

Corrosion

Exclusively



INSIDE:

- Corrosion management of lattice structures
- Strategy for corrosion remediation program
- Using ISO Standards for cost effective corrosion control
- Annual Awards and Institute News
- Tribute to Michael Brett and the RUST Spot



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President's Comment

Our Annual awards dinner hosted for the first time in Cape Town since inception of CorriSA and was well attended by a number of important Johannesburg members and the evening seemed to have been enjoyed by all. Neil Webb reflected on the passing of some of our older fellow corrosion engineers. Top students for 2016 were recognised for their respective achievements, as were the all-important members and organizations that have made a significant contribution to our industry in 2016. The detail of the

nominations and the results are published in the magazine for you to read and enjoy!

Dr. Gasem Fallatah of NACE International presented the Corrosion institute with an award in recognition of CorriSA's contribution to the growth of NACE International outside of America. This recognition is encouraging for the institute as we are making educating into Africa one of the strategic focal points for 2017.

As we close the chapter on 2016, we can reflect on our success regarding the launch of CorriSA's NUI-CorriSA bursary scheme and the registering the Corrosion Institute as a Training Academy with the South Africa Qualifications Authority (SAQA) and MerSETA. Being accredited will benefit many local organizations in facilitating opportunities for much needed skill development in corrosion control within South Africa and afford them the mechanism to claim back from government.

I wish all our members and their families a safe and blessed festive season and hope the New Year brings

Yours in corrosion,

Edward Livesey, President

Dear Mr. Edward Livesey, President of CorriSA,

I would like to take this opportunity to sincerely thank you and the entire team of CorriSA for the kind hospitality and the very open and forward looking discussions during my visit to CorriSA two weeks ago with special thanks to Mr. Mark Terblanche for helping in getting the discussion between CorriSA and NACE International started.

I was very much impressed with the history of CorriSA in the fight against corrosion and the heritage that has been made by the organization during the last 56 years. I have attached a brief summary about CorriSA as an introduction to our NACE International team.

During the visit a couple of cooperation areas were explored/discussed as summarized in a separate "CorriSA - NACE International Cooperation Area Matrix" MS Word document.

To move forward and engage with more detailed discussion on these identified areas, I'll be sending follow up emails with more details on each item with limited distribution to those that are concerned from both organizations so that we have a better focused one-to-one follow up mechanism. I'll also work on providing some sort of periodic general update on the development of these discussion items as things develop.

Once again, I sincerely thank all of CorriSA team and will be looking forward to having a follow up meeting with those of you making it to Corrosion 2017 in New Orleans.

Note: In addition to the stakeholders mentioned in the Cooperation matrix, copied with email are the following:

Mr. Bob Chalker, NACE International CEO; Mr. Matt Miller, NACE International COO; Mr. Mohammed Subaie, NACE International West Asia & Africa Area Director; Mr. Donovan Slade, CorriSA Vice President

Kind Regards,

Gasem Fallatah

OBJECTIVE OF THE MAGAZINE

"The objective of 'Corrosion Exclusively' is to highlight CORRISA activities, raise and debate corrosion related issues, including circumstances where inappropriate material and/or coatings have been incorrectly specified, or have degraded due to excessive service life. Furthermore, it shall ensure that appropriate materials or coatings, be they metallic or otherwise, get equal exposure opportunity to the selected readers, provided these are appropriate for the specified exposure conditions on hand."



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Cover: A collection of corroded components exposed to marine conditions



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Editorial Comment

After having decided to include all the activities of this year's annual Awards event which for the first time was hosted by the Cape Town region, in the final edition for 2016 and despite some minor technical obstacles we aim to have the magazine with our readers depending on their scheduled end of the year break either at the tail end of 2016 or when arriving back fresh for work in early 2017.



This is the fifth edition of the magazine. Thanks to all the amazing local and international contributors for their valuable contributions and the willing advertisers of the last 14 months, many of whom accepted the previous incentive to take multiple adverts to their financial benefit, thank you!

In order to build on the success of the previous editions we wish to continue to develop the relationship with our current contributors and where possible expand the publication to other contributors and in the near future include features on corrosion protection systems, materials like aluminium, copper and possibly the corrosion of concrete and even plastic.

Should there be any specific subject readers or advertisers wish to see discussed in this forum, kindly advise?

We plan to produce four more editions of the magazine in 2017 starting with the first in February/March; May/June; August/September, with the final in November/December.

In this issue we have two international and two local contributions.

Mark Dromgool of KTA Tator with part one of "Corrosion management of elevated lattice galvanized structures" and a collaborative article written for ACA by Stephen Foley and Giles Harrison on "Strategy for a corrosion remediation program".

While Gerald Haynes of Corrosion Technology Consultants writes about "Utilising ISO Standards and best engineering practices in order to ensure long term cost effective corrosion control" and Simon Norton of Chemical Investigation Services contributes an interesting corrosion case study investigation where copper nickel condenser tubes on a marine vessel failed prematurely.

We had the privilege of meeting Dr Gasem Fallatah a NACE International representative from Saudi Arabia who has been tasked to develop the relationship with NACE International and CorriSA to the mutual benefit of both organisations. In the next edition of CE we will provide some feedback on the discussions and his visit.

Lynette van Zyl the Manager at the Coré as well as Graham Duk and Ryan van Wyk the Western Cape and KZN Chairmen respectively give account of their activities.

Other activities of the Institute include feedback on a number of NACE and Corrosion Engineering Courses as well as proposed courses in 2017, the recent annual Johannesburg Golf Day plus many interesting technical evenings held both in Johannesburg and Cape Town.

