COATING AND BUSHFIRES

by CM Staff

INTRODUCTION

Again, eastern Australia has been subjected to a summer of exceptionally bad bushfires for the second year in a row. Bushfires are a normal part of the natural order of things dictated by the El Nino weather cycle of wet, normal and dry years.

The Australian bush has had several million years to acclimatize to this and it is not only extremely resilient in the face of fire (some species of vegetation require fire for their seed germination), but eucalypt forests are particularly flammable.

High fuel loads that develop in good seasons can cause extreme fire events, as occurred in Canberra and other regions over the 2003/2003 summer.

In addition to substantial private property loss, considerable damage occurred to the electrical distribution network where hardwood timber poles were used.

Along with poles, there are many other items such as highway safety barriers, posts and fencing used in bush fire prone areas. The loss of function of these items is another problem that has to be dealt with following a severe bush fire event.

While some steel items may withstand the heat of the fire from a functional point of view, damage to their protective coatings will lead to their premature deteriration due to corrosion.

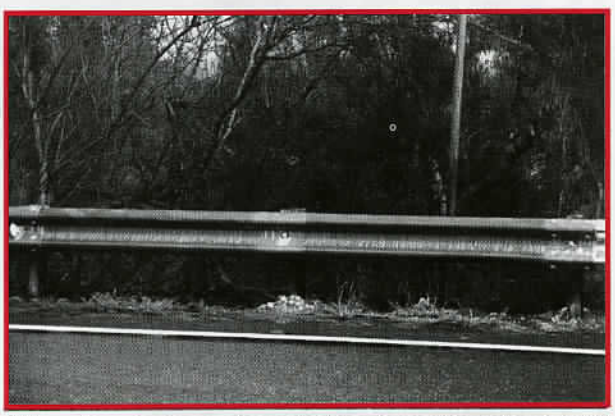
Of the many coatings available, most organic coatings cannot withstand tempatures much above 200°C without suffering damage or deterioration. Some inorganic coatings are designed for high temperature use, but these are generally used for special high temperature engineered applications, rather than for generic coatings at ambient temperature.

Of the readily available common coatings, hot dip galvanized coatings offer unique benefits for surviving severe bushfire events. Unlike almost all other applied coatings, the hot dip galvanizing process actually produces a zinc-iron alloy on the steel surface, making it, in effect, a composite material.

Zinc melts at 420°C, but the alloy formed when it reacts with iron to form the galvanized coating has a much higher melting point of around 650°C.

Another often overlooked characteristic of metal coatings is their inherent ability to reflect heat. When new and shiny, galvanized coatings can act like a mirror to reflect heat away from their surfaces. Even when dull with weathering, a characteristic of shiny metals called 'emissivity' enhances their ability to reflect heat, while non-metallic materials lack this characteristic. The lower the emittance number for a material, the better its ability to refelect heat.

BHP Lysaght has highlighted the benefits of its Colorbond™ steel roof sheeting compared to concrete or terracotta tiles in its literature. Bright metal surfaces are rated at an emittance of around 0.1 while most non-metallic roofing products have an emittance of 0.9.



This section of galvanized guardrail has been subjected to a recent Australian bushfire. Although smoke stained & discoloured, the coating is still in excellent condition.

In bushfire events, the combination of galvanized coating alloy's melting point of around 650°C and the emissivity of the metalic coating gives the coating and what is underneath it a very good chance of surviving the fire.

Increasing interest in the use of galvanized steel poles for power distribution has increased the focus on the performance of galvanized structures in bushfires. Energy Australia has been at the forefront of this change from traditional timber poles.

Following the 2001/2002 summer fires around Sydney and the South Coast of NSW, Energy Australia has undertaken a trial of modular steel poles, jointly developed by INGAL EPS and BHP Steel.

For the poles used by Energy Australia at Putty, NSW, the design specification required a structure that could survive temperatures of 800°C for periods of up to 120 seconds. At first glance this seems to suggest that the coating would not survive the specified conditions. However, steel surface temperatures can be significantly lower than the peak temperature of the fire itself, according to research by Dr Ian Bennetts, Professorial Fellow at the Victorian University of Technology Centre for Environmental Safety and Risk Engineering. Dr Bennetts' work indicates that surface temperatures in conditions of 800°C for 120 seconds do not exceed 430°C for steel of 3 mm thickness and 300°C for steel of 5 mm thickness. In such conditions, therefore, there is very little risk to a zinc-iron alloy coating with a melting point of 650°C.

Another point to note is that the tensile properties of the steel are reduced dramatically at temperatures around 650°C, and structural performance may well be affected prior to the galvanized coating failing.

Any steel pole is likely to survive a bushfire event, simply because it is not susceptible to catching fire like a wooden pole. Under such conditions, the bushfire flame duration and intensity are not enough to compromise the hot dip galvanized coating. The coating should therefore remain largely unaffected through a bushfire event and in so doing continue to perform its primary function of surface protection from the elements.

