ACA BRANCH
NEW ZEALAND BRANCH

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CELEBRATING THE PARIS OLYMPIC GAMES IN METALS

In the centre of the medals awarded at the 2024 Paris Olympics and Paralympics is a hexagon-shaped piece of wrought iron taken from the Eiffel Tower.

The Eiffel Tower was built in 1889 from “puddling iron”. Steel was not used because carbon-steel was considered to be a new and untried alloy in that era. All 5,084 gold, silver and bronze Olympic medals for the Paris games will feature the six-edged iron medallion, which will be set like a gemstone in the medal designed by the French jewellery house Chaumet. The Chaumet design also features a circular arrangement of ridges intended to catch the light and evoke the sun’s rays.

Each gold medal weighs 529 grams and it is plated with 6g of pure gold. The silver medals are 92.5 percent silver - 7.5 percent copper, and the bronze medals are 97 percent copper / 2 percent tin / 1 percent zinc. All three of the Paris Olympic medals have the same unique design. The gold Olympic medal is gold plated over 92.5 percent silver /1.34 percent gold / 6.16 percent copper.

The wrought iron centrepiece is held in place by six small clasps that are intended to resemble the rivets used on the Eiffel Tower. The iron was recovered from a Paris warehouse used to store off-cuts by the tower operating company, which maintains the 330-metre landmark known affectionately in France as the “Old Lady”.

One possible point of concern is that if a Paris Olympic medal was stored in a high humidity environment, then galvanic corrosion may occur on the iron centre piece (acting as an anode) and causing it to tarnish due to surface corrosion. It would be good practice for the medal winners to give their special Paris Olympic medals a coating of a good quality metal polish to keep any moisture away from the iron centre-piece.

ACANZ would like to gratefully acknowledge this month’s sponsor

MATERIALS DEGRADATION IN NZ ATMOSPHERIC ENVIRONMENTS

Many of our members will be aware of the atmospheric corrosion maps that BRANZ has produced over the last 40 years, which have relevance to design of all types of structures – from fences to skyscrapers – in guidance on likely background corrosion rates.

The latest issue of BRANZ's publication BUILD has three articles which are addressing atmospheric corrosion issues and updating on research under way.

The first article describes the network of carefully chosen sites around Aotearoa New Zealand and offshore where metal building materials are systematically exposed.

All New Zealand's major climate zones are represented, from subtropical Northland to the deep south, from the rain-lashed West Coast to semi-arid Central Otago, and the geothermal zone in Rotorua and the eastern Bay of Plenty. Recent additions to the network – in Chatham Islands and on the slopes of Kīlauea volcano in Hawai'i - allow deliberate exposure of materials in more extreme conditions. Kīlauea is far more active than NZ's volcanoes, exposing samples to greater concentrations of sulphur dioxide, hydrogen sulphide and other corrosive volcanic emissions than is usually possible here.

The second article discusses a range of factors in the atmosphere that affect our structures:

- the seasalt that is present, in at least low levels, in much of our populated areas (though the article doesn't highlight the synergistic effect of often-found high relative humidities as well);
- the UV that can damage any polymeric materials, from paint coatings to polymer claddings to polymeric spouting systems (again with potential impacts of high humidity in some systems, which is not referred to); and
- the geothermal emissions which pose problems especially in Rotorua but often further afield as well.

But the third article is the most cutting-edge development, describing how BRANZ and University of Auckland researchers are applying 'machine learning', a subset of artificial intelligence, to the forty years of accumulated BRANZ exposure site results to build models to calculate likely base atmospheric corrosion rates of metals in any particular location by inputting the geographical coordinates and

yearly precipitation.

Empirical models have been developed in the past to do this but reliable results have remained elusive because corrosion comes from complicated interactions between materials and environments, over time scales often lasting years. Empirical models are limited in their ability to deal with this complexity.

A machine learning model is a computer algorithm that searches for statistical patterns in large datasets, estimates mathematical functions and allows discovered patterns to be used for predictions and classifications. In this instance, data from the extensive BRANZ database, including measured corrosion values at over 100 NZ sites in the 1980s and 90s (for most of which meteorological data is available), is fed in and the model tested by having it predict the values for sites whose data had been withheld from the learning process.

The researchers report that so far the predictions look reasonable, but they still have to better train their model for the influences of sea spray and geothermal gases. There is hope, too, that the potential effects of climate change will be able to be incorporated to the predictive model.

There's still a lot of development ahead, and the consequences of rain- washed and unwashed areas still has to have human intervention. But this is very interesting territory!

