





# **SEVEN OF THE BEST DURING A TIME OF TURMOIL**

#### In this issue

- 2 Anthozoa: Galvanizing Protects the Single Largest Underwater Sculpture in the World
- 5 The Benefits of Galvanizing Cruise into the Port of Brisbane
- 8 Curtin University's Galvanized Yarning Circle Pays Tribute to Indigenous Culture
- 12 The Spirit Of Progress: Galvanized for a Truly Striking Result
- **15 Julia Reserve:** An Iconic Industrial Design
- 18 Indooroopilly Riverwalk: An Iconic Brisbane Landmark Galvanized for Durability
- 20 Petuna Rowella: Galvanizing the Most Unique Aquaculture Site in the Southern Hemisphere

#### Editorial

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Over the last two years many industries have been affected by major bushfires, raw material shortages, labour availability, and, of course, COVID. The Australian hot dip galvanizing industry has not been unaffected, but for the most part, has remained open and continues to provide protective coatings an amazing array of innovative Australian fabrications.

This issue of galvanize celebrates seven of the best projects from the last two years, including the 2020 and 2021 Sorel Award winners. The Sorel Award commemorates French civil engineer Stanislaus Sorel who filed a patent in 1837 for a method of protecting iron from rust - the parent of the HDG process. It is designed to highlight the high standards of design, fabrication, construction, and corrosion protection achieved when hot dip galvanizing features as a key component of a project.

The Brisbane International Cruise Terminal was the 2020 Sorel Award winner. It showcases the benefits of modular construction with galvanized steel and dramatically reduced the environmental footprint of the original concrete design.

Anthozoa, which comes from the Greek words 'anthos' (flower) and 'zóa' (animals), was the 2021 Sorel Award winner and is a remarkable underwater concrete and galvanized reinforced sculpture (the largest in the world) which again exhibits the versatility and sustainability of the galvanizing process.

Our other five projects from around Australia are all remarkable and vary from the visually striking Yarning Circle (pictured above) to the more traditional Julia Reserve and Indooroopilly Riverwalk, while the Petuna Rowella and the Spirit of Progress are examples of great communication accomplishing the complex.









## ANTHOZOA: GALVANIZING PROTECTS THE SINGLE LARGEST UNDERWATER SCULPTURE IN THE WORLD



Following the devastation caused by Cyclone Debbie in 2017 across the Whitsunday region, the Queensland and Federal Governments announced a jointly funded \$7 million Tourism Recovery Fund. Part of this funding was granted to Reef Ecologic for the Whitsundays Reef Recovery and Public Art Project.

Commenced in 2018, the Project encompassed coral reef restoration activities, as well as the design, creation and installation of six underwater, inter-tidal interpretive art pieces. Installed at Langford Reef, Anthozoa is one of these six sculptures.

Anthozoa is the single largest underwater sculpture in the world. It is a reimagining of the tiny coral polyp, the life source of the reef. It is a symbol of resilience, regeneration and hope at a time when the future of the reef is greatly threatened – and it is protected by hot dip galvanizing delivered by the APG Group.





Anthozoa was designed by sculptor Jessa Lloyd, and Ngaro artist Nicky Bidju Pryor's artwork is featured in the mouth, where the ripples tell a story of change ahead and cultures working together to save the reef.

The name Anthozoa comes from the Greek words ánthos (flower) and zóa (animals) or 'Flower Animals', as they were earliest known by biologists, a reference to the floral appearance of the perennial polyp stage of all coral species.

#### Innovation in Design

Anthozoa was designed using a 3D scan of a real coral polyp that was upscaled approximately 5,000 times. Sculptor Jessa Lloyd said it made sense to create a piece that would have great strength not only in its aesthetic form, but also in its capacity to deliver as a regenerative structure.

"I think nature is the greatest artist ever; Anthozoa was created by using a 3D scan of an actual coral polyp to determine the dimensions and structure then measured up to its current giant scale," explained Lloyd. "Anthozoa was created using a specially formulated pH neutral concrete mix, which ensures Anthozoa's 100m<sup>2</sup> surface area will provide the perfect surface for new coral to seed on and within the piece exists a chamber filled with crevices and surfaces designed for a range of marine life to shelter."

#### Hot Dip Galvanizing: The Only Choice

Anthozoa's internal structure (or skeleton) is comprised of more than 1,000 linear metres of steel that was hand-shaped to create the form into which the marine-grade concrete layer was bedded. All this steel was galvanized by the APG Group before the exterior of the sculpture was coated with concrete.

According to Steve Pollard (Managing Director, APG Group), "Anthozoa is a combination of different materials. Given that it is submerged underwater in the ocean, and covered in concrete, the substrates used in the metal fabricated structure needed a coating that is proven to hold up in that kind of environment. The go-to coating was galvanizing."



Seawater immersion is a severely corrosive environment for steel reinforced concrete as chloride ions migrate through the concrete matrix over time and initiate corrosion of the steel reinforcement. But galvanizing performs well in this environment because cement paste in the concrete reacts with the zinc to form a protective layer that resists corrosion initiation by chloride ions.

Not only does the galvanizing protect the steel from corrosion but it also provides structural integrity for the pH neutral, marine grade concrete. Unlike uncoated steel reinforcement which relies on the high alkalinity of concrete to maintain passivity, HDG steel remains passive in concrete under both neutral and alkaline conditions.

