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George Thomson
Rosemary Scott

Prepared by

Galvanizers Association of Australia

GALVANIZING IN ENGINEERING AND THE ENVIRONMENT

Asia Pacific Edition

HOT DIP GALVANIZING

AESTHETICS AND PERFORMANCE FOR AN INNOVATIVE NEW SCULPTURE



The Project – ‘Reverie’

In 2004, the City of Greater Dandenong and the Dandenong Development Board formed a partnership to commission an iconic artwork to be sited in a high profile area on one of the city’s busiest intersections, providing a focal point for motorists and pedestrians.

Queensland artist Paul Johnson’s concept was chosen from a short listed pool of four artists. Johnson is an accomplished artist who has completed a number of innovative light-based artworks in Queensland.

Reverie commands attention during the day with its contemporary hot dip galvanized finish and contrasting red elements and at night engages pedestrian life with its vibrant, interactive laser composition.

Comments from the Artist

“The reasons for the galvanised finish on this 2 tonne sculpture were both aesthetic and pragmatic. The sculpture needed to be part of the commercial/industrial landscape yet different from it. While it has visual links with the poles supporting traffic lights and various signages, it differs significantly in form. It both belongs there, and yet does not. This ambivalence is a calculated attempt to insert something large and strange without arousing the predictable cries of horror and visual pollution.

The work was built in Queensland, with units weighing more than 200 kgs each. A painted surface was not going to survive the 2000 kilometre journey without damage. The galvanized surface, however, showed no signs of abrasion.”

Comments from the City of Greater Dandenong

Grissel Walmaggia, Cultural Planning Officer, said “Dandenong is undergoing significant change and revitalisation with a number of major developments within the central business district. ‘Reverie’ contributes to this revitalisation and is a significant and innovative city landmark that will provide interest and build on the sense of excitement as the city enters a new era.”

‘Reverie’ 2005 by Paul D Johnson

Photographer: Mark Wilson

Acknowledgements – City of Greater Dandenong, Victoria

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DAINTREE DISCOVERY CENTRE



Atmospheric steel corrosion in Australasia is complex and varied due to Australia's great size and diverse climatic zones.

After-fabrication galvanizing has a wide range of capabilities in service and this Far North Queensland location demanded performance in some of the most extreme conditions possible. After considerable research into serviceability and environmental impact, after-fabrication galvanizing was chosen as the most appropriate form of corrosion protection.

Daintree Discovery Centre – An accredited wet tropics information centre

This Discovery Centre is unique and provides an ideal introduction to a remarkable pocket of rainforest in Far North Queensland.

With advanced eco tourism accreditation, the centre is well recognised as a leader in its field and caters for visitors of all ages at this striking rainforest wilderness.

The centre consists of:

The Aerial Walkway

This provides for intimate rainforest viewing at a mid level while connecting the built units of the centre.

Canopy Tower

The tower stands to a height of 23 metres and offers spectacular views over the top of the tree canopy of the surrounding forest. It is cyclone rated and can accommodate 70 people on 5 viewing platforms.

The interpretative display centre

This offers the latest interactive experiences and a wide range of information on such topics as evolution, ecology, flora, fauna and fungi with a useful library component.

A DVD theatre: this provides films introducing creatures from Cassowaries to Crocodiles.

An Elevated Boardwalk

This structure gives access through the forest floor promoting close interaction by enabling visitors to comfortably experience the rainforest at an intimate and elevated level.

Eco Shop: provides souvenirs of this extraordinary experience.

The Daintree Discovery Centre was built in 1989 and is a private enterprise.

Over the 6 years it has been active, the Centre has gained a most impressive record of awards including:

- State Winner 2005 Telstra Queensland Small Business of the Year Award
- Winner 2005 Telstra Queensland Small Business of the Year – MYOB Award
- Winner 2005 North Queensland Best Small Employer of the Year Award
- Winner 2004 Tourism Tropical North Queensland Ecotourism Award
- Winner 2004 Tourism Tropical North Queensland Most Outstanding Submission Award
- Winner 2004 QMBA Tropical North Queensland Tourism & Hospitality Facility under \$2 million
- Finalist 2004 Queensland Tourism Awards



Designing and Building The Centre

Building the Daintree Discovery Centre was an undertaking in the face of the most severe limitations and obstacles of nature.

Prevailing conditions included the difficulties of unmade roads, material load restrictions to manual carrying, a site without power, water or support services and where heavy lifting plant and equipment could not be permitted.

To contain impact on the surroundings, normal welding and hot work were minimized by the use of bolted connections. A stable foundation to achieve no-sway platforms and walkways for the assurance of visitors to this tree top zone was a further design feature.