We pay tribute to Michael Brett who recently passed away by way of a number of friends and colleagues giving account of their lives with him.

Peter Quorn of Stoncor well known in corrosion related circles too, gives us an account of his life in 'The RUST Spot'.

Finally, may I wish all CorriSA members, contributors and readers of Corrosion Exclusively a happy and safe Festive Season for whatever it means to you and may 2017 provide us with some equitable political solutions and sustainable but honourable business dealings!

Terry Smith

Corrosion management of elevated lattice galvanized structures (Part 1)

By Mark B Dromgool,
KTA Tator Australia Pty Ltd

Abstract

Elevated lattice-form galvanized steel structures pose some quite unique challenges to control corrosion, to preserve their functionality and extend their durability, especially in more corrosive environments or after many years of exposure. This article outlines some of the more successful methods that have been employed by elevated structure owners and contractors to maintain and preserve these vital infrastructure items and to improve the durability of new-build towers.

Background

Many countries, especially the western nations who had ramped up and developed immense industrial capacities during WWII, underwent huge expansions in their infrastructure after the end of the war, primarily in the 1950s, 1960s and into the 1970s. Not only did this include the building of roads, bridges, ports and railways; but expansive networks of high voltage power distribution lines soon criss-crossed the countryside and soon after, TV broadcasting and telecommunications networks were constructed and expanded. Large numbers of towers and masts were also erected to serve new radio distribution systems, radar facilities for airports, navigation aids and so on. Many of the structures for these networks were elevated lattice towers made from piece-small steel sections bolted together in the field. With very few exceptions these elevated assets were made from hot dip galvanized carbon steel. Occasionally these were painted – and if so, this was typically after erection – although most overpainting was performed for the purpose of civil aviation obstruction marking, e.g., for structures proximate to airports or close to flight paths, rather than to augment the corrosion control aspects of the hot dip galvanizing.



A galvanized lattice strain tower on a 220kV urban transmission line. This structure is heavier than most because it is placed at a corner of the line and is subject to higher side loads, thus the multiple angle members in the main legs and heavier bracing. The regularity of the galvanized steel members and the nature of bolts for assembly are visible.



This is the upper cross arm on a 500kV tower located in a near coastal environment. This tower is about 35 years old and was site painted about 13 years ago with a high build epoxy coating system. The extent of corrosion, in spite of the overpainting, particularly of the lighter and partly sheltered members, is readily discernible.

Given the protective system employed in these parts of the last century, it is not unreasonable to predict that a design life of around 50 – 60 years would have been a realistic expectation for untopcoated hot dip galvanized steel in the more moderate urban and rural environments. However,

with much of the population, industry and commerce of many of the larger countries located reasonably close to the sea and with considerable industrial developments since these assets were erected and commissioned, there are obviously many structures in environments that are now more severe than they were.

Galvanized steel in an atmospheric exposure has a finite life. The multiple layers (three in total, *gamma*, *delta* and *zeta* layers) of zinc/iron alloy plus the mostly pure outer zinc layer (*eta*) that are produced when carbon steel is hot dip galvanized can provide durability terms ranging from a few years to multiple

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decades depending on the service exposure the steel is subject to. Galvanizing has the ability to protect carbon steel due mainly to the principle of anodic protection (sometimes called galvanic protection). It also has some barrier properties that help keep ionic species, oxygen and the electrolyte from accessing the corrodible substrate. Over time, however, the zinc in the galvanizing is slowly consumed due to the concurrent mechanisms of galvanic action plus attack on the zinc itself by oxygen, water, CO₂ and corrosives such as marine salt, acidic influences from urban atmospheres and other causes.

For the most part these elevated lattice structures have survived particularly well, even though many are perhaps decades past the time when maintenance, individual member or structure replacement would have been expected if the initial 50-60 odd years of design life was realistic. However, even minor differences such as the:

- location of the individual tower;
- corrosivity of the service environment;
- natural variation in the initial coating thickness of the galvanizing; and
- effects of orientation of the individual member

will affect the depletion or consumption rate of the galvanizing layers.

For many networks the multiple decades of a virtually maintenance-free life may give the asset owner a sense of security and apathy, which can mean that corrosion or section loss in bolts and members can seem to appear quite suddenly and spread very quickly after initiation. Perhaps this is because, after the initial dulling of the fresh galvanizing to a matt grey, nothing seems to visually change whether the galvanizing is one quarter spent, at its half-life position or almost all consumed, e.g., there is no gas gage needle that shows a progressively reducing residual life.

Another fact is that with complex structures built of multiple piece-small components, there is almost no chance that each member will reach its ultimate end of life at the same date.

The process of hot dip galvanizing does not result in the same thickness of zinc and zinc-iron alloy layers being deposited on all surfaces. The type of steel (i.e., its metallurgical formula); the weight of steel; its section thickness; its surface roughness; the bath

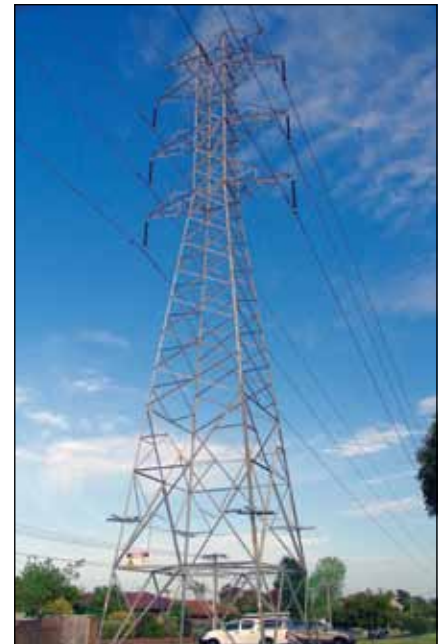
immersion time (with some steel grades); and the orientation of the member as it is withdrawn from the galvanizing bath, all can affect the resulting zinc coating thickness. Unlike some other forms of zinc-rich coating, e.g., zinc silicate or zinc-rich epoxy, the lifespan of a galvanized item in a specific exposure condition, is quite closely related to the original coating thickness of the galvanizing layers.