This combination of stability at neutral pH and high chloride resistance has made galvanized reinforcement in concrete a very common technique used in many applications, including coastal and marine structures.

Galvanized steel also delivers higher levels of adhesion to concrete, when compared to uncoated steel. The higher level of chemical adhesion increases the bond between the galvanized steel and the concrete. This bond is further increased by mechanical interlock between the concrete and the surface of the bars used.

# **ANTHOZOA:** GALVANIZING PROTECTS THE SINGLE LARGEST UNDERWATER SCULPTURE IN THE WORLD

### Early Involvement of APG Group

The unique nature of the sculpture design required considerable skill and collaboration before the fabrication and galvanizing of the structural base and internal skeleton could commence.

APG Group was engaged early in the design process, which helped ensure that the design concept was clear from the outset. Sculptor Jessa Lloyd, steel fabricators Strathdickie Engineering, and galvanizers APG Group were in close collaboration throughout the design phase to deliver the best possible outcome.

"There was a lot of backward and forwards in the design stage. Like everything, the more effort you put in up front to get the design and critical logistical elements correct, the better the end result," said Pollard.

In the end, due to its sheer scale, the sculpture was engineered into six separate parts, that came together to create a form that rises over 6m from its polyp base to tentacle tip.

## The Galvanizing Process

The key challenge overcome by APG Group during the galvanizing process was the sheer size of Anthozoa. "The enormous size and scale of the sculpture caused some difficulties. We had to create individual components that were able to be transported, able to be galvanized, and able to be reassembled," said Pollard.

Even when the sculpture was dismembered, the largest piece was a 3.8m diameter cylinder. As Pollard explained, this piece was rolled through the zinc to deliver a seamlessly even coating. "There was one large article in particular – a big cylinder.

We had to make up a dipping jig. The jig was fitted in the centre of cylinder, one edge of the cylinder was dipped into the zinc, and then it was spun around on the central axis. The cylinder went around and around until it was covered evenly with the zinc."

"This rollover dip was further complicated due to the support base that stuck out. Minor modifications had to be made once the sculpture arrived in Townsville to ensure it would fit in the galvanizing bath. Two of the support base legs had to be cut off the sculpture, galvanized separately, and then welded back onto the base later," said Pollard.

#### An Underwater Wonderland

With facilities in Cairns, Townsville and Mackay, APG Group has been in the business of galvanizing for over 55 years. Their projects have ranged from road signs, footbridges, and safety barriers, through to railway footing and overhead equipment. And all their projects have one thing in common: superior quality, long-term corrosion protection delivered with unrivalled customer service.

"APG is a long established, large capacity business. We have the machinery, people, skills and knowledge to make whatever projects come our way a success for our clients. Often, it's the little things – gained over years of experience – that make the biggest difference," said Pollard.

"It's certainly not every day you get to work on the tallest underwater sculpture in the world. I've never seen anything like it before, and don't expect to again. With all its unique elements, technical challenges and its high profile nature, Anthozoa was a career highlight. It was fantastic to be involved."

In an Australian and Great Barrier Reef first, avid snorkellers and divers can now experience an underwater wonderland, protected by galvanizing. The unique artworks, particularly Anthozoa, not only provide amazing scenery for guests to enjoy, they act as a new base for coral growth and animal shelter.







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PROJECT TEAM Client: Reef Ecologic Artist: Jessa Lloyd and Nicky Bidju Pryor Engineer: Paragon Consulting Engineers Steel Fabricator and Detailer: Strathdickie Engineering Hot Dip Galvanizer: APG Group

## THE BENEFITS OF GALVANIZING CRUISE INTO THE PORT OF BRISBANE

The new \$177 million Brisbane International Cruise Terminal has been designed to treat passengers to a world-class experience. Located at the mouth of the Brisbane River with access to deep water, the Cruise Terminal is equipped to handle a range of ships, including the largest cruise ships in the world.

Over 180 cruise ships had been scheduled to arrive during the 2020-2021 season prior to the outbreak of the COVID-19 pandemic. While COVID-19 is likely to have a sustained impact on tourism globally, the Cruise Terminal is expected to become a major gateway to south-east Queensland long-term, and a vital pillar of the tourism industry in Brisbane and throughout the sunshine state.

The Cruise Terminal will also deliver a major, long-term economic boost to the region. Within 20 years, it is likely to triple Brisbane's cruise industry to: support 3,750 jobs, bring over 760,000 visitors to the region annually, and contribute \$1.3 billion in net expenditure to Brisbane's economy.

The terminal building itself occupies approximately 9,300m<sup>2</sup>, set over two levels, and is connected to a 200m long wharf. The elegantly designed structure features a covered elevated walkway from the passenger drop off area into a large-span covered plaza, which then continues into the main entry, embarkment hall, and café. Passengers access level one via travelators to immigration, then make their way onto the elevated walkway and through to the cruise ships.

The Cruise Terminal also encompasses a 900-space car park, fitted with solar panels that will generate approximately 1,300MW of power each year – the equivalent of powering approximately 160 homes. It is the Port of Brisbane's largest solar installation to date.

Another benefit of utilising the galvanized steel modular system approach was that the spans could be constructed at the same time as the wharf and piers

#### Transitioning from Concrete to Steel

Initially, the design of the elevated walkway called for the use of two large steel box beams on concrete piers with multiple pre-cast concrete slabs fitted on top to form the walkway base. Steel roof portals were then to be fixed on top of the pre-cast concrete. The walkway consisted of twelve individual spans measuring 5.8m wide x 4m high and up to 32m long per span. This design would have meant working at height over water for the duration of the build.