See the full BUILD articles at https://www.buildmagazine.org.nz/issues/show/climate, and the latest atmospheric corrosion maps at BRANZ Corrosion Map

from John Duncan

Preserving copper and copper alloy items

Copper is a "living metal" because the metal and its alloys, such as brasses and bronzes, can form protective layers in most atmospheres that act as barriers against corrosion. These layers are called patina, and form as a result of different chemical, electrochemical and physical processes that occur slowly during the interaction between the metal and its environment.

They are comprised of corrosion products that contain various compounds that determine the overall behaviour and appearance of the exposed metal.

The term patina refers to fading, darkening or other signs of ageing, which give building facades and sculptures a one-of-a-kind symbol of cultural heritage that is hard to replicate. The patina consists mainly of basic copper carbonates and sometimes basic copper sulphates, but in marine atmospheres the patina may also contain chlorides. After years of exposure as the patina continues to grow, it assumes a dark bluish or green colour. The patina is relatively stable and it acts as a protective barrier for the underlying copper metal.

Cleaning and preservation of copper and its alloys generally comprises physical cleaning and/or chemical cleaning. Physical cleaning methods include water blasting and mechanical abrasive cleaning to remove corrosion crusts and unwanted deposits from the surface. Chemical cleaning entails the use of chelation chemicals to dissolve corrosion products and sometimes more aggressive pickling solutions.

However, the conservation of copper building facades and bronze sculptures can be achieved by treating the surfaces with various types of specialist waxes. The wax provides a waterproof, hydrophobic, chemically stable protective layer. Re-application of the protective wax after about two years reduces the formation of the copper or bronze patina and preserves the original look of the material. Waxes grow old due to oxidation, losing their elasticity and flexibility, so the metal surface needs to be re-conserved periodically to maintain a protective system.

A bronze sculpture in a marine environment with a protective coating applied

FAREWELL TO HANIEH

After seven years' service to the ACANZ Branch and Auckland Division Committees, our former Branch Membership Officer Hanieh Ghominejad has moved to the Perth Office of WSP. Our loss will be the gain of the Western Australian Branch of ACA.

In recognition of her service, the Branch Committee arranged for her to receive on arrival at her new office, a plaque of appreciation as shown below. Trish Shaw has kindly volunteered to take over Hanieh's duties as our new Membership Officer.

DEADLINE EXTENDED FOR ACAF SCHOLARSHIP NOMINATIONS

Each year the ACA Foundation awards scholarships to assist ACA members attend the annual Conference or one of the many ACA training programmes. Details and application forms are available at https://www.corrosion.com.au/foundation/scholarships/2024-sponsorship-forms/

Members are advised that the closing date for applications has been extended to 30h September and the ACA Foundation thanks Centurion Members and the following Corporate Members who funded these scholarships; ie. Denso, Infracorr, MCM and Phoenix Solutions.

from Willie Mandeno

TRAINING OPPORTUNITIES IN NEW ZEALAND

CP1 | NZ | 14-18 Oct 2024 Level 1 Tester

This course is the first of AMPP's Cathodic Protection series, covering both theoretical and practical CP techniques. For more details and to reghister, go to: https://events.blackthorn.io/en/5j1hxgo7/g/3VggT5Fffm/ampp-cathodic-protection-level-1-tester-or-nz-or-14-18-oct-2024-4a2ZI7235y/overview

CP2 | NZ | 21-25 Oct 2024 Level 2 Technician

This certification indicates intermediate-level knowledge of corrosion theory and CP concepts, types of CP systems, and advanced field measurement techniques. For more details and to reghister, go to: https://events.blackthorn.io/en/5j1hxgo7/g/3VggT5Fffm/ampp-cathodic-protection-level-2-technician-or-nz-or-21-25-oct-2024-4a2ZI7236D/overview

CSS | NZST | 21-23 Oct 2024

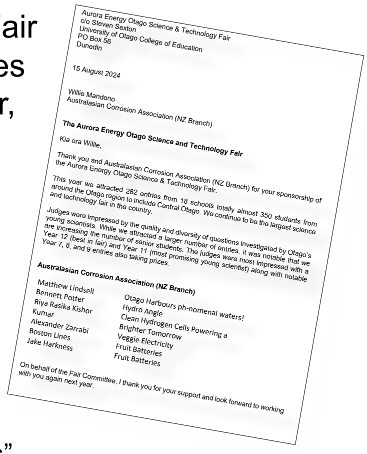
This course addresses the guidelines for writing paint coating specifications that are fit for purpose.
For more details and to register, go to: https://events.blackthorn.io/en/5j1hxgo7/g/3VggT5Fffm/aca-coating-selection-and-specification-or-nzst-or-21-23-oct-2024-4a2ZI7236S/overviewACA