Galvanizing heavier weight sections of steel usually results in a greater coating thickness of zinc and zinc-iron alloy layers, partly because thicker sections take longer to come up to the temperature of the galvanizing bath, typically around 455 - 460 deg C. Steel that is withdrawn vertically from the bath will have a lower coating thickness than one withdrawn flat or at a low incline, because the molten zinc will run off to a greater extent before freezing. The rate of withdrawal from the bath will also effect zinc builds with faster extraction rates usually resulting in a higher thickness of the eta layer. Metallurgical influences, such as the silicon, molybdenum and phosphorous content of the steel, can also affect the build and form of the galvanizing layers, but that will not be discussed herein.

One other influence – and this affects bolts and fasteners almost exclusively – is any post-galvanizing operation before quenching. Bolts, nuts and studs are spun centrifugally immediately after they emerge from the bath to spin off the excess zinc from the threads whilst it is still liquid so that the mechanical and physical properties of the matching threads do not result in a nut that will not turn on the bolt. Interestingly, nuts for tower and engineering bolts are tapped with a slightly oversize thread after galvanizing, so there is actually no zinc on the internal thread of a galvanized nut.

As can be seen, even if all of the steel sections for a lattice tower are galvanized on the same day through the same galvanizing plant, different members and items (including bolts) will have different coating thickness of zinc.

Whilst the initial zinc coating thickness is a guide to the potential lifespan of galvanized steel – taken to be the time until red rusting (from the carbon steel substrate) commences – there are other influences. Some of these are the member orientation once erected; and the degree of shelter or exposure to the prevailing weather, rain and corrosives; as well as the time-of-wetness.



A more typical transmission tower, also on a 220KV twin circuit line. Most towers have single angle steel leg members and many face braces are affixed with only a few structural bolts. This structure is just over 50 years old and has not yet been painted. The ability to remove and replace the more accessible members can be easily envisaged.

On surfaces that are sheltered to some degree from the prevailing rainfall, such as the underside of angle steel sections or channel steel with downward pointing legs, the time-of-wetness is often less and the erosion/corrosion process on surfaces that face the weather suffer from a far greater rate of zinc loss. Countering this is the tendency for corrosives and wind-deposited materials to remain for longer on these sheltered surfaces because they are denied the beneficial effects of fresh water washing during rainfall events and they often suffer from an increased time-of-wetness.

Corrosion rates in the weather-influenced zones are usually much greater, even though they might be only centimetres from surfaces with an altogether different orientation on the same piece of steel.

Once bolted into position in a structure such as a lattice tower, the consumption of zinc as this metal reacts with atmospheric oxygen, CO₂, water, airborne acidic influences, chloride and other ionic materials, commences. However, it proceeds at varying rates depending on orientation and the other exposure-related influences such as time-of-wetness and the concentration of any corrosives. So, because various parts or

elements of the structure start with different zinc coating thickness and they lose zinc at different rates, nothing gets to the end point at the same time, the end point being a condition whereby the zinc is depleted to a degree when it loses its effective electrochemical potential, is unable to galvanically protect the carbon steel and its barrier properties are degraded or spent.

Practically, this means that a lattice structure – which is an assembly of a many hundreds of individual galvanized members, typically angle sections – will not reach the point at which the galvanizing is mostly all consumed on all members at the same time. Usually, the first to show signs of red rusting are the bolts, because they start with a much lower coating thickness of zinc (due to the centrifuging operation) and possibly some edge damage during torquing. Next to lose the galvanic influence of the zinc galvanizing are usually the lighter secondary and tertiary braces such as 50mm and 60mm angle sections and the hoops and flat strap bars on caged ladders. Those with the longest lifespan are, fortunately, the heavier angles of the main legs and primary structural members.

My research has indicated that many asset owners have approached the issue of corroding lattice structures by considering two main options for maintenance: either prepare and paint the all of the tower steelwork with an organic coating system; or replace the structure with a new tower. Some elaborate decision-making protocols have been developed by these owners and their advisors to assess when and how to carry out surface preparation and painting; or when to replace the structure so as to provide the lowest long term cost, to optimise the net present value and give the best metric of risk minimisation.

There are obviously some maintenance strategies or practices used that fit in between these two binary choices. For many assets owners this typically involves selected member or bolt replacement on a like-for-like basis, mostly performed in a more *ad-hoc* manner.

In conjunction with some of our large facility owner clients in Australia – spanning power distribution, large switchyard operators (e.g., at aluminium refineries), telecommunications

and broadcasting – we have developed a more pragmatic model for elevated asset durability that incorporates a maintenance strategy where whole of tower painting or complete structure replacement are not the adopted maintenance actions on aged towers except in isolated cases.