Hindmarsh (the head contractor on the project) was keen to re-design the walkway to eliminate working at height over water during the installation of the elevated walkway trusses, and to reduce the overall build time.

According to Phil Cox (General Manager East, DSI Underground), "Collaboration between the architects Arkhefield, steel fabricators Steel Fabrications Australia, and the galvanizers DSI Underground saw the design undergo significant revisions. The concrete piers and slabs were replaced with hot dip galvanized steel."

As a result, over 700 tonnes of galvanized structural steel and purlins were used in the construction of the Cruise Terminal building, the elevated walkway, and the car park. All this steel was supplied by local steel mills, or ACRS approved mills (if the material was unavailable locally).

"The new lightweight galvanized steel truss modular walkway design was developed to enable 12 spans to be fully built on the ground – complete with louvres, roofing system and glass. Once each of the module spans was complete, they were lifted into their final position with a variety of mobile cranes. This reduced the working at height issue by more than 90% compared to the original pre-cast concrete floor design," said Cox.

"Another benefit of utilising the galvanized steel modular system approach was that the spans could be constructed at the same time as the wharf and piers. This saved a considerable amount of time, which was particularly important given the tight project schedule."



#### THE BENEFITS OF GALVANIZING CRUISE INTO THE PORT OF BRISBANE

The high profile nature of the project provides a real opportunity to highlight the benefits that hot dip galvanizing delivers, particularly when compared to pre-cast concrete installations



#### Technical and Engineering Innovation

With hot dip galvanizing chosen as the superior surface treatment, the challenges posed by the new design were identified early. Arkhefield, Steel Fabrications Australia and DSI Underground worked closely to ensure the best possible outcome for the project.

"Our galvanizing bath is 13m long x 1.8m wide x 3m deep. To alleviate any issues related to the width of our bath, the sides of the truss – which had stubs welded perpendicular to the top and bottom chords to facilitate bolting to the horizontal floor, roof and bracing steel members – were fabricated in a particular way," said Cox.

"With respect to the length constraint, all the trusses were split into lengths no longer than 12m. For instance, a 24m truss consisted of two 12m sections that were then bolted together on-site. This innovative design change allowed the trusses to be efficiently galvanized and transported to site without incurring significant additional transport costs."

"The new design also had to take into the consideration suitable venting and draining without compromising the aesthetics. All RHS trusses were internally vented, with a small inspection hole located in a position as to not detract from the visual appearance of the finished structure," said Cox.

# Improved Maintenance for Reduced Costs

As per AS/NZS 2312.2 and AS 4312, the Cruise Terminal is located in a C4 corrosivity environment. As such, one of the reasons for the selection of hot dip galvanizing in lieu of a paint system was the lower cost and a longer time to first major maintenance. It is estimated that the Cruise Terminal will have up to 33 years coating life to first major maintenance in the extreme marine environment.

"With Lysaght Bondek<sup>®</sup> selected as the material of choice for the elevated walkway, extensive corrosivity testing was carried out. As a result of this sample testing, we decided to strip the pre-galvanized Bondek<sup>®</sup> and hot dip galvanize it in order to achieve thicker coatings. This increased the coating thickness by approximately three times, considerably increasing the life span of the structure, and reducing ongoing maintenance costs."

"The high profile nature of the project provides a real opportunity to highlight the benefits that hot dip galvanizing delivers, particularly when compared to pre-cast concrete installations. With design considerations integrated early in the planning process, even oversized galvanized steel assemblies can be practical, safe and economically beneficial in the long-term," said Cox.



THEFT



Steel Detailer: CND Structural Services Galvanizer: DSI Underground

## **CURTIN UNIVERSITY'S GALVANIZED YARNING** CIRCLE PAYS TRIBUTE TO INDIGENOUS CULTURE



The Curtin University Indigenous Learning Circle, known as the Yarning Circle, is a significant project for the University and its Centre for Aboriginal Studies. A cultural and educational celebration of Curtin's Indigenous community, the Yarning Circle's rammed earth seating and large steel canopy will provide the Curtin University and wider communities a space to pause, meet, reflect, and connect.

With construction completed in August 2020 by Hoskins Contracting, the outdoor venue will provide On Country and integrated learning experiences for Curtin students, staff, and visitors. The Yarning Circle will provide links to the transformational learning and education of Noongar Culture seen at the university's Nowanup Bush Campus and contribute towards Curtin University's continued action towards Reconciliation.

The new outdoor venue will increase the use of Jack Finney Lake and activate the natural oasis for learning and leisure activities. The project also strengthens the bonds between the Perth campus and the Nowanup Bush Campus, providing a conceptual link between the two.

The galvanizing industry will benefit from this project in several ways. The project demonstrates the benefits that galvanizing can deliver in architectural and sculptural purposes (for which galvanizing is often overlooked) The Yarning Circle features a canopy designed to echo a thatched roof, which creates dappled lighting and a sense of enclosure. The entire canopy and its supporting structure was hot dip galvanized by Hartway Galvanizers Naval Base.

The structure was comprised of two very large diameter sections – each of which was 12.4m by 4.5m – joined together to create the canopy.

The canopy was created using interwoven rod and reinforcing bar to create a thatched roof effect. The material used in the canopy included 5.8 tonnes of rolled RHS and round bar rods with the final dimensions being 12.4m by 9m in width comprised of two halves to allow double dipping of the items. There were also nine CHS columns required to support the canopy.

