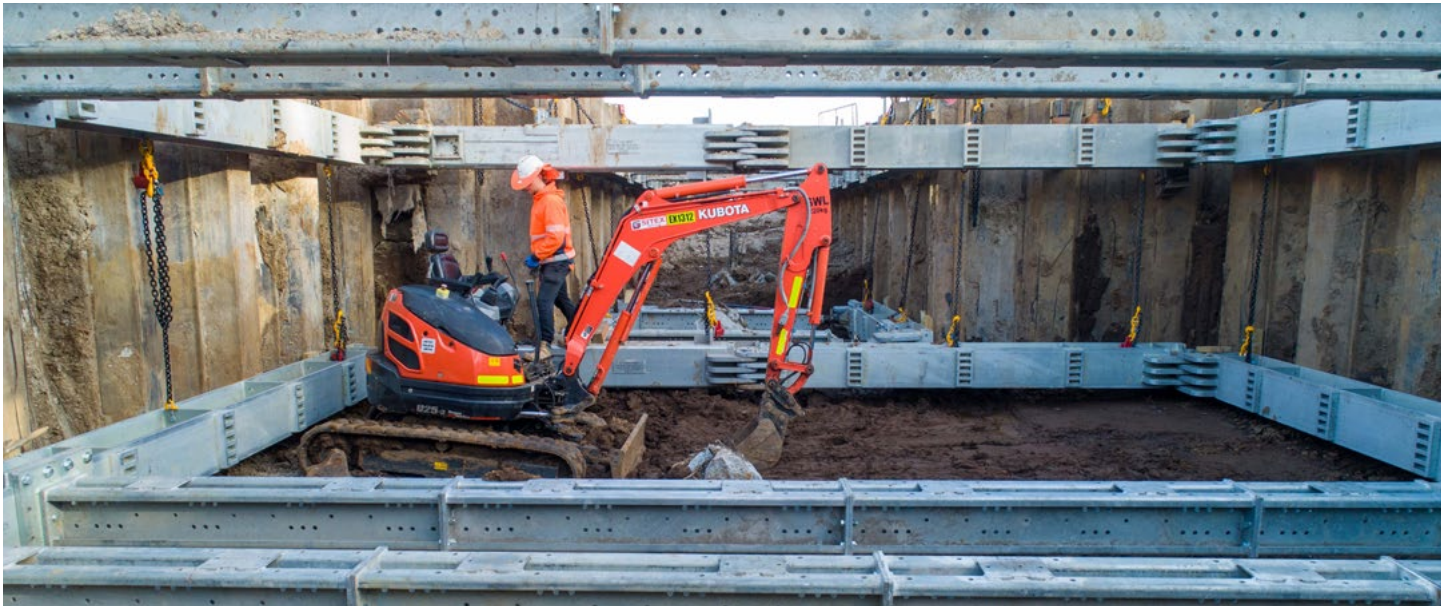
Galserv provided Shore Hire with training on the galvanizing process to assist with their understanding of each stage of the product’s handling and treatment. Each design iteration underwent many rounds of testing to determine the correct orientation to achieve the perfect finish until a specification was developed.

As a product for hire, the Galserv team worked to formulate dipping processes to ensure the Shore Brace 400 achieves a consistent finish, reducing fleet maintenance needs and eliminating the need for remedial work.

“Galserv enjoys the challenge of projects that make us think and innovate. We do a lot of design and engineering work to ensure the most successful outcome possible for our clients. We want to be involved in the journey to make sure we get the best result possible and build long-term relationships with our clients,” said Nolan.



Considering the design and tight tolerance for the pin, meticulous planning, development, and testing of the hot-dip galvanizing process was undertaken.



The highly engineered items required significant technical and design work to ensure a successful outcome, as every item in the fleet must meet exacting specifications to ensure the system can be interconnected, operational and protected from damp working environments.

Market Development Potential

Market interests have already shifted from traditional or smaller systems to the larger Shore Brace 400. Shore Hire has reported an increase in their market share following the successful completion of a number of high-profile projects.

“Shore Hire is a company that likes to innovate. This is a completely new product for the market – they don’t have a competitor in this space. So the market potential is unlimited, and is growing steadily. Everyone in the market will look to follow their lead,” said Chessell.

With product demand increasing, Shore Hire is developing further offerings in this space, introducing additional pin types and ancillary equipment to make installation and dismantling quicker and safer.

Environmental Benefit

Manufactured from steel and galvanized for longevity, the Shore Brace 400 system can be re-hired many times across multiple projects, greatly reducing the carbon footprint associated with bracing.

“One of the key drivers of Shore Hire was creating a product that could be reused, over and over again. Traditionally, the bracing industry generates a lot of scrap and material wastage – bracing is usually painted light-gauge steel walers that are scrapped after a single use. The Shore Brace 400 can be used, disassembled, taken back to the yard, cleaned up and then reused over and over,” said Nolan.

Galvanizing expertise is evident in resilience of the Shore Brace 400 system. Galserv didn’t just coat the steel; they provided vital input on technical design aspects to ensure optimal galvanizing results, preventing build-up and ensuring the durability and longevity of the system.

PROJECT TEAM

Client: Shore Hire

Hot Dip Galvanizer: Galserv

Article by: Sally Wood, [wordly.com.au](https://www.wordly.com.au)



2023 GAA Sorel Awards

Century-long Protection: Galvanizing Central Station's Metro Expansion

Sydney Metro is Australia's largest ever public transport project. It will extend Sydney's Metro rail into the CBD and beyond to Bankstown, with new stations delivered at Crow's Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street and Waterloo, along with the new underground platforms at Central Station.

As a result, by 2030, Sydney will have four metro lines, with 46 stations and a 113km standalone metro railway system.

The \$1.3 billion transformation of Sydney's Central Station will revitalise Australia's busiest commuter hub. Prior to the COVID-19 pandemic, more than 270,000 people used Central Station every day, with that number expected to rise to 450,000 over the next two decades.

The location of the metro platforms at Central Station will facilitate a critical interchange, fully connecting the station with suburban, intercity and regional rail services, buses, coaches and light rail.

A new entrance on Chalmers Street will provide direct access to Central Station for customers from the Surry Hills catchment area and a direct interchange for passengers from the CBD and South East Light Rail. The new Central Walk pedestrian concourse will better connect passengers to trains, light rail and the new Sydney Metro underground platforms.

The project also includes: new underground Sydney Metro platforms at Central Station beneath platforms 13, 14 and 15; escalators directly to suburban platforms 12 to 23 for the first time; and an upgraded northern concourse complete with pedestrian thoroughfares and a feature roof.