An innovative 3D design by Quadratic Pty Ltd was instrumental in coordinating the complex design activity.

The project planning required a return to construction fundamentals on the imperative of not damaging the environment whilst building access to experience the location.

The difficulty of this compromise of construction progress and site preservation is well illustrated by the record of regular auxiliary power cuts due to rodents chewing through the wiring.

Weather Conditions

Annual average rainfall varies from 1.2 metres to about 4.2 metres with some areas receiving up to 9.1 metres. These conditions are accompanied by 100% humidity, elevated temperatures and high levels of UV exposure.

The occurrence and type of this rainforest is dependent on both the total and spread of the rainfall throughout the year. The rainfall is higher than anywhere else in Australia and is often referred to as the wet tropics, creating the most difficult construction conditions.

Design and Durability Planning – Steel Construction and Protection.

Given the structural height and span of the various platforms and walkways, steel members were an obvious choice.

However as many protective systems for steel require regular maintenance to meet their required service life, the design had to address upgrading steel protection or alternatively to provide access for regular maintenance and replacement.

In this instance the latter was not a practical option, particularly since product warranties are, in such conditions, strictly limited or often unavailable.

The only course of action therefore was to seek substantive proof of use of products successful in similar environments. Hot dip galvanizing has a long history in Far North Queensland, going back as far as 130 years.



In this context severe steel corrosion is often illustrated as being only at the ocean's edge, in surf or high seas; however the complex environment of this tropical forest includes high salinity, long surface wet time, mould growth, elevated temperatures, and intense UV exposure, all conditions which can contribute to high rates of corrosion within the constant erosion and attack of an undisturbed cycle of life, decay and regeneration.

From an engineering standpoint, the preservation of building materials in this situation is a challenge and permanence hard to achieve.

Summary

Seldom is site delivery and installation of permanent structures as demanding, complex and restrictive of normal construction practice, so it is not surprising that the concept and its execution has won so much acclaim for innovation.

The client's requirements were for damage free coating at installation as well as long service life. **After-Fabrication Galvanizing was the predominant choice of protection for steel elements in this installation.**

Galvanizing's basic characteristics of steel hardness, increased edge cover, cathodic protection, surface patina development, inhibitive properties and UV immunity all come into play in this undertaking.

The Daintree is the oldest continuous rain forest on earth for which this striking Discovery Centre provides an educational gateway to the Queensland World Heritage Region.

*Acknowledgements – Ron Birkett, Director
Daintree Discovery Centre*



Zinc's Major Contribution – Protecting Steel

Zinc brings a multitude of economic and social benefits to society. Man has found a wide range of uses for this versatile natural element, whose properties are valued in many industries.

Galvanizing – the protection of steel against corrosion by metallurgically bonding zinc to steel – is the most important application of zinc, both in terms of volume and economic benefit to society. Corrosion is a significant drain on the economy and is estimated to cost over 4% of GNP each year. Zinc is helping to reduce this loss and new technology is making it possible to improve zinc's performance while at the same time reducing the amount of zinc needed.

Steel is one of the most widely used materials on the planet and thanks to zinc, steel's durability can be prolonged. Both steel and zinc are 100% recyclable and the zinc-steel combination has significant economic benefits in terms of life-cycle costs.

Other significant benefits from using zinc-coated steel are long service life, low maintenance costs and minimal service interruption. In the case of public infrastructure, these benefits contribute to lower maintenance budgets, thereby freeing up public funds for other priorities, without compromising safety or aesthetics.

Increased attention to whole-life costing is causing designers, specifiers and investors to opt for zinc-coated steel in many traditional and new applications, from construction to automobiles, from electricity distribution poles to safety barriers, from farm gates to ski lifts.

Steel so treated is also now recognised in construction economics where its unique handling capability is maintained by the galvanizing alloy coating.

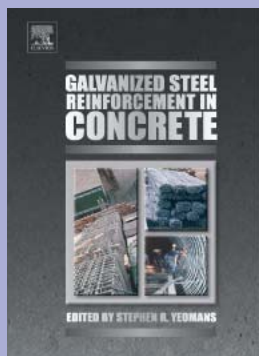
"From the natural resource management point of view, it is relatively favourable to use zinc compared with most other base metals in society. The use of zinc as corrosion protection permits a considerable saving of both natural resources (iron/steel) and energy"

Lander & Lindeström, Swedish Environmental Research Group, 1998: Zinc in Society and in the Environment

GALVANIZED STEEL REINFORCEMENT IN CONCRETE

Stephen R Yeomans (Editor)

University of New South Wales, Canberra, Australia



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124 Exhibition Street Melbourne Victoria 3000 Telephone 03 9654 1266 Facsimile 03 9654 1136

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