According to Paul Edmondson (Works Manager, Hartway Galvanizers Naval Base), "The design of the interwoven rod and reinforcing bar necessitated an extremely intricate fabrication process, as well as careful consideration of venting and drainage requirements during galvanizing. The end result is a true testament to the high-quality workmanship and attention to detail delivered by all members of the project team."

"The galvanizing industry will benefit from this project in several ways. The project demonstrates the benefits that galvanizing can deliver in architectural and sculptural purposes (for which galvanizing is often overlooked)."

"Its location in a prominent university will serve to educate future generations of architects and engineers about the aesthetic appeal and durability of galvanizing. Lastly, it demonstrates that early involvement of the galvanizer in the design stage can help reduce costs, rework, and ensure the project stays on-schedule," said Edmondson.

#### A Distinctive, Natural Appearance

The entire structure was painted with a duplex coating using Porter Paint Liquid Iron finish, with Insta Rust applied to give it a weathered finish. A topcoat of Instant Rust Clear Sealer was also applied. This coating served dual purposes: it enhanced the aesthetics of the structure, creating a finish akin to weathering steel that blends naturally with the surroundings and pays homage to Australia's landscape; and it further enhanced the durability, and therefore service life, of the structure.

"The distinctive, natural weathering steel patina complements rural environments particularly well, but can offset modern architectural features, like concrete, just as effectively. Weathering steel finishes also conjure images of the Australian outback, which was particularly important given the Indigenous links embedded in this project. As such, this project has the potential to expand the demand for galvanizing by opening new markets and applications," said Edmondson.

#### Venting and Drainage Engineering

As Edmondson explained, the most challenging aspect of the Yarning Circle project was its design and engineering, particularly those aspects related to venting and drainage.

"We liaised extensively with the client and fabricator on the design of the venting, so that it would not be visible once the canopy was erected. This was because the venting required was quite large and, had it been visible, would have detracted from the overall impact of the structure."



#### **CURTIN UNIVERSITY'S** GALVANIZED YARNING CIRCLE PAYS TRIBUTE TO INDIGENOUS CULTURE

"In addition, the sheer size of the structure at 12.4m x 9m meant that the galvanizing process itself was challenging. This was particularly difficult because our galvanizing bath has a maximum depth of 3m – careful planning was required to ensure a superior quality finish on all steel," said Edmondson.

In order to overcome these challenges, Hartway was engaged early in the project and liaised regularly with the project fabricators, Living Iron, on the delivery of the design drawings.

## Significant Cost Savings

As Hartway Galvanizers Naval Base was involved in the project early, and readily able to contribute to the design of the canopy and supporting structure, significant upfront cost savings were recognised by Curtin University.

For example, by ensuring that venting and drainage requirements were correct early in the process, none of the steel had to be re-fabricated or re-dipped. In addition, designing the steel dimensions around the size of Hartway's galvanizing bath, meant that the items could be split into two 12.4m x 4.5m sections, and double dipped in the 3m deep bath. By utilising

the two halves, not only was galvanizing possible, but the transportation of the items under escort was much simpler.

Finally, Hartway's extensive industry experience meant there no items were distorted post-galvanizing. This eradicated the need for straightening by the fabricators, as well as surface treatment touch-ups.

## Long-term Cost Benefit

The specification of hot dip galvanizing, protected by duplex coating, provided a finish with superior durability and corrosion resistance to either galvanizing or paint alone. In effect, the Yarning Circle's canopy and its supporting structure will last a lifetime.

It is estimated that the canopy and its structural steel will not require any major maintenance for at least 60 years. In comparison, if the canopy had been finished with a standalone three-coat paint system, it is highly likely that it would have required maintenance in about 10 years' time. This extensive difference in lifespan means that Curtin University has significantly reduced its ongoing maintenance costs.





# Involvement of Curtin University Students

In an innovation addition to the project, Curtin University architecture students, overseen by the project's lead design consultant UDLA, were involved in the initial design development through a Work-Integrated-Learning design program. This innovative program enabled students to not only gain valuable experience on a real-world project, but see their designs come to fruition.

"Given its location at Curtin University, the Yarning Circle will be on full display to generations of university students – many of whom may choose to embark upon a career in the construction or infrastructure industries," said Edmondson.

"Students will use the Yarning Circle to gather and connect. As such, the Yarning Circle has the potential to become a real-life advertisement for the longevity and aesthetic appeal of galvanizing and duplex coating, targeting the very students who may one day be responsible for specifying these processes on major projects."













PROJECT TEAM Owner: Curtin University Builder: Hoskins Contracting Designer: UDLA Fabrication and Installation: Living Iron Hot Dip Galvanizer: Hartway Galvanizers Naval Base

## 12 The spirit of progress: Galvanized for a truly striking result



In the second half of the 19th century, a north eastern railway line connecting Melbourne to Sydney was constructed. This railway line featured a single platform station, opened near Rocky Water Holes in 1872. Today, Rocky Water Holes is known as the Donnybrae Estate. Currently undergoing significant development, the Donnybrae Estate will form part of a larger principality: the Donnybrook and Woodstock precincts within the City of Whittlesea.

The entrance to the Donnybrae Estate on Donnybrook Road will have a contemporary urban design that features the 'Spirit of Progress' sculpture, which was fabricated by Bent Metal, and then hot dip galvanized and painted by Geelong Galvanizing.