Over the course of two and half years, Valmont Coatings galvanized 700 tonnes of structural steel for Central Station. Galvanizing has not only ensured a 100-year lifespan for the station but also overcome challenges associated with design, logistics, and site constraints.

Galvanizing Central Station's structural foundations

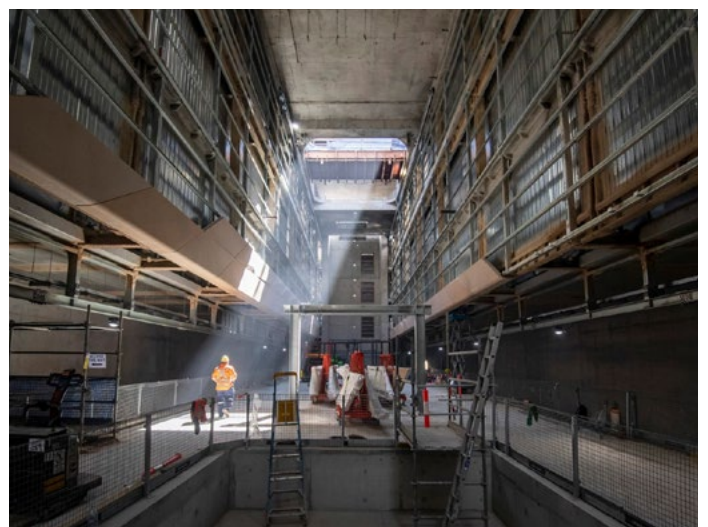
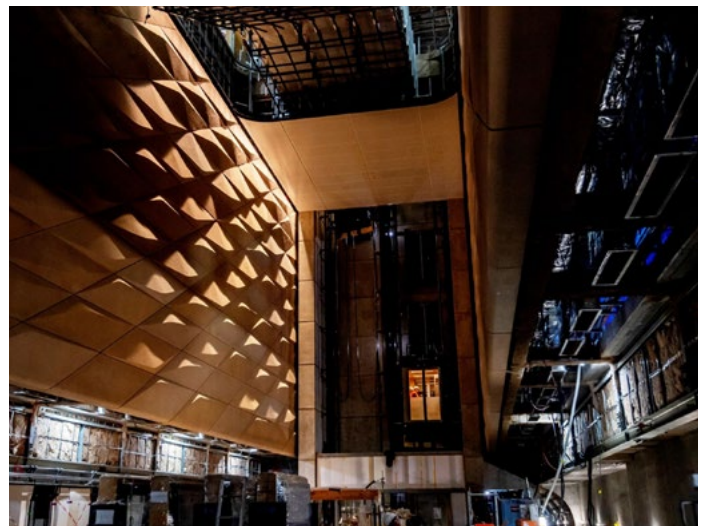
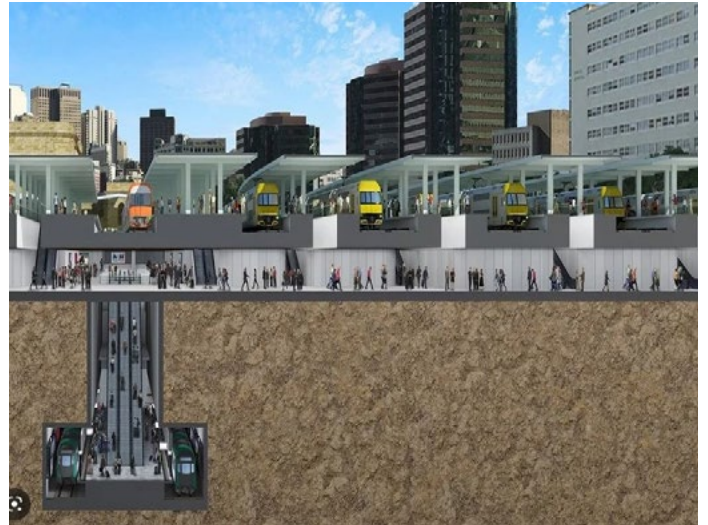
Galvanized steel forms the core of the basement hanging structures at Central Station. It supports intricate flooring systems and edge forms, vital for the station's functionality. The basement also benefits from this robust steelwork, upholding the precast hollow core plank flooring system. Notably, the steelwork extends to cladding support along metro walls and escalator support, ensuring seamless integration of modern amenities.

Galvanized steel supports precast walls, floors, and roof systems for the southern and northern vent building structures. The incorporation of removable floor grating demonstrates a thoughtful approach to infrastructure design, allowing for monorail access across levels.

Finally, galvanized steel underpins the flooring systems and control room roofs, illustrating its adaptability. The cladding support framework here exemplifies the material's strength and reliability in high-traffic areas.

The choice of hot dip galvanizing for this project was strategic. With over 450,000 daily commuters anticipated in the coming decades, the need for a durable, long-lasting solution was paramount. Alternative coatings paled in comparison to galvanizing's promise of a century-long lifespan.

Daily communication and coordination between Valmont Coatings and IMF were key. This synergy ensured adherence to stringent timelines, exemplifying the critical role of teamwork in large-scale projects like Central Station.



Overcoming challenges: design and logistics

A Dynamic Design

The project's evolving design necessitated frequent steelwork modifications, including stripping and re-galvanizing.

According to Tony Kalesovski (Sales Manager NSW, Valmont Coatings), "With some of the design changes being made while the installation of steelwork was being carried out, the need to expedite the stripping and re-galvanizing work was critical to allow the project to flow. The off-site expedited treatment was crucial to meeting the project's design life, showcasing galvanizing's flexibility under pressure."

Valmont Coatings undertook shift work to meet project milestones and delivery expectations. Reworks after required modifications were completed in a timely manner and the end-product was indistinguishable from unmodified steel.

A Logistical Labyrinth

Transfer between fabricator and coating specialist, and then forwarding to the install location takes significant planning and coordination on any project – let alone one the size of Central Station.

"Due to the nature of the project and changes in the installation sequence, logistics were constantly evolving, which meant that storage was also a big factor. The close working relationship between Industrial Maintenance & Fabrications (IMF) – the fabricators on the project – and Valmont Coatings played a major role in overcoming this challenge," said Kalesovski.

Construction and installation were time-critical; disruptions to the day-to-day operations of Central Station had to remain minimal. This meant that project timelines and milestones were often constrained by planned rail possessions. In addition, the site is located in the heart of Sydney's busy CBD, making access difficult.