Instead, the principal method of ensuring durability of the asset and prudent risk control involves an engineered combination of partial *in situ* painting and some selected member replacement, but with different action drivers for these two methods. We also have a similar strategy for new structures, especially those in corrosive environments, e.g., tropical marine on offshore islands, where the conventional method of erecting regular hot dip galvanized steel structures, as has been done for decades, has proven time and again to deliver an unsatisfactory life span.

The balance of this paper will firstly describe the strategies developed for aged elevated structures; and then discuss some initiatives for new towers and masts.

To be continued in Vol 3 Issue 1 2017.

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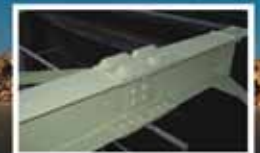
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Strategy for a corrosion remediation program

Collaborative article written for the Australasian Corrosion Association by Stephen Foley a member of the ACA and Regional Senior Civil/Structural Engineering Advisor for Newmont Mining Corporation & Giles Harrison also a member of the ACA and Project Manager at Extrin.

Stage 1 – Desktop preparation

1.1 Develop a project hierarchy

This item may already exist, but if not it is a critical step in Quality Assurance to assign accountability. This item is relatively straight forward to prepare and can be prepared quite quickly.

1.2 Review specifications

A robust specification reduces exposure by the owner and encourages attention to detail. It reduces the risk of a poor quality works, unsafe works, and incorrect or faulty works being carried out.

An experienced team should review the specifications that will be required by the contractors onsite carrying out the

remediation activities. This team will review existing specifications and add clauses and information in line with leading industry best practice.

Specifications are usually attached to, and form part of, contract documentation and are often legally binding. The specification is normally the overriding document for all aspects of the remedial works, testing and acceptance.

Probably the single most important document associated with a refurbishment project is the project specification. The document is usually produced by the end user or their nominated representative/consultant and should set out exactly the expectations of the client at each stage of the repair works, including:

- A precise scope of what is (and isn't) meant to be repaired.
- Pre-cleaning and rectification of fabrication defects.
- Method(s) and standard(s) of surface preparation.

- The selected repair system(s) for specified surfaces, including a description of the repair materials and QA parameters.
- Testing procedures and acceptance criteria.
- Touch up and remediation.

The specification should also address other matters such as safety, environmental and waste issues, product handling, transport to site, storage and other general site requirements.

1.3 Review / provide checklists, forms, SOP's

Paperwork is a function of Quality Assurance. It records all the pertinent information in regards to the job for future reference and as a checklist as the job progresses to ensure the specification is being met. Poor or incomplete paperwork can compromise traceability and the ability to confirm the required level of quality in a safe manner.

1.4 Prepare schedule and assign fixed budget

Site based scheduling and budgets should be taken into account but will not be covered in depth here.

1.5 Review site instruction document

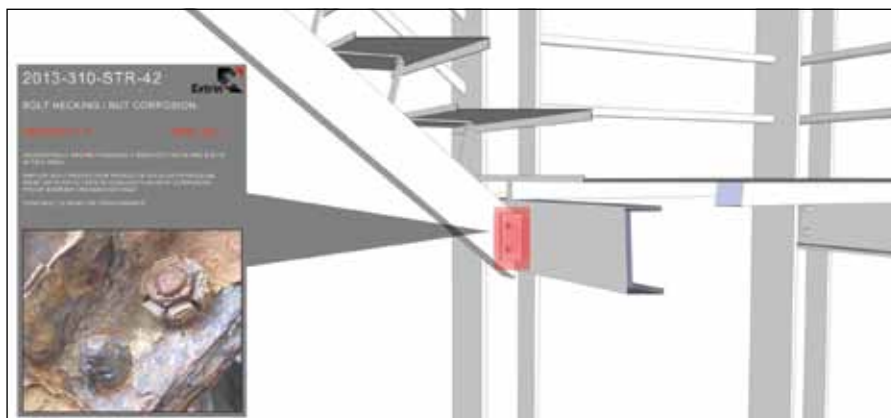
The Site Instruction or Work Pack document should contain all information required for the contractor to clearly understand what is required. It should reference Standards and Specifications as well as safety and site requirements. The document should contain the most appropriate technical remedial options to be used on site so that the best return on investment is achieved in a timely and practical manner.

1.6 Develop inspection and test plans (ITP)

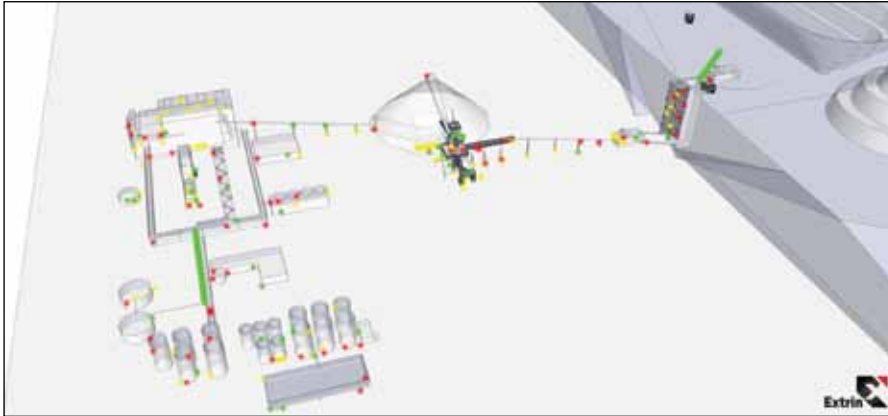
Usually the ITP for a particular project will reflect the requirements of the project specification, but will also include additional information such as the contractors instrument calibration records, training records of personnel and, as the project progresses, test results. An ITP should be produced by the contractor, often to comply with a specification requirement. However it has been found acceptable practice for the end user to produce the ITP and keep it as a standard document to be provided with site instructions.