The Spirit of Progress sculpture honours the importance of the train line's influence in Donnybrae's development. The moving train reflects both the genesis of, and a metaphor for, progress and development in the local area.

The sculpture comprises of two intertwined sweeping arcs in a conical helix and is 5,700mm high and 1,700mm wide. The entire sculpture was constructed in mild steel, with the two arcs weighing just over 500kg each.

David Chaston (General Manager of Geelong Galvanizing) explains, "The steel was galvanized and finished in part with a copper enriched protective

coating of Dulux Weathermax HBR. Superior to automotive paint, the combination of galvanizing and the protective coating delivered a highly durable finish with an extended time to first maintenance of at least 25 years."

"In addition, the coating provides an effective barrier against graffiti and resists repeated cleaning by most propriety graffiti removal agents; it has excellent resistance to splash and spillage of most acids. The high build quality of the product specified means that surfaces are scratch resistant, it also allows for suitable sanding for excellent re-coating. The panelled nature of the sculpture surface will allow smaller areas to be masked out and easily repainted if required. Once again, all of these aspects have greatly reduced the client's ongoing maintenance costs," said Chaston.

The sculpture features several coloured highlight panels. The colour scheme was specifically chosen to represent several aspects: the muted blues with gold pinstripes are a reference to historic train commuters; the red is a reference to historic car commuters; and dark, burnished copper is utilised as the dominant colour to integrate seamlessly with its surrounds and draw on indigenous heritage. All these coloured panels had to be carefully integrated into the galvanizing process.

"The use of galvanizing on the sculpture has afforded the client several benefits. It has provided the structure with the ideal corrosion protection; there is no other option available that could have delivered the same combination of an aesthetically striking finish, superior durability, upfront affordability, and low ongoing maintenance costs," said Chaston.





## Early Engagement for Technical Excellence

Geelong Galvanizing was heavily involved during the project's design phase, collaborating closely with Bent Metal to produce the best possible outcomes.

James Jhong (the Geelong Galvanizing Sales Manager responsible for delivery of the project) illuminates just some of the design aspects that were altered or improved as a result of this collaboration.

"Initially, the internal skeleton structure was quite intricate and would have made the galvanizing process almost impossible. The entire skeletal structure was fabricated from intricate pipework that was bent and rolled to create the desired shape," said Jhong.

"This posed a significant problem with venting and draining. There was a strict tolerance for venting and drainage holes without affecting the overall structural integrity of the sculpture. As such, innovative design of hole placement was critical to ensure the best possible flow of fluids and gases in and out of the structure."

"There were also concerns that the plates chosen would cause distortion. Once the skeletal structure was assembled and fabricated, the entire frame was then covered and stitch welded with layers of 3mm to 4mm plate. This meant that distortion became a serious issue," said Jhong.

Together, Geelong Galvanizing and Bent Metals worked on innovative solutions for the surface area, plate design and stich patterns. Minimising all these aspects made a significant impact in the sculpture's performance during the dipping process. It ensured that when the steel was delivered, it could be processed immediately and effectively, and eliminated time consuming and expensive rework.

Coupled with the thorough venting and draining solutions for the skeletal structure, these technical innovations enabled the frames to move in and out of Geelong Galvanizing's system without any major issues. As a result, the galvanized finish was not only beyond what was anticipated, it managed to highlight and accentuate key aspects of the structure to compliment Bent Metal's overall artistic vision.



#### THE SPIRIT OF PROGRESS: GALVANIZED FOR A TRULY STRIKING RESULT

## A Non-Scalable Design

A major consideration in the design and engineering phase was the creation of a 'non-scalable' sculpture. As such, the sculpture had to be engineered to have a flat surface that was also as smooth as possible.

The sculpture was also designed so as not to have any footholds, clothing entrapments or finger grips. All edges and shadow lines are solid (without any gaps) and rounded to a 5mm edge radius, with a maximum of 6mm in or out from the surface, and none are any lower than 2.3m above ground level. In addition, the distance between the two halves could not be less than 230mm at any point to prevent potential wedging resulting from a slip or fall.

The designs were reviewed by two independent playground assessors who confirmed that all was in line with the safety requirements set out in AS 4685.1.

#### **Epoxy Primer for Extra Protection**

Bent Metal specified an MIO metallic finish for the sculpture to enhance its elegance. As such, a bronze colour was applied over whip blasted galvanized steel with an epoxy primer designed to deliver enhanced protection for external environments.

Careful turning using overhead cranes was essential so as not to damage the sculpture, which was exceptionally well-executed by the paint division. From there, Bent Metal used their architectural painting skills to create shadow effects using different coatings and colours to create the dazzling end effect.

## A Truly Striking Result

Oftentimes, galvanizing is overlooked by designers, particularly for sculptural pieces or projects that require a specific finish. The Spirit of Progress demonstrates that galvanizing, when combined with duplex coating, can deliver a truly striking result. This project has the potential to expand the demand for galvanizing by opening up new markets and applications.

As Chaston noted, the project can serve as an example of the finish that can be achieved, helping to build confidence in the ability of galvanizing throughout the industry.

"Galvanizing has a major role to play in projects that require improved aesthetics, as well as improved durability. A fantastic showpiece of galvanizing and duplex coating, the sculpture is a prime example of a fully protected, durable system that will catch the attention of all that pass by," said Chaston.