"We worked flexibly to adjust schedules to meet site demand and used our facilities to store a large percentage of finished items when programs changed," said Kalesovski.

"Daily communication and coordination between Valmont Coatings and IMF were key. This synergy ensured adherence to stringent timelines, exemplifying the critical role of teamwork in large-scale projects like Central Station."

Market growth and sustainability

As a pivotal node in Sydney's transport network, Central Station represents both a market growth opportunity and a showcase of sustainable resource utilisation for Australia's galvanizing industry. Galvanized steel, with its 100-year lifespan, recyclability and minimal waste production, stands out as an environmentally conscious choice.

Galvanizing enabled innovative design, rigorous adherence to timelines, and logistical prowess for Central Station. The project demonstrates galvanizing's unmatched ability to meet contemporary demands while promising longevity, sustainability, and efficiency.



PROJECT TEAM

Developer and Owner: Sydney Metro

Architect: GHD

Engineer: Aurecon

Head Building Contractor: Laing O'Rourke

Steel Fabricator: Industrial Maintenance & Fabrications (IMF)

Steel Detailer: Revision Zero

Galvanizer: Valmont Coatings

2023 GAA Sorel Awards

Oceanfront Innovation: Galvanized Exoskeleton Weathers the Coastal Test

Located in the heart of Bibra Lake, Western Australia, a colossus of industry rises nearly half a football field into the sky – welcome to the Americold Spearwood Expansion. This isn't just any warehouse; it's a cutting-edge cold storage and logistics facility that has redefined the local horizon.



Crafted around a striking exoskeleton, Americold's facility is a showcase of engineering and design, with 615 tonnes of structural steel intricately woven into a tapestry of strength and durability. The facility stretches an impressive 100m in length and 50m in height, making it seem a modern-day lighthouse.

Located four kilometres from the abrasive coastal elements, this facility had to be durable. Enter the hero of our story: hot dip galvanizing. More than just a surface treatment, galvanizing was readily able to outperform paint in the trilogy of cost-efficiency, longevity, and time to first maintenance. With every inch of Americold's steel exoskeleton galvanized by DSI Underground, the Americold facility confidently meets – and exceeds – the requisite 50-year design life.

Showcasing the potential of hot dip galvanizing

According to Jason Davies (Head of Infrastructure at DSI Underground), the impressive height of the facility gave the project its 'wow factor'. He said, "It is quite prominent in the area. With the exoskeleton completely exposed, and galvanized, it really shines."

Jason said, "The project is an exposed steel construction, located only 4km from the coast and was chasing a 50-year design life. The combination of all these factors together made galvanizing the best choice. The project couldn't have been achieved economically by any of the alternatives: galvanizing and paint, or paint only. By the time you add up upfront and ongoing costs of all these options, galvanizing wins by far."

"The project is an exposed steel construction, located only 4km from the coast and was chasing a 50-year design life. The combination of all these factors together made galvanizing the best choice."

The Americold Spearwood Expansion demonstrates the strength and resilience of galvanized-only surface treatment for fully exposed structural steel – more than just the usual awning steel on warehouse structures, but for the entire building. Jason said, "The project has potential to open that market up to specifying galvanizing only surface treatment more frequently, particularly on fully exposed steelwork, located this close to the ocean."

Typically, at this distance from the coast, galvanizing would only be specified on internal steel clad with sheeting. But the cooling afternoon sea breeze, known as the Fremantle Doctor, often picks up salt spray and blows it much further than the four kilometres where the building is located. "Galvanizing can stand up to these salt deposits on the steel for the intended design life, in the most economical way," Jason explained.

What's more, combining galvanized steel with an exoskeleton design allows optimisation of the internal floor area, providing greater value for the end user. Jason commented, "Being easily the tallest building in the area, it stands out anywhere in the surrounding area, which will keep galvanizing at the front of mind and therefore promote hot dip galvanizing for this application."

A feat of technical and engineering innovation

To avoid having both insulated panels and exterior cladding, the building utilises exposed structural steel. Being higher than other buildings, it will endure the full force of the infamous 'Fremantle Doctor'. This led to the engineers opting for galvanized steel so it could meet the desired design life.

"We have worked closely with the fabricator for this project – Fremantle Steel Group – on a number of jobs, so they were fully aware of our galvanizing capacity," Jason said. "Having the biggest galvanizing kettle in the Southern Hemisphere, everything was single dip for us. We opened the plant about seven years ago now, so local industry is aware of our capacity and maximum sizes."

The building features large truss columns throughout, which were custom-designed to fit into DSI Underground's galvanizing facilities. This reduced the number of bolted connections required, while removing any requirements of welding after surface treatment.



While the initial design included minimum requirements for vent and drain holes, after the first truss column was galvanized, the galvanizer proposed larger holes. Consequently, all further truss columns were galvanized to a high-quality finish.

Jason said, “The only issue we encountered were on the large truss columns. They were initially fabricated with the minimum size drainage holes, which didn’t allow for the zinc to drain fast enough for a high-quality finish. So, after the first truss was dipped, we proposed that larger drainage holes were applied to the remaining columns for the project.”

Reaping the economic benefits

Hot dip galvanizing provides key benefits to the end user, when compared with alternative surface treatment options such as inorganic zinc paint, two-coat paint, and three-coat paint.

Inorganic Zinc Paint System

Although the initial cost of an inorganic zinc paint system would be lower, the life to first maintenance is significantly reduced – meaning there would be additional maintenance costs within the first 10 years.

In order to meet the 50-year design life, the structure would also need to be externally cladded, adding significant initial costs to the end user.

Two-Coat Paint System

The initial cost of a two-coat paint system would be either similar or slightly higher than galvanizing. However, the life to first maintenance would still be significantly reduced, resulting in a higher maintenance cost. If the second coat was a high-build epoxy, then this would not be UV-stable and would lose its colour to become chalky. Greater care would also need to be taken during installation of the steel, with any touch-ups adding to costs.

Three-Coat Paint System

The initial cost of a three-coat paint system is far higher than galvanizing. Ongoing maintenance would be required to achieve the design life, with installation and touch-up costs also a significant factor.

Environmental and social responsibility

The Americold Spearwood Expansion project delivered key environmental benefits. Due to the selection of hot dip galvanizing, the building will require minimal maintenance throughout its design life.

This drives down water usage, in lieu of regular washdown of painted steel, and the fuel needed for maintenance teams travelling to and from the site.