Issue identification.



Issue identification.



Site corrosion mapping.

Stage 2 – Site work specifics

2.1 Issue identification

Issue capture onsite should be carried out by a suitably experienced person in the field. The aim is to identify issues as well as record information which will allow a concise work pack/site instruction to be developed.

The deliverable for this line item is usually a report which includes:

- A summary comment on each issue assessed during the audit, encompassing any inconsistencies with regards to statutory, industry and site standards and surrounding site infrastructure.
- A detailed comment on each issue identified/observed during the audit.
- Those items of non-conformance with relevant standards/codes, site specifications, etc, broken down into the appointed areas of site and sub areas as deemed relevant.
- Quantification and precise location of issue should be included in the recommendations for refurbishment works will also be provided to assist maintenance personnel. (eg; 2 lineal metres of UB150 requires replacing at RL050.15 (level 3) on the South side of the Ball mill right of bolted connection as marked up on drawing G-3020-01.).
- Comment on the suitability of current safety items, devices and equipment employed, including design and procedures, and recommendations for improved corrosion control. This includes recommendations for improved material/

system performance in high corrosion risk areas.

- Recommendations for corrosion protection strategy of aforementioned items for the remaining life of mine.
- Assign assessment rating, and prioritisation of each of the items noted in the audit.
- Comment should also be provided on the performance to date of the assets and include recommendations for extending service life of assets.

2.2 Site corrosion mapping

‘Corrosion environment mapping’ which identifies the different corrosion service environments onsite at a mine site and in turn dictates what products and methods are applicable. This will allow modification of the repair systems to suit the environments specific to a mine site, resulting in a tailored approach to ensure value is being provided to the operation.

The process involves water sample analysis and interpretation, site specific atmospheric corrosion results and observations to produce a Corrosion Map for the mine site. This can be then used for a whole range of specification purposes.

2.3 Contractor review

Understanding the capabilities of the contractor is important to assess if they are deemed suitably qualified and competent for the undertaking of the remediation works. Examination of each contractor and their

capability statement to determine if they are suitable should be carried out.

2.4 Ensure coating QA/QC awareness

This item will ensure that both site personnel and contractors are fully aware of the QA/QC requirements as required not only for this project but for future repair works. In general, most site personnel in mining operations have some awareness of corrosion, however not a detailed understanding of the process and QA/QC requirements. By ‘up-skilling’ site personnel, including supervisors and superintendents, in these fields by way of, for example, a short coating awareness presentation, it has been found that quality of work executed on site by contractors is to a higher standard and thereby ensures that the operation gains the outcomes expected when directing funding to this issue.

Reality check

It is important to note, when undertaking the issue identification phase by the corrosion specialist that a holistic view of the operation needs to be considered. Some factors that may affect the prioritisation of works and assessment rating are:

- Life of mine / operation.
- Risk rating – likelihoods and probabilities of occurrence.
- Possible failure of element – how does this affect operation.
- Inherent redundancy in systems, corrosion allowances, interlocks, failsafes, etc.
- Other treatment options available.
- Future projects or modifications being undertaken in area, and impacts this may have on issue.

The above needs to be undertaken in conjunction with site personnel working collaboratively to ensure risks are adequately identified and assessed, and an appropriate level of treatment is applied in proportion to the level of risk an issue presents – this will endeavour to provide a value assured approach to the mitigation of these risks and funding is being spent in an appropriate and pragmatic manner.

CorrISA wishes to thank Wesley Fawaz the Executive Officer of ACA for this contribution. 🙏



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“Utilising ISO Standards and best engineering practices in order to ensure long term cost effective corrosion control”

By Gerald Haynes of Corrosion Technology Consultants

The corrosion protection of structural steel and ancillary steel components against corrosive atmospheric environments can be achieved in a number of ways. These include the selection of suitable materials, correctly designing the corrosion protection system, reducing the corrosivity of the environment or the use of barrier protection in the form of protective coatings.

The selection process regarding the most appropriate corrosion protection method is comprised of several steps. These steps include correctly characterising the product, determining the design and service life, knowing the complexity of the corrosive environment and other important aspects such as durability, serviceability, future accessibility and maintenance.

The International Organization for Standardization (ISO) defines serviceability with respect to corrosion, as “the ability of a system to perform its specified function(s) without impairment due to corrosion”. ISO also defines the service life with respect to corrosion, “as the time during which a corrosion system meets the requirements for serviceability”. The design service life is the principal factor utilised in terms of selecting the corrosion protection method for the structure. However, many protective coating systems cannot often meet the “service life” without several maintenance cycles.

The environmental conditions need to be comprehensively defined, as detailed in ISO 9223 “*Corrosion of metals and alloys - Corrosivity of atmospheres - Classification*”. The latter specification provides a means for classifying the corrosivity of atmospheres based on four standard metals (carbon steel, zinc, copper and aluminium). The general controlling factors are defined in terms of the total “wet” time, the deposition of soluble chlorides, the presence and magnitude of sulphur dioxide and other airborne corrodants. Other important factors relating to the environment are radiation from the sun (relating to UV degradation of protective coatings) and

temperature extremes (diurnal or seasonal – relating to cracking, stress, etc., of protective coatings).

