

26. RESTORING SERVICEABLE GALVANIZED ITEMS

INTRODUCTION

Much of Australia's power, water and transport infrastructure was installed in the third quarter of the 20th Century. Much of this construction was hot dip galvanized steel, particularly in the power transmission area. In addition, the ownership of many of these assets has changed. Most have been 'corporatised' and some have been privatised.

Many of these facilities have now been in service for close to 50 years, and structurally, are still capable of performing their original function.

Galvanized coatings are alloyed to the steel, and the zinc in the coating acts as an anode to prevent the steel from corroding while any zinc is present. The galvanized coating closest to the steel surface has higher levels of iron in the alloy layer (about 10%). This gives some early warning of the end of the galvanized coating's life on ageing infrastructures.

The approaching end of the galvanized coating's life is manifested by brown staining on the surface but this will not give rise to the severe flaking or blistering associated with the corrosion of un-galvanized steel.

This is an advantage when galvanized coatings need to be maintained, because surface preparation is very simply and there are few, if any hazardous residues to have to contain during the maintenance schedule.

METHODS OF REMEDIATION.

1. Re-galvanizing

If it is feasible to remove the item from service, the most economical treatment is simply to have it re-galvanized. No special preparation is needed to do this, as the chemical pre-treatment in the hot dip galvanizing facility will remove any remaining coating or surface rust.

The galvanizing process will restore the item to virtually as-new condition with the expectation that its service life will be at least as long as its existing service has indicated. In most cases, this will be exceeded, as the re-galvanizing process will result in the production of a thicker galvanized coating

On a typical manufactured item, the savings associated with this form of remediation compared to replacement with new product is in the order of 50-70% when labour costs for removal or replacement are considered.

Savings may be considerably higher for greater volumes of structural steelwork.

2. Painting

In non-industrial environments, where the weathering of the original galvanized coating has left a measurable amount of sound coating on the surface (10-20 microns), a very simply life extension measure is the coating of the weathered galvanized surface with a water-based acrylic topcoat typified by high quality acrylic house paints.

These types of coatings have excellent UV resistance and all have very good adhesion to clean



This 50-year old cast marine bollard has been hot dip galvanized. Although it is badly pitted, the bollard was easily re-galvanized to restore its durability.

galvanized surfaces (free of oily contaminants). While these paint coatings do not have high abrasion or chemical resistance, they perform very well in normal atmospheric environments, and have been used quite extensively as aesthetic coatings on prominent galvanized structures such as transmission towers.

Where rust blooming is starting to appear on the surface arising from the iron's oxidation in the alloy layers, a primer is recommended prior to the application of an appropriate topcoat.

For over 15 years, Industrial Galvanizers Corporation has recommended Wattyl Superetch primer for applications of this type. This recommendation has been based on comprehensive laboratory trials as well as numerous projects on which the system has been used.

Wattyl Superetch is a phosphate-based single-pack inhibitive epoxy primer that performs equally well with either uncoated or galvanized steel. It is a high solvent coating with a recommended applied dry film thickness of no more than 15 microns. It dries very quickly and can be top-coated very quickly after application while it also has a long (months) top-coating latitude.

For aggressive environments (severe marine or industrial) an epoxy primer such as Wattyl Sigma EP Universal primer can be used.

There are a number of zinc-rich paint (ZRP) products that are used for repairing new galvanized coatings, and can equally provide a solution to remediating aged galvanized coatings.

The inorganic ZRP coatings are not recommended for this application so organic (usually epoxy-based) ZRP's are specified for recoating of galvanized steel. These can be either single-pack or two-pack systems.

To emulate the performance of the original galvanized coating, organic zinc-rich paints need a high zinc loading. Most organic zinc rich paints have a zinc loading, by weight, in the dry film exceeding 90%.

WHEN TO TREAT OLD GALVANIZED STEEL.

The weathering of galvanized steel is relatively uniform. Some variations can occur in a single location. They can occur because of the design of the structure and the orientation of the components within it.

However, average corrosion rates can be established by simply measuring the remaining coating thickness and calculating coating loss over time, given that the date of installation and the original galvanized coating thickness can be determined with an acceptable degree of accuracy.

SURFACE PREPARATION

Weathered galvanized coatings develop a stable complex carbonate film on their surface. This provides a good substrate for the application of paints as long as the surface is clean and free of grease and oil.

High pressure water washing will often be sufficient surface preparation as it removes any soluble salts or other corrodents from the surface. Where contamination of the surface has occurred, proprietary degreaser/cleaners are available that will condition the galvanized surface.