Jason said, “Galvanizing offers minimal maintenance compared to the alternatives. If the structure had been painted, it would have needed more frequent maintenance. Every few years, it would have needed a wash down with water, full inspections and touch ups applied if required. So, sustainability wise, there is much less water usage over the life of the project, as well as fuel consumption, and material usage.”

Being a cold storage facility that mainly handles food products, there is also a clear social benefit to this project: enabling fresh and frozen food to be distributed more efficiently to Western Australian companies and people. Because food is coming from a hub in the Perth metropolitan area, rather than the possible alternative of being transported from interstate in refrigerated transport, the end result is reduced emissions – creating an additional environmental benefit.

PROJECT TEAM

Architect: Bell Architecture

Engineer: Michael Bale & Associates

Head Building Contractor: Badge (D&C)

Steel Fabricator: Fremantle Steel Group

Steel Detailer: Xstruct Australia

Galvanizer: DSI Underground, Kewdale

Article by: Sally Wood, [wordly.com.au](https://www.wordly.com.au)

2023 GAA Sorel Awards

Supercharged Skate Park: Unleashing the Galvanized Grind



With construction of a multi-storey car park for METRONET's new Morley train station on the horizon, the existing skate park at Wotton Reserve in Embleton, Perth had to be relocated.

Funded by the Western Australia State Government through METRONET, the City of Bayswater built a brand new \$2.5 million skate park in the eastern section of Wotton Reserve. The hero of the new skate park is Western Australia's biggest half-pipe: a 3.9m high, 13.5m wide vertical ramp with additional roll-ins from above the main platform. The first of its kind in Western Australia, the half-pipe is a major drawcard for skaters and riders alike.

Initially, the existing vertical ramp was set to be relocated. However, it was closed in July 2022 when a condition assessment discovered that significant corrosion had impacted the structural integrity of the ramp, presenting a high risk of failure. Over half the structure required replacement. Instead, the brand-new vertical ramp was designed and built.

The new skate park encompasses a range of other elements for beginners through to more experienced riders and skaters. The junior plaza includes a 1m mini ramp designed for younger skaters who are just learning the ropes, while BMX riders now have access to intermediate and advanced jumps, alongside a return loop for continuous riding. The development also features a variety of complementary community facilities such as floodlighting, a bike repair station, barbecues, picnic shelters, bike racks, drinking fountains, landscaping, and plenty of seating.

Galvanizing the Ride

All steelwork for the new skate park was galvanized by Hartway Galvanizers in Canning Vale. With a century of combined management experience and a galvanizing capacity in excess of 60,000 tonnes per year, Hartway's Canning Vale facilities can galvanize frames up to 5.1m in width and single items up to 15m in length by double end dipping.

In total, Hartway Galvanizers hot dipped over 15 tonnes of steel for the new Bayswater skate park, including elements such as the ramp, grinding rails, shelter, stairs, handrails, and lighting towers around the park.

According to Gavin Bowey (Works Manager, Hartway Galvanizers Canning Vale), galvanizing offered several economic benefits for the City of Bayswater. "The City of Bayswater specified hot dip galvanizing because it provides the best rust protection and maintenance lifecycle. Hot dip galvanizing is a *one and done* coating that doesn't require additional work for many, many years – the time to first maintenance for the skate park is estimated at 100 years."

"Galvanizing is uniquely placed to withstand the extreme wear and tear expected from the high volume of users at the skate park, particularly as all of the steel members are fully coated, and hollow sections are coated inside and out."





“The durability and toughness of galvanizing made it an incredibly affordable solution for the City of Bayswater, particularly compared to other coatings on the market.”

“Plus, the galvanized coating flawlessly integrates with the skate park’s design, harmonizing with its industrial aesthetic. The application of galvanizing as a finish not only enhances the park’s appearance but also embodies the rugged industrial style that resonates with the world of extreme sports,” said Bowey.

From a (Half) Pipe Dream to Engineering Innovation

Margaret River Engineering undertook fabrication and installation of the galvanized steelwork for the project. As Shaun Radley, from Margaret River Engineering explained, the size and shape of the structures that were galvanized presented several challenges for the project team, particularly the drop-in ramp. At 13.5m wide x 19m deep x 6.7m high (at its highest point), the curve of the half-pipe had to line up perfectly to ensure the final skatelite surface was smooth and safe to skate on.

“To overcome these challenges, consultation between all members of the project team – the designers, engineers, fabricators and galvanizers – was essential. The team was in regular communication on all aspects of the project to ensure that all structures looked and performed as they were designed to once the project was complete,” said Radley.

The project featured a modular design that was entirely bolted together. “Modular design enabled fabrication of many pieces of the same shape that could be dipped together. The modular design also means that the ramp can be easily replicated at other skate parks; dismantled, moved to a different location and re-built; or dismantled, re-galvanized and reassembled in the same location.”

“All pieces were designed so they could be single dipped and required minimal venting and drainage work during fabrication. The curved sections were fabricated from angle to remove the requirement for drainage and reduce the chance of distortion. This resulted in a lot more components. Because there were so many pieces, every piece was marked with a welded number that could be easily identified after the piece had been galvanized. This made construction much faster,” said Radley.

With more components, the risk of distortion during galvanizing and failure to align during erection increases. As such, the location and orientation of the joining cleats were carefully designed so that they could pull against the distortion to achieve tolerances onsite. Often, components such as channels are straightened after galvanizing using a press. However, the frames were too complex for straightening.

In addition, all the pieces had to be transported from Hartway Galvanizers’ facility in Canning Vale to Embleton. This meant that every piece had to fit on a standard semi-trailer.

“All pieces were designed so they could be packed, loaded and transported on a standard semi-trailer. Once galvanized, the same shaped sections could be easily stacked and strapped together, reducing time and labour costs. Bundles could then be quickly and safely loaded for transport and unloaded at site,” said Radley.

The end result is a community facility that enables BMX and skating enthusiasts to safely enjoy their favourite pastime in a modern, purpose-built park designed to last.



PROJECT TEAM

Owner: City of Bayswater

Builder: MG Group

Designer: Skate Sculpture

Fabrication and installation of galvanized steelwork: Margaret River Engineering

Fabrication and installation of wooden cladding: MG Group

Galvanizer: Hartway Galvanizers Canning Vale

Article by: Sally Wood, [wordly.com.au](https://www.wordly.com.au)



2023 GAA Sorel Awards

Metro Magic: The Role of Galvanizing in Melbourne's Rail Revamp

The \$13 billion Metro Tunnel is the biggest upgrade of Melbourne's train network since the City Loop opened in 1981.