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# JULIA RESERVE: AN ICONIC INDUSTRIAL DESIGN



One of Sydney's fastest growing areas, Oran Park Town is a master planned community designed to encourage sustainable living, and deliver a diverse mixture of housing. The \$1.5 billion development is a pivotal element of the New South Wales Government's South West Growth Area. Once complete, over 25,000 residents will have easy access to employment, education, health amenities, public transport, and recreational facilities.

At the heart of Oran Park Town is Julia Reserve Youth Park. This two hectare public open space blends typical recreation facilities and rest areas with more contemporary features like skateable elements, parkour facilities, ping pong tables, multi-purpose courts and kickabout spaces.

Two modern 'ribbon' art structures weave their way throughout the park, covering some 100m, to create a dynamic focal point. Bright, colourful artwork panels adorn the upper 'banner' areas of these 10m high structures. Abstract designs for these panels were developed by local schools and youth with Marla Guppy and Associates and Graham Chalcroft (Vertebrae).

Based on the idea of colour and graphics as identity signifiers, the abstract designs were inspired by the graphics and markings of motorsport vehicles that once raced at Oran Park Racetrack, which was located on the site prior to its development.

Galserv<sup>®</sup> (part of NEPEAN Building & Infrastructure, a division of NEPEAN) hot dip galvanized approximately 20 tonnes of steelwork for the Julia Reserve Youth Park. An artistic focal point itself, this steelwork was integrated into support structures, including the bridges that connect Julia Reserve to nearby homes and community facilities, five very large shade shelters, and the 'ribbon' art structures.



#### Long Design Life

According to Kim Henretty (Marketing Communications Manager, Nepean Building & Infrastructure), galvanizing was the ideal solution for Julia Reserve. Galvanizing delivered superior weathering capabilities, robust resistance, and the lowest overall maintenance cost for the asset's lifespan – a key consideration for asset owners.

"Ultimately, galvanizing was the best, fit-for-purpose solution, given its long design life. It's a much more natural looking coating than paint and far more durable," said Henretty.

"Galvanizing provides Julia Reserve with weathering capabilities and protection from long-term wear in a space that is expected to take some rough handling. This reduces the need for expensive onsite touch-ups and will yield aesthetic appeal for years to come."

The project increases the value of the community, creating a draw card for families and long-term attractiveness for buyers considering their future in the Camden Council area.

#### **JULIA RESERVE: AN ICONIC INDUSTRIAL DESIGN**

#### Iconic Industrial Design

Aesthetics played a crucial role in the decision to specify galvanizing for the Julia Reserve Youth Precinct. The artwork 'ribbon' creates a unique rhythm, highlighting the dynamic relationship between the various zones in the Precinct. Its galvanized finish is eye-catching.

The iconic industrial design and silvery finish of the galvanized steelwork contrasts with the bright, bold artwork panels to create a cohesive urban landscape, and express a youth culture that is embraced by the local community.

"Galvanizing was chosen to add a contrast to the bright colour design, giving it a modern, industrial feel. The high impact aesthetic properties of galvanizing enhance the bold, bright artwork," said Henretty.



#### Speedy Assembly Amid Major Challenges

One of the major challenges in the completion of this project was the widespread bushfires that impacted New South Wales from late 2019 into early 2020.

Galserv<sup>®</sup> processed all steelwork in mid-November 2019, coinciding with the declaration of catastrophic fire danger across Greater Sydney. The bushfires caused thick smoke, poor air quality for people working outside, and widespread concern for personal safety.

The flow-on effects of these impacts extended to reduced timeframes and personnel, and a real need for Galserv<sup>®</sup> to remain agile in their processing and delivery procedures.

"While the project itself was relatively straightforward, it fell at a time when our state was in chaos with the bushfires. The project was managed in exactly the same way as every single job that comes through our facility. A high level of attention to detail was applied to everything – all our processes are very robust and focused on continuous improvement and making our customers successful," explained Henretty.

"Our professional project management process – from forecasting through to delivery – was adapted to suit the circumstances. We made adjustments to production planning and safety controls to account for increased breaks for the wellbeing, safety and comfort of our team. We also increased communication between stakeholders with our team providing updates to our client, including timely text updates when batches were completed. Finally, we ensured stringent quality control and traceability through specific tagging and item identification, for accelerated processing."

The use of hot-dip galvanizing also provided advantages in processing and handling speed. It allowed for rapid on-site assembly – even in adverse weather conditions – to achieve critical milestones. The project was completed just weeks before the outbreak of the COVID pandemic changed the way we live and work.



#### The Future of Urban Living

Julia Reserve Youth Precinct represents the future of urban living. Its dynamic spaces embrace less traditional sport and bring the community together through multiple 'zones' connected as one.

The high-profile project places hot-dip galvanizing in a contemporary urban setting, highlighting the finish as a modern, bold design choice embedded with a raft of technical benefits – appealing to architects and designers alike.

"This project – and others like it – demonstrates that galvanizing offers a twofold outcome: design aesthetic, in addition to durability and design life. The council can reliability specify galvanizing and know that it is going to last a very long time; this project highlights that," said Henretty.

"We're excited to see galvanizing used in a way that enhances the community. Over time, this public space will grow with the community, and serve generations of young people. Ensuring that galvanizing is a part of future projects like Julia Reserve is really important. From a design point of view, there are other options, but none offer the lasting durability of galvanizing."

As new residential developments seek to expand their appeal and provide community facilities for future generations, the lifetime durability, affordability and aesthetic appeal of hot-dip galvanizing is made clear in this project.