Where rusting or more serious oxidation of the zinc (e.g. heavy white rust) has occurred, brush blasting



The re-galvanizing of old boat trailers will restore them to 100% original condition. Boat trailers, anchors and chains are routinely re-galvanized to restore their original corrosion prevention performance.

with illmenite or garnet, or other specialised mild abrasives (foam jet, ice jet) to specification will produce a very good surface for remediation painting of galvanized steel.

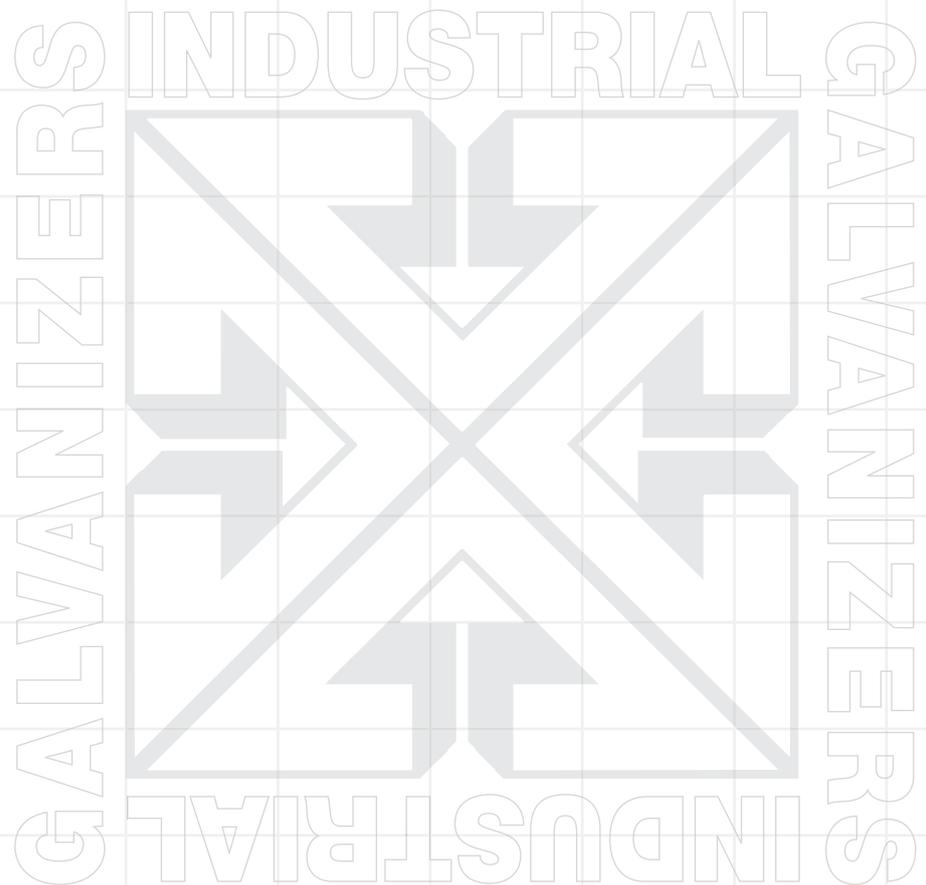
Obviously, where such pre-treatment can be avoided, the environmental management issues associated with site painting become very simple.

SUMMARY

The hot dip galvanizing of steel is a proven method of providing very long-term protection against corrosion for steel in atmospheric environments. 50-year coating life is common, and while the coating is intact, the steel remains in its original condition.

By utilizing the unique characteristics of the galvanized coating, in combination with appropriate coating systems and techniques, the service life of any accessible steel structure can be extended indefinitely at a very low life cycle cost.

Re-galvanizing the steel will restore its durability to as-new condition or better, ifvteh steel item itself is still appropriate for the application.