The Metro Tunnel will create a new end-to-end rail line from Sunbury in Melbourne's west to Cranbourne and Pakenham in the south east, with bigger and better trains, next generation signalling technology and five new stations.

With its twin 9km tunnels, it will give passengers direct train access to new destinations including St Kilda Road (Anzac Station), Melbourne's major health and education precinct (Parkville Station) and North Melbourne (Arden Station). Passengers will save up to 50 minutes a day on a return train trip, and there will be capacity for an extra half a million passengers across the network every week.

The Cross Yarra Partnership (CYP) – a joint venture between John Holland, Bouygues Construction Australia and Lendlease – is building the twin tunnels and five new stations.

In conjunction with fabricators Stilcon, GB Galvanizing undertook the galvanizing and installation of 50,000 brackets and 16km of elevated steel walkway for emergency and maintenance access between two of the new Metro Tunnel stations: Anzac Station (located at the intersection of St Kilda Road and Domain Road) and Arden Station in North Melbourne.

One of the challenges of the project was the shapes, sizes, and safe handling weights of the project components. The inherent flexibility in our design allowed brackets and support frames to adjust and fit the tunnel's unique dimensions.

In total, GB Galvanizing hot dip galvanized over one million components – equivalent to approximately 1,600 tonne of steel – including:

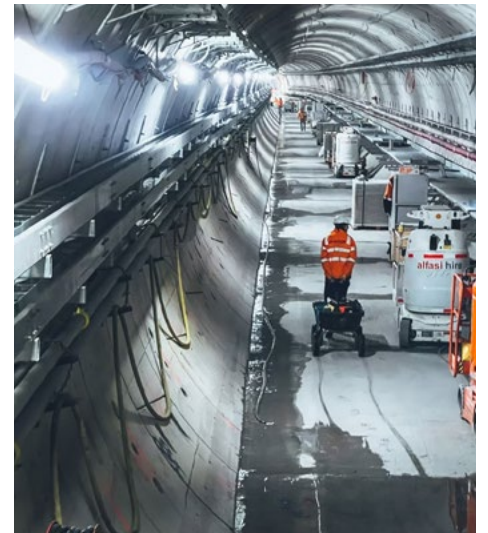
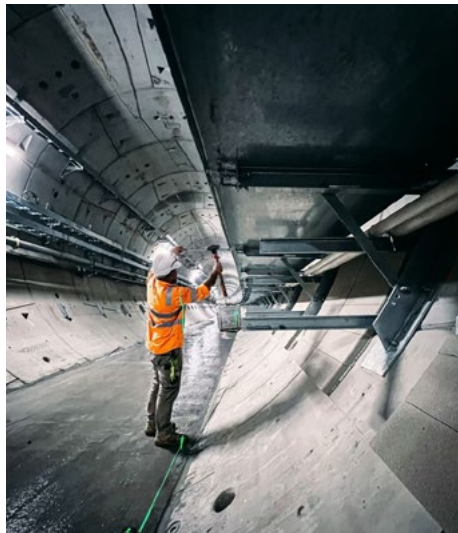
- 1,000 tonnes of chequer plate
- 400 tonnes of mild steel plate
- 100 tonnes of 75PFC
- 90 tonnes of 100PFC
- 40 tonnes of 50x5EA

Commenced in July 2021, the Metro Tunnel is expected to open in 2025, a year ahead of schedule.

Market development potential for the industry

According to Vince Gucciardo (Operations Manager, GB Galvanizing), Galvanizing was the perfect solution for the internal structures of the Metro Tunnel Project. “This project demonstrates that not only is galvanizing the most suitable anti-corrosive coating for infrastructure, it is also economical during construction and maintenance, fast to erect, and provides better damage resistance compared to paint.”

“While the use of galvanizing in infrastructure isn’t ground-breaking, the innovation in the Metro Tunnel Project lies in its modular design. This design was pivotal in ensuring that fabricators, transporters, galvanizers, and installers collaborated efficiently and safely. A hallmark of the project was the significant emphasis on communication among stakeholders. This wasn’t just crucial for the galvanizing aspect, but also for safe handling by all involved, setting a precedent for similar large-scale projects in the future,” said Gucciardo.



Perfecting the process

When it comes to large-scale infrastructure projects, innovation does not always involve reinventing the wheel, but rather refining it for efficiency, safety, and adaptability. In the Metro Tunnel Project, the technical approach to galvanizing embodied this principle – it was centred around practical adaptability and efficient processes.

“One of the challenges of the project was the shapes, sizes, and safe handling weights of the project components. The inherent flexibility in our design allowed brackets and support frames to adjust and fit the tunnel’s unique dimensions. A quick glance at the installed product’s photographs showcases this innovation: platforms with adjustable angles ensured perfect alignment and level surfaces. Moreover, keeping the components’ weights within manageable limits eliminated heavy-lifting equipment for many items, streamlining the installation process,” said Gucciardo.

During the design phase, detailed planning and discussions were essential given the tunnel’s limited access and the need to assemble components in situ over its 16km length. Galvanized components could not be too heavy for people to handle; the brackets and smaller items had to remain under 20kg to 30kg each so that they could be lifted without a forklift.

“One of the primary challenges we faced was the stringent turnaround times. With over a million components, many of which needed individual hanging, the logistics were demanding. Handling plates required quick jig creation, and the sheer volume of components necessitated countless hours of hanging and cleaning,” said Gucciardo.

“Moreover, during certain periods, such as site shutdowns, managing storage space became particularly challenging. At one stage, we had 15 loads stored in our yard, all of which had to be kept separate. Ensuring components from different loads were kept distinct was another logistical concern.”

Economical and efficient

The use of hot dip galvanizing on the Metro Tunnel Project plays an instrumental role in achieving the economic benefits desired by the asset owner. These benefits stem from three key aspects: lower initial cost; reduced maintenance requirements; and efficiency in fabrication to installation.

Lower Initial Cost

When viewed against comparable coatings and paint solutions, hot dip galvanizing provides an economical alternative without compromising quality or durability.

For a project as vast and significant as the Metro Tunnel, this translates into substantial initial cost savings. The sheer volume – over 1,600 tonnes of steel and one million components – underscores the magnitude of cost efficiency achieved.

Reduced Maintenance Requirements

“In the challenging environment of a metro system, the long-term resistance to wear and tear delivered by galvanizing means a substantial reduction in ongoing maintenance costs – particularly important given that undertaking maintenance works on an operational train network is expensive and poses health and safety challenges for workers,” said Gucciardo.