We're excited to see galvanizing used in a way that enhances the community. Over time, this public space will grow with the community, and serve generations of young people





#### PROJECT TEAM

Asset Owner: Camden Council Galvanizers: Galserv® Shade, Public Art Structures and Bridges: Fleetwood Urban Builder and Developer: Greenfields Development Company; Landcom Architect: JMD Design Skate and Parkour Design: Convic Skate Construction: Trinity Skate Construction: Perfection Landscape Services Civil Engineering: Calibre Civil Construction: TRN Structural Engineering: Northrop Lighting Design: Lighting Art and Science Public Art: Marla Guppy and Associates; Graham Chalcroft

## INDOOROOPILLY RIVERWALK: AN ICONIC BRISBANE LANDMARK GALVANIZED FOR DURABILITY

Brisbane City Council is committed to providing safer, accessible, active transport routes. As part of this commitment, the \$40 million Indooroopilly Riverwalk project was constructed. A separated two-way cyclist and pedestrian path, the new Riverwalk is 5m wide and 790m long (including adjoining pathways).





Galvanizing was specified because of the durability it offers. Railings can be painted or coated, but for longevity of service life, galvanizing is the best option

It links Twigg Street to the Jack Pesch Bridge and the Indooroopilly Rail Station, with additional connections to Radnor Street and Riverview Terrace. From the viewing platforms along the new Riverwalk, residents and visitors alike can enjoy gorgeous views of the Brisbane River and the iconic Walter Taylor Bridge.

The path is a critical part of the active transport corridor between the Western Freeway Bikeway and the University of Queensland.

DSI Underground delivered 1,580m of galvanized pedestrian balustrading for Indooroopilly Riverwalk, as well as lamp post brackets and cover plates. In total, DSI Underground galvanized over 100 tonnes of steel, including 690 posts, 690 panels and 350 lengths of handrail.

According to Drew Stainton (Senior Sales Representative, DSI Underground), the project was a career highlight. "The Riverwalk will be used by joggers, cyclists, pedestrians, tourists and locals – it's a short-cut between the city, which will attract a lot of foot traffic. That means a lot of people throughout Brisbane will see our work. It really was an iconic project to work on."

#### Why Galvanizing?

With the Riverwalk located in a C3 Corrosivity Category, the use of galvanized steelwork was the optimum means by which to ensure lower ongoing maintenance costs.

"Galvanizing was specified because of the durability it offers. Railings can be painted or coated, but for longevity of service life, galvanizing is the best option. It is also more affordable compared to a material like stainless steel," said Stainton.

DSI Underground was involved early on in the planning process, prior to construction commencement. This helped to ensure a seamless transition for the steelwork, from the fabricator to the galvanizer and onto the site.

It was during the planning process that DSI Underground confirmed the best possible design for the venting, draining and fabrication to achieve the best possible galvanized finish.



The use of galvanizing on the Indooroopilly Riverwalk will enable us to market the use of galvanizing to other government projects – and there are quite a few on the horizon

"We altered some of the venting holes on the original design. There were some different angles in the handrailing that required holes in the exact right positions for venting and draining, as well as handling points so that there weren't any wire marks left on the surface of the handrails. Given the high visibility of the galvanized product and large volume of public traffic, it was important that a high quality galvanized finish was achieved on the handrail and balustrade system," said Stainton.

To further increase service life in an area classified as a C3 Corrosivity Category, DSI recommended that all components were sandblasted prior to galvanizing. The sandblasting process lightly roughens the surface to create more surface area to react with.

"Sandblasting increased the coating thickness. This was particularly important when it came to the low silicon steel in the base plates – in order to achieve the requisite levels of coating thickness set out in Australian Standards, sandblasting was essential. Sandblasting the steelwork also afforded us rapid galvanizing turnaround times, which contributed to our early completion of the project," said Stainton.

"In fact, DSI Underground completed the Riverwalk five months ahead of schedule. As a local Brisbane supplier, working on a local Brisbane project, our turnaround times were fast. Plus, regular onsite consultations with the other project stakeholders around any issues reduced delays and budget blow out."

# Galvanizing, Transportation and Delivery

The design of the Riverwalk featured changing elevations and directions. This meant that each post and panel was unique. To ensure efficient, effective installation, DSI Underground devised a custom process for the galvanizing and delivery of all these unique components.

"The marked steelwork was delivered to our workshop for galvanizing according to its installation sequence. After galvanizing, it then had to be delivered to site, in exactly the same order," said Stainton.

"This meant that tracking of every item throughout the galvanizing process was crucial. Each post and panel had to be individually marked to ensure that it was installed into the correct position along the bridge. Every part was labelled with an ID number to ensure it could be correctly fitted onsite, and then our barcode scanning system provided the traceability required for the project."

"Handling was also a challenge on this project. DSI galvanized a lot of small, loose components, like lamp post brackets and cover plates. All these components had to be packed carefully, so that during transportation and delivery they were not damaged," said Stainton.

# Economic, Environmental, Social and Engineering Innovation

DSI Underground's work on the Indooroopilly Riverwalk produced a variety of beneficial outcomes across all areas, from economic and environmental, through to social and engineering innovation. The project paves the way to support the use of galvanized coatings in corrosive environments and, when marketed well, will lead to further opportunity for the Australian galvanizing industry.