In order to accurately classify the areas, as defined in ISO 9223, there are two methods one may follow in order to achieve this. It must also be noted, that ISO 9223-2012 edition, has some significant changes, for instance there is no longer a C5M category, but C5X. Unfortunately, the SANS ISO 12944 series, still references the older ISO 9223 1992 version.

The first ISO 9223 method relates to defining an area which may be classified in terms of the wetness duration (time) and “pollution”. The measurement of pollution is covered under ISO 9225 “*Corrosion of metals and alloys – Corrosivity of atmospheres – Measurement of pollution*”. ISO 9225 essentially specifies three methods for measuring the deposition rates of sulphur dioxide and air-borne salinity. However, it does not cover concentration measurements. It does however include measuring methods which apply to the characterisation of the corrosivity of the test site. In terms of these specific ISO 9225 assessments in RSA, there do not appear to be any accredited laboratories or test houses that are able to carry out these pollution measurements. Furthermore, there are many aspects which are also subjective, such as “time of wetness”, “calculated time of wetness” and the assessment of the “electrolytes and their ability to cause corrosion”.

The second ISO 9223 method permits the corrosivity of the environment to be determined based upon the corrosion rate of standard test specimens. The determination of the respective corrosion rates is very well covered and the requirements adequately documented in ISO 9226 “*Corrosion of metals and alloys – Corrosivity of atmospheres – Determination of corrosion rate of standard specimens for the evaluation of corrosivity*”.

Therefore, in RSA, it is more pragmatic and achievable to accurately determine the corrosivity of an area or industrial site, by properly implementing ISO 9226. The latter ISO standard determines the corrosivity of a location or industrial site based upon the well established mass loss per unit area of the standard specimen based on tried and tested methodologies. Mass loss has been established as an acceptable method in determining corrosion degradation of iron, zinc and copper alloys. The process may be readily assessed and determined by local Consulting Engineers and laboratories. Samples are prepared in accordance with ISO 8565 “*Metals and alloys – Atmospheric corrosion testing - General requirements for field tests*”. At least three metals of each alloy must be exposed for at least a one year period. The commencement of the testing should coincide with the beginning of the worst corrosive period of the year. The samples are then assessed in accordance with ISO 8407 “*Corrosion of metals and alloys – Removal of corrosion products from corrosion test specimens*”.

It is often argued that project time constraints do not permit the time required to carry out the ISO 9226 assessments correctly. The latter constraints may be more plausibly explained in terms of poor planning and a possible lack of understanding in terms of the consequential costs that will be arise as a result of this. ISO 9225 is seldom if ever implemented in RSA, and this is typically based upon the costs and other “technical issues”. Therefore to simplify these ISO 9225 assessments, areas are also generally classified in terms of their “wetness”, as well as the performance of “historical coatings”. There is generally no ISO 4628 “*Paints and varnishes - Evaluation of degradation of paint coatings*” assessment that takes place regarding the failed coatings. The actual ISO 9223 corrosivity classification is therefore never satisfactorily established either via ISO 9225 or ISO 9226, but rather inferred via these crude and simplistic approaches.

If one were to assume that the corrosivity of the environment had been established based upon Table 4 (ISO 9223) using best engineering practices and either ISO 9225 or 6, then one would be permitted to select the most appropriate corrosion protection system, utilising ISO 14713 "Protection against corrosion of iron and steel in structures – Zinc and aluminium coatings – Guidelines" and/or ISO 12944 "Paints and varnishes – Corrosion protection of steel structures by protective paint systems" (Parts 1 to 8). As soon as the corrosivity of the environment has been correctly determined, then the most appropriate corrosion protection system can be determined, taking into consideration important aspects such as a life cycle costing, under-film corrosion risks, etc.,

There are corrosion rates tendered for hot dip galvanized steel which are based upon the ISO 9223 C1 to C5 atmospheric classifications. Its salutary to remind ourselves that hot dip galvanized steel can readily achieve a 30 year coating life before any "first maintenance" is required, even on smaller steel sections (thinner

zinc coatings). On the larger steel sections (thicker zinc coatings), 20 years can also be attained in C4 (High Corrosivity) environments before any first maintenance is required. More importantly is the fact that there are changes that occur in atmospheric environments as time passes. A substantial reduction in pollution, especially in sulphur dioxide has occurred world-wide in the past 30 years. This means that the present corrosion rates as detailed in ISO 14713 Table 1 are somewhat higher than those currently being experienced in the field. This is due to the fact that each environmental category is much lower than the historical rates (established prior to 1995) and therefore even lower rates can be expected in the future if the pollution rate continues to fall.

Hot dip galvanized coating failures are also a lot simpler to visually identify upon completion of the galvanizing process, and so is the assessment of the surface preparation prior to hot dip galvanizing.

ISO 12944 "Paints and varnishes – Corrosion protection of steel structures by protective

paint systems" (Part 1 to 8) covers the type of protective paints that may be applied to bare steel surfaces (uncoated), surfaces coated with zinc or aluminium metal spray, hot dip galvanized steel surfaces, etc, in order to protect them in the more corrosive atmospheres.

ISO 12944 also considers three different durability ranges, as per Section 3.5 Clause 4, viz low (L) 2 - 5 years, medium (M) 5 - 15 years and high (H) greater than 15 years. However, before these ranges can be truly implemented the level of coating failure needs to be agreed upon upfront by all parties, utilising ISO 4628 (Part 1 to 5) "Paints and varnishes – Evaluation of degradation of paint coatings". This would therefore appear to be significantly more complex than the "durability" values as tendered for hot dip galvanizing coatings in ISO 14713 and the longevity of the protective paints, appears to be significantly shorter than the coating life tendered on hot dip galvanized steel components.