Less maintenance not only translates into direct financial savings but also minimises service disruptions, delivering indirect economic benefits by optimising usability of the train network.

Efficiency in Fabrication to Installation

With a compressed delivery timeframe, Stilcon and GB Galvanizing were able to fabricate, galvanize and install all critical components between Anzac and Arden stations in line with the client’s needs. The efficient streamlining of this process played a key role in the Metro Tunnel’s anticipated early opening – a year ahead of schedule.

Green innovation: Metro Tunnel’s sustainable blueprint

Sustainability is at the heart of the Metro Tunnel Project. For example, all five of the new stations boast 6-star Green Star design accreditation from the Green Building Council of Australia.

The expansive roof space at the new Arden Station has been used to install 125kW of solar panels – 392 panels in total. These solar panels will generate approximately 140MWh of electricity annually, enough to power about 50 homes. The renewable energy replaces 15% of grid electricity used by the station, and helps power lighting, ventilation, escalators and lifts. It is expected that use of renewable electricity at Arden Station will reduce carbon emissions by approximately 146 tonnes per year.

Given the emphasis on environmental sustainability throughout the design and construction of the Metro Tunnel, it is little wonder that galvanizing was specified. The long-term durability provided by galvanizing is achieved at a relatively low environmental burden in terms of energy and other globally relevant impacts, particularly when compared to the energy value of the steel it is protecting.

PROJECT TEAM

Client: CYP Design & Construct JV (joint venture between John Holland Pty Ltd, Bouygues Construction Australia Pty Ltd and Lendlease Melbourne Metro Pty Ltd)

Galvanizer: GB Galvanizing

Fabricator: Stilcon

Structural Engineer: TTW Structural Engineers

Steel Suppliers: BlueScope and Infrabuild

Steel Detailer: RMS Engineering Services

Acoustics Works Contractor: Baron Forge

Article by: Sally Wood, [wordly.com.au](https://www.wordly.com.au)

ANNIVERSARIES



Galvanizers Association of Australia turns 60

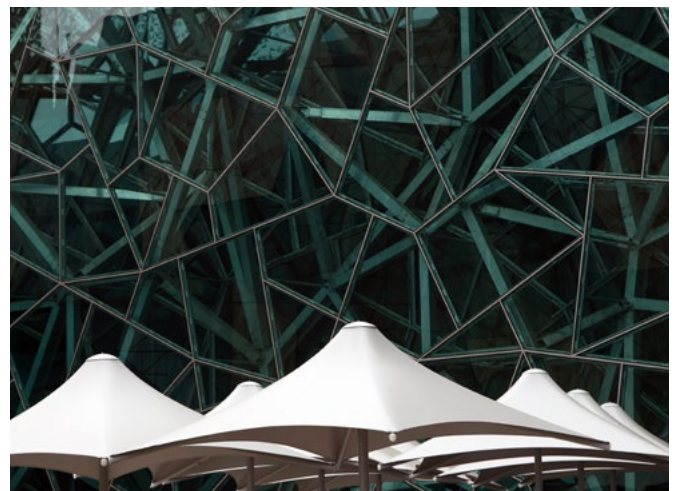
In July this year, we celebrated our 60th Anniversary of supporting the Australian hot dip galvanizing industry. Over the years, our members have provided corrosion protection for the most famous structures and for many smaller, less iconic structures. Sometimes these projects feature HDG, while in others HDG does its best work behind the scenes. The three projects featured below are just some of the historical projects we have been involved with over the years – perhaps you have some examples of the use of HDG you'd like to hear more about? Let us know and we'll be pleased to feature them in upcoming issues of *Galvanize*. ■

Federation Square

Fed Square is built on top of Melbourne's most heavily-trafficked railway. Opened in October 2002, it turns 21 years old this year and received five major awards for architectural and design excellence from the AIA by the end of its first year.

The distinctive look of Fed Square is inspired by complex patterns that are identical both on a smaller scale and when viewed as a whole. A combination of sandstone, zinc and glass form triangular pinwheel grids of the same size and proportion to make up a larger triangular 'panel'. Five panels are joined together to create a larger triangular 'mega panel', which is then mounted onto the structural hot dip galvanized steel frame to form the visible façade. We reckon it looked good back in 2002, and it is much loved by visitors and locals alike now.

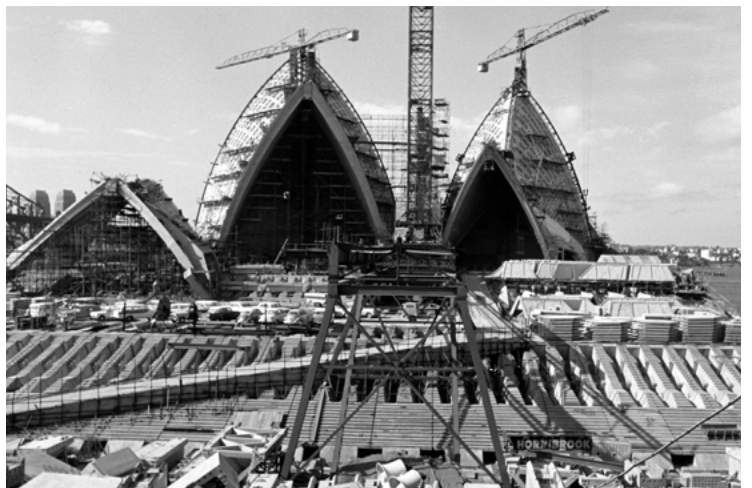
You can visit fedsquare.com to find out more, or talk to us if you want to know about the use of HDG in this famous building. ■





Eastern Freeway Lighting

Since the 1970's anyone who has travelled out to Doncaster (and beyond) from the Melbourne CBD has used the iconic Eastern Freeway. Some might even have noticed the towering central lighting columns that guide your way. Fewer still will have noticed they are hot dip galvanized in segments. These light towers are now around 50 years old and have never been touched other than to replace the lights every now and then. A tribute to durability, when the galvanizing eventually wears off, these segments will be able to be regalvanized, providing a truly sustainable solution for hundreds more years. ■



Sydney Opera House

This year the Sydney Opera House turns 50 and the world is celebrating this iconic Australia structure. But did you know the tiles covering the stunning white sails are protected from corrosion by hot dip galvanized mesh? The black and white images above from the 1960's show the construction of the chevrons and the mesh in place.