"The use of galvanizing on the Indooroopilly Riverwalk will enable us to market the use of galvanizing to other government projects – and there are quite a few on the horizon," said Stainton.

As a large, iconic, government project, Indooroopilly Riverwalk showcases the superior corrosive protection offered by galvanizing when compared to other coatings.



#### **PROJECT TEAM**

Builder: Georgiou and Brady Marine Architect: Brisbane City Council Engineer: Brisbane City Council Steel Supplier: Vulcan Steel and Steelforce Fabricator: Kenro Metal Galvanizer: DSI Underground (Queensland)

# **PETUNA ROWELLA:** GALVANIZING THE MOST UNIQUE AQUACULTURE SITE IN THE SOUTHERN HEMISPHERE





Originally established in 1949 as a fishing company, Petuna diversified into aquaculture in 1990 and is now one of Australia's largest domestic retail suppliers of salmon. Their marine farm at Rowella on the Tamar River employs around 25 people, where salmon are nurtured in pens for approximately 15 months before being harvested for the consumer.

With strong river flows and tidal movements, the Rowella marine farm has a continual supply of well oxygenated water. It also boasts beneficial biosecurity and environmental outcomes, given its isolation from other marine farms. The walkways that link the farm to the shore make it unique to other marine sites, allowing feeding and harvesting without the need for boats.

Over the last 20 years or so, the Rowella marine farm grew organically, from two polar circles, to comprise of 30 x 24m pens. While these expansions were operationally and technically sound, they were 'pieced together' add-ons. With improvements in fish health, operational ability and mechanical advances, it was clear that the farm would greatly benefit from a complete re-design. As such, the entire Rowella marine farm was upgraded to 22 x 36m pens.





Valmont Coatings hot dip galvanized the new pens, which were comprised of large Parallel Flange Channel (PFC) base frames, with walkway mesh welded onto the surface. Each frame was approximately 12m long and up to 3.4m wide, requiring double dipping. Valmont also galvanized a range of smaller components like lugs, poles and fittings.

According to Marco Bazzano (Sales Manager Victoria and Tasmania, Valmont Coatings), "Galvanizing was used for the Rowella marine farm for its durability. The years to first maintenance and longevity of galvanizing are second to none. Galvanizing can look fantastic if designed and prepared correctly – painted, tarred and plastic finishes just don't look as good."

#### Innovation in Design

Bazzano described how Valmont's involvement during the design phase delivered several benefits to the project.

"We were heavily involved in the design of the platforms from a galvanizing perspective, this was to ensure the components were designed to best practice venting and draining for galvanizing, and all surfaces were coated to the best possible finish and thickness requirements."

#### Logistics and Installation

The project timeframe was critical. The day-to-day operations of the Rowella marine farm continued as usual while the existing 24m pens were removed, and the new 36m pens were installed. This meant that construction and installation had to adhere to strict timelines to ensure that production at the marine farm was not adversely affected.

The strict timeframe was compounded by various site constraints. The site area itself was very tight, with minimal flat hard standing ground. Truck access was difficult, with the construction area itself also doubling as the only route in and out of the marine farm.

The tides only allowed a six-hour window for removal of the existing pens and installation of the new pens. If a new pen was not moored off prior to the tide turning, the structural integrity of the farm was placed in significant danger.

"The installation of the pens was no mean feat. The Installer had to wear a wetsuit, and jump into freezing cold waters – where the temperature is only about 7°C. The frames and walkways were bolted onto permanent floats and floated out into place for installation. When carrying out this type of installation in the middle of winter, parts of your body can go numb," said Bazzano.

Finally, the walkways were manufactured in Launceston, shipped across to Melbourne for galvanizing, and then shipped back to Launceston. This presented a series of logistical challenges, given the considerable number of moving parts.

"Valmont adhered to strict completion times so that the products were on time for the correct ship sailings. Our production scheduling and throughput efficiencies in the plant made this possible," said Bazzano.

Teamwork was absolutely paramount in this project. There was daily communication between the galvanizer, the fabricator and Petuna Group

#### **PETUNA ROWELLA:** GALVANIZING THE MOST UNIQUE AQUACULTURE SITE IN THE SOUTHERN HEMISPHERE

22



## Teamwork and Collaboration

As Bazzano describes, teamwork and collaboration were essential to the success of the project. "The highly effective design of the new pens was made possible through collaboration with the farm, the fabricator, the designers and architects and us – the galvanizers."

"Teamwork was absolutely paramount in this project. There was daily communication between the galvanizer, the fabricator and Petuna Group. The reasoning was that cranes and teams were specifically locked and loaded on set days, all based on tides and water flow for the installation to proceed."

"Attention to detail and passage of information were key – it was imperative that everyone involved had 'buy in'. The active involvement of the entire team ensured that the project was extremely successful," said Bazzano.

Given the success of the Rowella project, there is ample room for future market growth across salmon farms generally, and particularly in Tasmania. It is expected that extensions and reconfigurations of existing salmon farms will grow due to increasing demand for the product. Valmont Coatings is already in discussions for projects over the next two to five years, and beyond.

The highly effective design of the new pens was made possible through collaboration with the farm, the fabricator, the designers and architects and us

#### **PROJECT TEAM**

Developer and Owner: Petuna Group Head Contractor and Fabricator: Crisp Bros. Hot Dip Galvanizer: Valmont Coatings (Melbourne and Launceston) Pontoon Manufacturer: Mitchell Plastics

## **GALVANIZE** MAGAZINE

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