CTC | NZ | 25-29 Nov 2024

This is a great foundation course for all corrosion professionals. For more details and to register, go to: https://events.blackthorn.io/en/5j1hxgo7/g/3VggT5Fffm/aca-corrosion-technology-course-or-nz-or-25-29-nov-2024-4a2ZI71kFV/overview

ACANZ-sponsored winners at Otago Science Fair

The Aurora Energy Otago Science and Technology Fair continues to be the largest of its kind in New Zealand. 282 entries from "almost 350 students" were received from 18 schools this year, which is open to students from intermediate and secondary schools (years 7-12).



Aurora Energy Otago Science & Technology Fair
c/o Steven Sexton
University of Otago College of Education
PO Box 56
Dunedin

15 August 2024

Willie Mandeno
Australasian Corrosion Association (NZ Branch)

The Aurora Energy Otago Science and Technology Fair

Kia ora Willie,

Thank you and Australasian Corrosion Association (NZ Branch) for your sponsorship of the Aurora Energy Otago Science & Technology Fair.

This year we attracted 282 entries from 18 schools totally almost 350 students from around the Otago region to include Central Otago. We continue to be the largest science and technology fair in the country.

Judges were impressed by the quality and diversity of questions investigated by Otago's young scientists. While we attracted a larger number of entries, it was notable that we are increasing the number of senior students. The judges were most impressed with a Year 12 (best in fair) and Year 11 (most promising young scientist) along with notable Year 7, 8, and 9 entries also taking prizes.

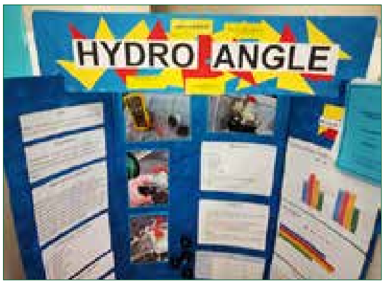
Australasian Corrosion Association (NZ Branch)

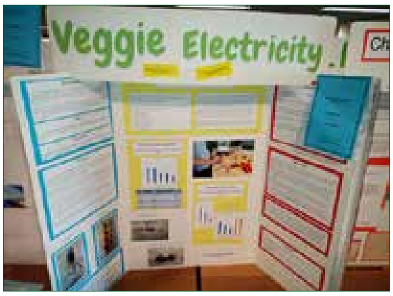
Matthew Lindsell	Otago Harbours ph-nomenal waters!
Bennett Potter	Hydro Angle
Riya Rasika Kishor Kumar	Clean Hydrogen Cells Powering a Brighter Tomorrow
Alexander Zarrabi	Veggie Electricity
Boston Lines	Fruit Batteries
Jake Harkness	Fruit Batteries

On behalf of the Fair Committee, I thank you for your support and look forward to working with you again next year.

ACANZ winners were:

- Matthew Lindsell, Y 7 at Dunedin North Intermediate, for his entry "Otago Harbour's ph-nomenal waters!"
- Bennett Potter, Y 8 at Balmacewen Intermediate, for "Hydro Angle"
- Riya Rasika and Kishor Kumar, Y 8 from Dunedin North Intermediate, for "Clean Hydrogen Cells Powering a Brighter Tomorrow"
- Alexander Zarrabi, Y 9 at John McGlashan College, for "Veggie Electricity"
- Boston Lines and Jake Harkness, Y 9 at Cromwell College, for "Fruit Batteries"





New non-slip product from Metal Spray Suppliers

Steel surfaces on loading ramps, stairs, manhole covers, bridge expansion joints and Navy vessel decks can become very slippery, making them prone to corrosion.

To ensure the safe walking and industrial operating conditions vital to personal safety and productivity, our 28E ARCTEC coating provides a durable, non-slip, anti corrosion coating.

Traditionally, steel structures are hot dip galvanised or painted to protect against corrosion. 28E ARCTEC coating is a thermally sprayed coating that can be applied with a rough texture, and has excellent non-slip properties while being extremely hard and resistant to wear. It provides comparable corrosion protection to aluminium, as used in aggressive environments.

Application is easy and covered by international standards - the surface result has acceptable slip protection as defined by the UK Highways Agency standard HA104. The coating is corrosion resistant and because of its durability, site owners can be confident that once applied, they can forget about rust or slippery surfaces for many years.

https://www.metal-spray.co.nz/product-range/non-slip/

Advertorial

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