No short story on the Sydney Opera House can do justice to this great building, so we recommend you go the longer route and visit sydneyoperahouse.com to perhaps view the 50th Anniversary Film and celebrate a world-wide recognisable image. ■



The influence of thermal cutting processes on hot dip galvanized coatings

Flame-cutting, laser-cutting, and plasma-cutting change the steel composition and microstructure in the zone on and around the cut surface. This influences the formation of a hot dip galvanized coating which sometimes makes the minimum coating thickness more difficult to obtain and may cause decreased cohesion/adhesion of the coating to the steel substrate. Clause 9.6 of AS/NZS 2312.2 and Appendix D1.3 of AS/NZS 4680 also describe the influence of the thermal cutting processes on a hot dip galvanized coating.

Thinner coatings

Cutting using high temperature techniques makes the steel surface of the cut edge less reactive due to the depletion of alloying elements such as silicon in these areas. The formation of the zinc-iron alloy layers during the galvanizing process is consequently reduced and upon withdrawal from the zinc bath these areas will have a somewhat thinner coating compared to the other surfaces of the article.

The thinning effect is illustrated in the two micrographs seen in Figures 1 and 2 showing the zinc coating on different surfaces of an 8 mm thick steel part. The thickness of the coating at the edge of the part (Figure 1) is approximately 60 μm whereas the galvanized coating thickness 10 mm from the cut edge (Figure 2) is approximately 100 μm .

Figures 3 and 4 show a 50 mm base plate of a fabricated article with flame-cut edges. As well as a visible thickness variation on the cut edge itself, Figure 4 shows the measurement of the coating thickness on different areas of the plate with a significantly thinner coating on the thermally cut edge.

Decreased cohesion/ adhesion

Coatings formed on thermal cut surfaces are known to be more susceptible to flaking at edges during transport and handling. Thermal cutting processes can produce slag and oxide inclusions on the steel surface which generally are unable to be removed in the normal galvanizing pre-treatment process. If these slag and oxide inclusions are not removed prior to galvanizing, a rough coating with poor adherence will result.

Fabrication to AS/NZS 5131

Clause 9.8.5 of AS/NZS 5131 recognises the issue of thermal processing and requires flame cut, laser cut, and plasma cut surfaces to be ground off and the sharp edges associated with these surfaces to be treated to the specified AS/NZS 5131 treatment grade. However, internal faces, bolt holes, and venting and draining provisions are generally not required to be ground off unless they create sharp edges likely to be damaged in transport or handling.

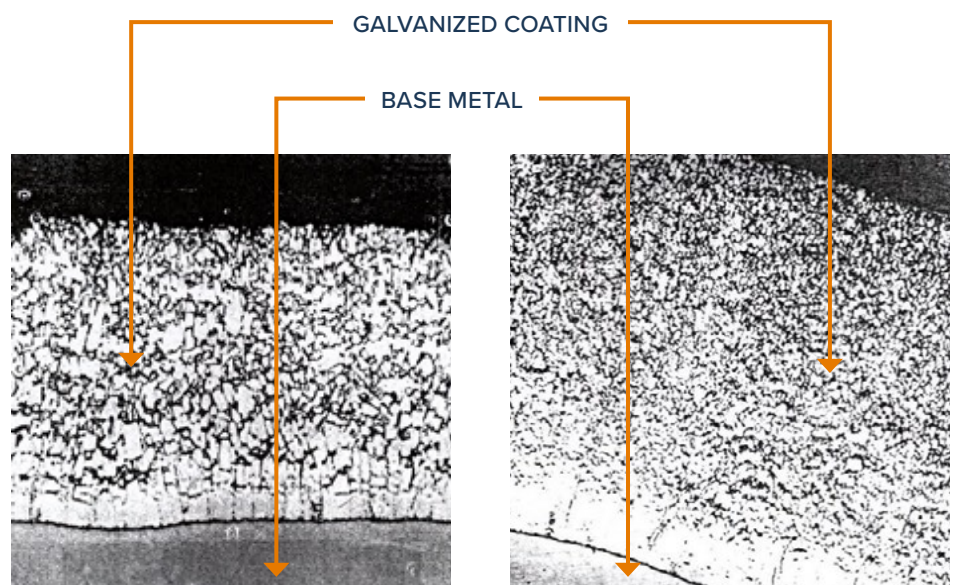


FIGURE 1: Micrograph of coating on flame-cut edge (200x)

FIGURE 2: Micrograph of coating on uncut areas (200x)

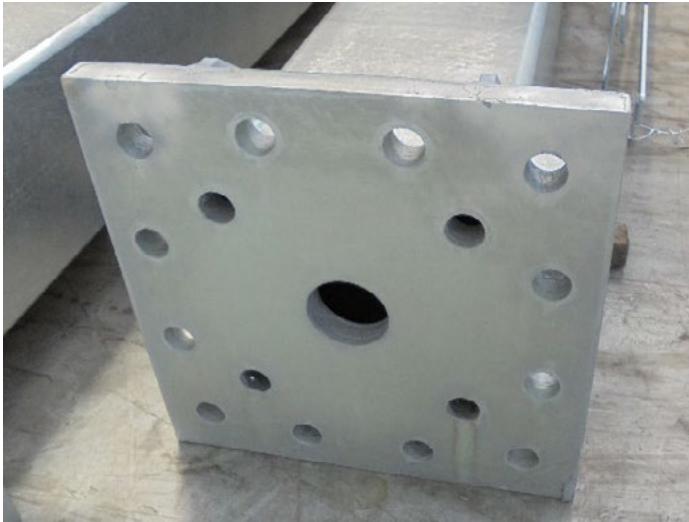


FIGURE 3: Base plate, 50mm thick, with flame-cut edges



FIGURE 4: Measurements showing significant variation in coating thickness on flame-cut edge



FIGURE 5: Flaking of coating at a laser cut edge

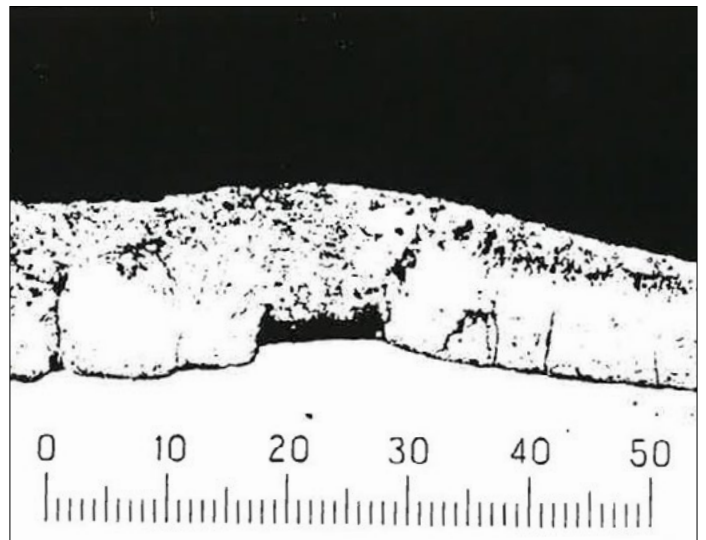


FIGURE 6: Micrograph of flame-cut surface showing retained slag/oxide

Summary

To ensure adequate cohesion and adhesion of the HDG coating, flame-cut, laser-cut, and plasma-cut surfaces should be ground off by the fabricator and sharp edges should be removed prior to galvanizing. If the fabrication specification includes a requirement to meet AS/NZS 5131, then thermal cut surfaces must be treated to the requirements of the Standard.