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PUBLISHER: John C. Hansen
Industrial Galvanizers Corporation Pty Ltd

EDITOR: John Robinson
312 Pacific Highway
Hexham NSW 2322
Ph: 02 4967 9089
Fax: 02 4964 8341
Email: tech@indgalv.com.au
Website:
www.corp.indgalv.com.au/cmmagazine

LAYOUT & TYPESETTING:
Leoni Hines
312 Pacific Highway
Hexham NSW 2322
Ph: 02 4967 9088
Fax: 02 4964 8341
Email: lhines@indgalv.com.au

PRINTING: Newcastle City Printers P/L
34 Metro Court, Gateshead
Newcastle NSW 2290
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Fax: 02 4947 8666

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***CORROSION MANAGEMENT** is published for those interested in the specification, application and performance of protective coating systems.*

Editor.

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The Walsh Bay Bond Stores refurbishment is the first major ice blasting project done in Australia. Specialist site services has ice blasted the old coating from 6000m² of these heritage structures.

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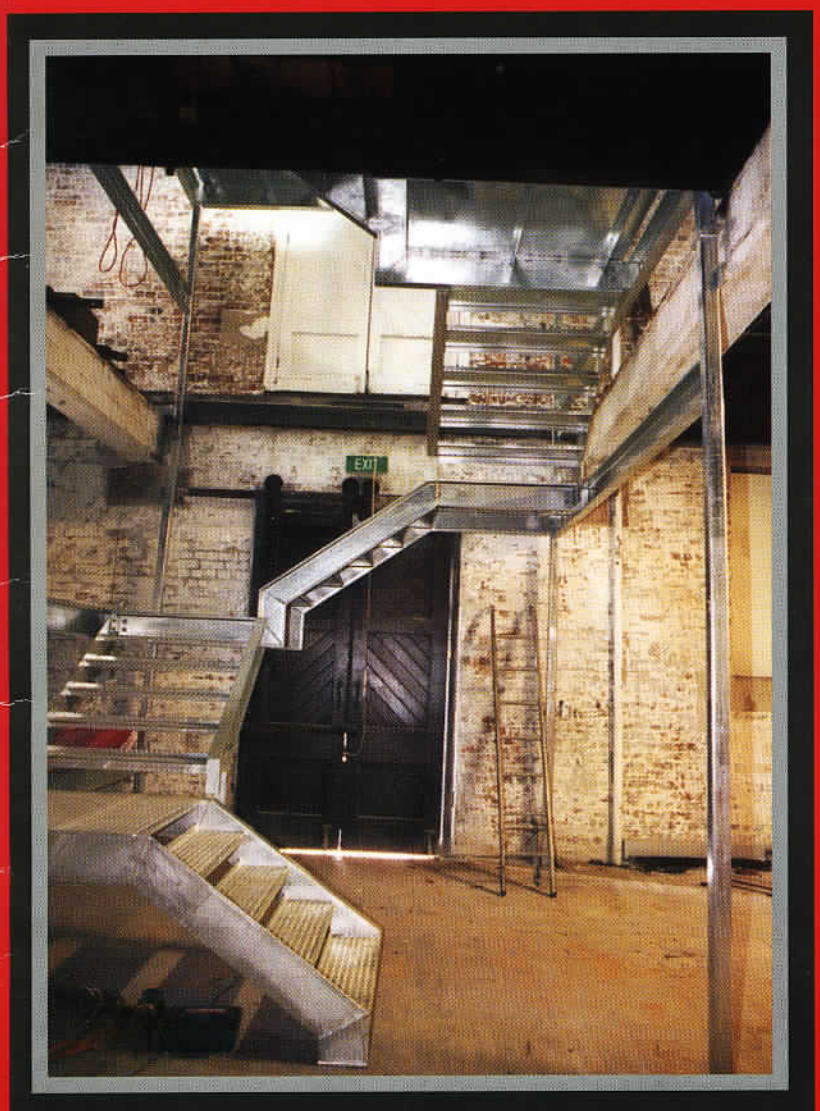

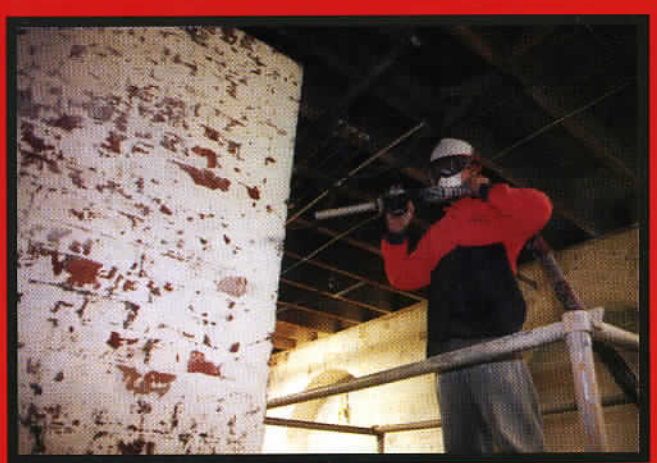

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