INGAL

SPECIFIERS MANUAL

| | |
|----|--|
| 01 | SPECIFIERS MANUAL |
| 02 | INDUSTRIAL GALVANIZERS COMPANY PROFILE |
| 03 | ADHESION OF PROTECTIVE COATINGS |
| 04 | BOLTING GALVANIZED STEEL |
| 05 | BURIED GALVANIZED STEEL |
| 06 | CONCRETE DURABILITY & GALVANIZED REBAR |
| 07 | CORROSION MAPPING |
| 08 | COST FACTORS FOR HOT DIP GALVANIZED COATINGS |
| 09 | CUSTOM COATING PACKAGES |
| 10 | CUT EDGE PROTECTION |
| 11 | DESIGNING FOR GALVANIZING |
| 12 | ILLUSTRATED GUIDE TO DESIGN FOR GALVANIZING |
| 13 | DEW POINT TABLES |
| 14 | DIFFICULT STEELS FOR GALVANIZING |
| 15 | DOCUMENTATION - CORRECT PAPERWORK ENSUES EFFICIENT PROCESSING |
| 16 | ENVIRONMENTAL ISSUES FOR INDUSTRIAL COATINGS |
| 17 | ZINC, HUMAN HEALTH AND THE ENVIRONMENT |
| 18 | DEFECTS IN GALVANIZED COATINGS |
| 19 | GALVANIC SERIES |
| 20 | GLOSSARY OF GALVANIZING TERMS |
| 21 | GUARANTEES FOR HOT DIP GALVANIZED COATINGS |
| 22 | LIFE CYCLE COSTS OF INDUSTRIAL PROTECTIVE COATING SYSTEMS |
| 23 | PAINING OVER GALVANIZED COATINGS |
| 24 | POWDER COATING OVER GALVANIZED COATINGS |
| 25 | QUALITY AND SERVICE FACTORS AFFECTING GALVANIZED COATINGS |
| 26 | RESTORATION OF PREVIOUSLY GALVANIZED ITEMS |
| 27 | REPAIR OF GALVANIZED COATINGS |
| 28 | STEEL STRENGTH AND HOT DIP GALVANIZING |
| 29 | STANDARDS - AS/NZS 4680:2006 |
| 30 | STANDARDS - AUSTRALIAN AND INTERNATIONAL STANDARDS |
| 31 | STEEL SURFACE PREPERATION |
| 32 | SURFACE PREPERATION FOR PAINTING HOT DIP GALVANIZED COATINGS |
| 33 | THICKNESS MEASUREMENT OF PROTECTIVE COATINGS |
| 34 | WELDING GALVANIZED STEEL |
| 35 | AN INTRODUCTION TO THE HOT DIP GALVANIZING PROCESS |
| 36 | ZINC COATING PROCESSES - OTHER METHODS |
| 37 | GALVANIZED COATINGS AND BUSHFIRE |
| 38 | LIQUID METAL ASSISTED CRACKING OF GALVANIZED STRUCTURAL STEEL SECTIONS |
| 39 | GALVANIZING 500N GRADE REINFORCING BAR |
| 40 | PREDICTING THE LIFE OF GALVANIZED COATINGS |
| 41 | CHEMICALS IN CONTACT WITH GALVANIZED COATINGS. |
| 42 | ATMOSPHERIC CORROIVITY ASSESSMENT |
| 43 | GLOBAL WARMING - CLIMATE CHANGE AND GALVANIZING |
| 44 | STEEL - ITS CORROSION CHARACTERISTICS |
| 45 | GALVANIZED STEEL AND TIMBER |
| 46 | WHITE RUST PREVENTION AND TREATMENT |

01 - SPECIFIERS MANUAL – THIRD EDITION

Industrial Galvanizers Australian Galvanizing Division (IGAG) operates nine galvanizing plants around Australia, ranging in size from large structural galvanizing facilities to specialised small plants designed to process small parts.

The Australian Galvanizing Division has galvanized in excess of 2 million tonnes of steel products in Australia since its first plant was commissioned in 1965 and is recognized for its ability to handle complex and difficult projects, as well as routine contracts.

This experience has been collated in the Specifiers Design Manual, to assist those involved in the design of steel products and projects to better understanding the galvanizing process and allow the most durable and cost-effective solutions to be delivered to these products and projects. All sections of this Third Edition have been completely updated and additional sections have been included to provide additional technical information related to the use of hot dip galvanized steel.

In addition to its Australian Galvanizing operations, Industrial Galvanizers Corporation has a network of manufacturing operations in Australia, as well as galvanizing and manufacturing businesses throughout Asia and in the USA.

The company's staff in all these locations will be pleased to assist with advice on design and performance of hot dip galvanized coatings and products. Contact details for each of these locations are located elsewhere in this manual.

This edition of the Industrial Galvanizers Specifiers Manual has been produced in both html and .pdf formats for ease of access and distribution and all documents in the Manual are in .pdf format and can be printed if paper documents are required.

The Specifiers Manual is also accessible in its entirety on the company's web site at www.ingal.com.au.

Additional copies of the Specifiers Manual are available on CD on request.

PUBLISHER:

Industrial Galvanizers Australian Galvanizing Division,
PO Box 503, MOOROOKA
QLD 4105
Ph: 07 38597418

EDITOR:

John Robinson,
Mount Townsend Solutions Pty Ltd
PO Box 355, JESMOND NSW 2299
Ph: 0411 886 884
Email: mt.solutions@optusnet.com.au

LAYOUT AND DESIGN:

Adrian Edmunds,
Nodding Dog Design
Ph: 0402 260 734
Email: adrian@noddingdogdesign.com
Web: www.noddingdogdesign.com