Grinding exposed thermal cut faces will lead to a more reliable hot dip galvanized coating that is less susceptible to transport and handling damage and which also meets the requirements of AS/NZS 4680.

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- Pasminco.** (1990). *Report TSP No TP06: The Uneven Galvanizing of Flame-Cut Edges*. Port Pirie: Pasminco Research Centre.
- Standards Australia / Standards New Zealand.** (2006). *AS/NZS 4680 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles*. Sydney and Wellington: Standards Australia & Standards New Zealand.
- Standards Australia / Standards New Zealand.** (2014). *AS/NZS 2312.2 Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 2: Hot dip galvanizing*. Sydney and Wellington: Standards Australia & Standards New Zealand.
- Standards Australia / Standards New Zealand.** (2016). *AS/NZS 5131 Structural steelwork - Fabrication and erection*. Sydney & Wellington: Standards Australia and Standards New Zealand.



The BCA requirements for the corrosion protection for structural steel have changed

The 2022 version of the Building Code of Australia has brought significant change to the *deemed-to-satisfy* requirements for the corrosion protection of structural steel. No longer in Volume 2, the new requirements can be found in Section 6.3.9 of the ABCB Housing Provisions Standard 2022.

The minimum requirements for corrosion protection are now aligned with the environment, and use the same environmental definitions shown in AS/NZS 2312.2. Table 6.3.9.a of the ABCB Housing Provisions Standard lists options for HDG, paint and duplex coatings, where all coatings must comply with either AS 2312.1 or AS/NZS 2312.2. The same requirements apply to both interior and exterior environments and no longer is it acceptable to simply apply two coats of “house paint” to un-blasted steel. In the new code, pre-galvanized hollow sections are considered *deemed-to-satisfy* in areas with low corrosivity (C2) when all cut ends and other damage is repaired.

The minimum requirements for HDG coatings are typically lower than those in AS/NZS 4680 as the ABCB has specified the galvanized coating mass to give a minimum of 15 years life to first maintenance across each zone of corrosivity. This is not stated but can be calculated based on the first-year corrosion rate of zinc shown in AS/NZS 2312.2.

The new requirements are good news for homeowners, designers, builders, and galvanizer alike. The coating thickness on batch HDG articles varies with steel thickness and this can be related to the deemed-to-satisfy provisions of the 2022 Housing Provisions Standard.

For AS/NZS 4680 conforming products, all batch HDG coated steel can be used in areas of medium corrosivity (C3) and batch HDG coatings on steel sections greater than 3mm can be used in areas of high corrosivity (C4) – this typically covers all areas of Australia to within 200m of breaking surf. Areas with very high corrosivity (C5) will require a duplex or HDG900 coating.

There is a transition period for the new requirements until May 1, 2024, during which the requirements from the 2019 code may still be used. More information is available in our Advisory Note AN 49, available [here](#) (a free registration is required).



INDUSTRY NEWS



60 years of Galserv

Galserv began life as Galvanising Services under the Graham Group in 1963. It was one of the first galvanisers in Australia and a founding member of the Galvanizers Association of Australia. Now part of NEPEAN Building & Infrastructure, this year marks 60 years of Galserv servicing construction and infrastructure projects that helped build an ever-expanding Sydney.

Joshua Nolan, General Manager of Galserv, states, "We're proud of our long history of supporting major infrastructure and construction projects in New South Wales and beyond. We've worked on Sydney Harbour Bridge modules, Sydney Boathouse, Taronga Zoo's elephant enclosure, Sydney Metro stations, Scenic Railway, the Illawarra Fly Walk and almost everything in between."

The business has marked the milestone as a time to reflect on a rich history spanning six decades and looks to the future for its customers and dedicated team who have made this possible. Nolan continues, "We take immense pride in what our team accomplishes. Highly skilled and dedicated, our people are driven by a shared purpose in our NEPEAN DNA to make the customer successful, and that's key to our future innovation and investment."

The team at Galserv is thrilled to reach 60 years and celebrate this milestone with every team member, past and present, who has contributed to its success. ■



Furphy Celebrates 150 years in Shepparton

More than 500 locals and dignitaries gathered at the Furphy Museum in Shepparton in November to celebrate 150 years of Furphy manufacturing in the region.

The festivities included a Furphy Water Cart Display Competition, Furphy historical works (re-barrelling), a tour of the Furphy Historical Museum, a Furphy Water Tank End Auction and dinner.

Exhibitors displayed 23 Furphy Water Carts of different styles and 15 Water Tank Ends – featuring a new design – were cast to commemorate the occasion, with five being awarded to the winners of the Furphy Water Cart Competition.

A massive \$50,000 was raised for the only tank end sold under the hammer at the celebration. The proceeds will go to the local 'Lift Off' scholarship program to assist young people in the community make the next step to secondary education.

What a milestone! ■

Photo above: Adam Furphy, Greater Shepparton City Council Mayor, Councillor Shane Sali, and Sam Furphy.



Andre Meneghello Rises to Chairman

At the last Board Meeting of the 2023 GAA Board, Andre Meneghello of Mgalv was unanimously elected to the role of Chairman, replacing Adam Furphy who has retired as Chairman after four years in the role.

Andre is a Director of the Meneghello Industrial Group and is based in Western Australia, our second WA Chairman after Barry Bebb in 2006-2007. He has been on the Board of the GAA since 2017, coincidentally joining at the same time as Adam, who will remain on the Board to assist with the growth of the hot dip galvanizing industry.

We also welcome David Murada (Korvest Galvanisers) to the Board for the first time. ■

GALVANIZE MAGAZINE

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We provide information, publications and assistance on all aspects of design, performance and applications of hot dip galvanizing.