The protective coatings must be further subjected to ISO 12944 Parts 2 to 8, in order



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- Pipeline External Coating Integrity Surveys – PCM, DCVG and CIPS
- Audits, Maintenance and Monitoring of Cathodic Protection Systems

to ensure that the correct system is implemented. Clearly, the latter also attracts significantly more consulting revenue and inspection service revenue, when compared to that required in order to effectively implement hot dip galvanizing.

Therefore taking due cognisance of the steel section (thickness), a hot dip galvanized section can readily outperform even a high (H more than 15 years) durable paint system in a C1 to C4 environment. Closer scrutiny of structures like transmission towers and electrical substation components also allows one to determine how similar steel components or hot dip galvanized components would behave if exposed in that or a similar environment.

There is no good reason as to why many areas which are deemed to be "corrosive atmospheres" (C1 to C4) cannot simply be protected using hot dip galvanizing. There is also no good reason as to why Duplex Coatings (Hot dip galvanizing and protective coating) cannot be used on the smaller steel sections in the more aggressive C4 and C5 environments. It's also important to note that once the protective paint has been damaged, the corrosion rate of bare steel is orders of magnitude higher than hot dip galvanized steel, which should intuitively imply that a Duplex System would be the most viable and cost effective (and robust) system in a C4 and C5 environment.

Due to project time constraints (in certain cases) and the possible lack of understanding regarding how these corrosive atmospheres should be properly classified, protective paints are often solely used, which can result in more frequent maintenance, additional planning, as well as unwarranted additional costs.

Therefore if the ISO 9223 atmospheric corrosivity classification can be properly established using ISO 9226 (or ISO 9225 if suitable local laboratories can be utilised), then the most appropriate and viable corrosion protection system can be correctly implemented, with long term cost savings and environmental benefits to all. ↵

Case study in corrosion investigation

by Simon Norton of Chemical Investigation Services

Solving copper-nickel condenser tube failure

Background

A Cape Town based firm of refrigeration engineers had installed three sea water cooled condensers onboard a large naval replenishment vessel (see Figure 1) which were used to chill the extensive food freezer rooms. Within 6 weeks of putting to sea on an operational patrol, the 90/10 copper-nickel tubes pinholed and seawater entered the refrigeration system. The engineering firm were seriously concerned by this turn of events and together with the suppliers of the condensers brought in Chemical Investigation Services to investigate the cause of the pinholing and to offer a solution.

Analysis

Chemical Investigation Services tackled the failure in three ways namely through a detailed literature search, by sectioning and examining the failure copper-nickel tubes using optical stereoscopic means and finally investigating remedial measures based on the outcome of the literature review.

Solution

The physical and laboratory based evaluation highlighted that the copper-nickel tubes had suffered pitting corrosion, probable microbiologically influenced corrosion as well as erosion-corrosion (see Figure 3). The damage and tube failure resulted from

excessive sea water flow rates, uncontrolled turbulent flow, no conditioning of the copper-nickel tubes and the impact of contaminated putrified sea water in the vessel seawater piping system

Outcome

Based on the test work carried out by Chemical Investigation Services and the detailed review of engineering literature, a solution was provided to the refrigeration engineers and the naval engineers as follows:

- i) all the copper-nickel condenser tubes were chemically conditioned before installation.
- ii) a chemical dosing plant was installed onboard the naval vessel to intermittently dose the condenser tubes when entering polluted waters or harbours.
- iii) flow control valves were installed to maintain the seawater flow rate within fixed limits to safeguard the copper-nickel tubes from erosion-corrosion.
- iv) an instruction manual was compiled and provided to the vessels chief engineer which allowed the vessels crew to manage the system independently of any external advisor.

What we learnt from this investigation

- a. This investigation proved extremely difficult as there was little information available from the vessel concerning the



Figure 1: A naval replenishment vessel similar to the one involved in this investigation.

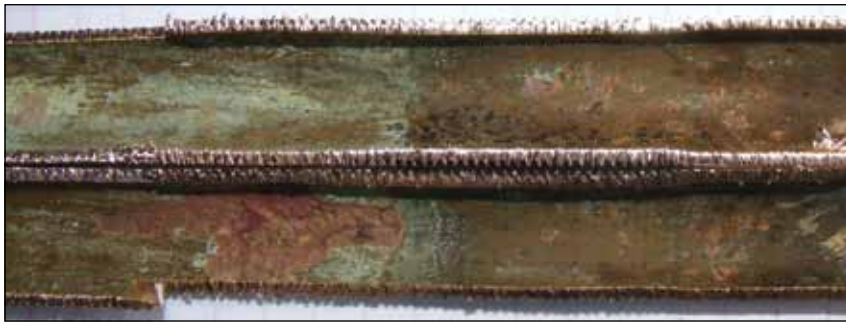


Figure 2: Close up of the inside of the condenser 90/10 copper nickel tubes showing pitting.



Figure 3: View of the end plate of the failed condenser tubes.

- b. The type of failure identified in the investigation was still being studied by other navies around the world and no clear consensus on how to combat the failure of copper-nickel condenser tubes had been finalised.
- c. Chemical pre-conditioning of the new condenser tubes to form a protective film and thus prevent future corrosion and tube failure was successful.
- d. There was resistance to change to switch the ship from seawater to fresh water in the cooling systems and thus prevent corrosion initiation.
- e. The idea of flow control, flow rate limits and chemical conditioning was new to the vessel engineering staff and had to be introduced gradually and with training.

Simon V. Norton

Simon Norton is an industrial chemist with over 30 years of corrosion, materials & petroleum product experience.

He graduated from the University of Cape Town with a Bachelor of Science degree in Chemistry and is a Member of the SA Chemical Institute and CORRISA. He acquired significant technical and managerial expertise during his professional career from 1983 to 2016 both as a chemist and senior manager for the SA oil industry.

He currently offers expert advice to industry focussing on independent technical investigations, corrosion assessments, materials testing and selection with the specific emphasis on corrosion engineering. He has carried out numerous failure investigations in industry and on ships.

Mr Norton also holds specialist knowledge in accelerated AND atmospheric corrosion testing.



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From the KETTLE

Because corrosion control of steel by hot dip galvanizing plays such an extremely important role for specifiers and end-users in their specification choice, it was proposed that we highlight and demystify a number of surface conditions over a series of editions that bear very little influence of the coatings durability seen both during the initial inspection and also after years of being exposed to a particular environment. See surface condition F9 and F10.

Legend

- #1 As the life of a zinc coating is proportional to its thickness, a thicker coating will proportionally outlast a thinner one, however, a thicker coating can be more prone to mechanical damage, when handled inappropriately.
- #2 All passivation products including sodium di-chromate will be excluded by the galvanizer when he has received written instructions that the hot dip galvanized steel is to be painted.
- #3 While double dipping is occasionally seen to be necessary due to a limited bath size, the galvanizer must inform the customer that this practice can increase the propensity for distortion, before he commences with the work.
- #4 While the galvanizer can lower the zinc temperature and shorten the immersion time to limit coating pickup, however, due to increased costs to himself, he is not obliged to do this and if necessary will recover the cost from the purchaser. Insufficient vent, fill and drain holes will lengthen immersion times.

Hdg Hot dip galvanizing A Accept R Reject N Negotiate C Clean REP Repair SS Significant surface.

F9

DESCRIPTION:

Dull grey or mottled coating appearance due to the chemical analysis and differential cooling of the steel.

Dull grey or mottled coatings can appear as a dark grey circular patten, a localised dull patch or may extend over the entire surface of the component.

CAUSE:

This appearance indicates the presence of extensive iron/zinc alloy phase growth, caused by steels with reactive levels of Silicon and/or Phosphorous.

Comment:

Some of the photos (like top left) may be as a result of slow cooling as opposed to immediate water quenching? See also G20.

EFFECT / REMEDY:

Although not as aesthetically pleasing as a coating with free zinc on the surface, a dull grey coating provides similar or better corrosion protection. See also F3 (Vol 2 Issue 2).

ACCEPTABLE TO SANS 121:

A

Depending on customers use.

Galvanizer must comment prior to galvanizing the steel.

ACCEPTABLE FOR DUPLEX AND ARCHITECTURAL FINISH:

A - (D)

A - (A) but refer to F3.



F10

DESCRIPTION:

Typical spangled hot dip galvanized coating appearance.

A typical hot dip galvanized surface is shown in the example. The surface is silver grey in colour and not necessary but often has a spangled effect (zinc crystals) in a range of sizes.



F10 continued...

CAUSE:

Surface appearances may vary according to the chemical composition of the steel. Cooling rate has a direct effect on the surface brightness and spangle size.

Some galvanizers offer this spangled effect as a standard finish.

Faster cooling usually results in a brighter coating with a smaller spangle size.

EFFECT / REMEDY:

Small additions of aluminium to the molten zinc, brightens the coating.

Photo below on extreme right shows an aged spangle effect.

ACCEPTABLE TO SANS 121:

A
Customer to refer to steel supplier.

ACCEPTABLE FOR DUPLEX AND ARCHITECTURAL FINISH:

A



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Manager's Message

This year has been a tough one, we have seen so many changes, many of which are positive and encouraging.

2016 is fast drawing to an end. We have just had our Annual Awards Dinner hosted by the Western Cape Region on the 18th November 2016 and so far, the feedback has been very positive. Planning for 2017 Annual Awards Dinner will start soon.

Our SETA Accreditation was submitted and we expect to hear that our application has been approved and that our accreditation has been awarded before the end of this year. We will most definitely keep you up dated. In addition to this exciting news we were fortunate enough to have Dr Gasem Fallatah from NACE visit us and look forward to forging a lifelong relationship with him and NACE.

2017 events and training schedule has been set and we will be introducing some new courses which will be run either in Gauteng or in the WC. Some of the courses to look out for are PCS-1 Basic Principles (NACE Protective Coating Specialist) Scheduled for March 2017; P-CAFT (NACE Pipeline Corrosion Assessment Field Techniques) scheduled for June 2017; NPP (NACE Nuclear Power Plant for Coating Inspectors) scheduled for July 2017; PCIM (NACE Pipeline Corrosion Integrity Management) scheduled for August 2017.

Our Training Schedule is available in this edition and I am optimistic that next year will see our courses filled to capacity.

2017 will also see CorriSA introducing a new Sales position and the successful candidate will start in Feb 2017. For more information please visit our Website.

On behalf of CorriSA I would like to extend an open invitation to our Technical evenings held monthly KZN, WC and GP. Should you be interested in presenting at one of these evenings please contact email admin@corrisa.org.za and we will gladly assist you in scheduling a presentation.

As the year draws to an end, I would like to take this opportunity to thank all our members for their support and dedication towards CorriSA. I would like to thank our Executive Team for their support, perseverance and commitment towards CorriSA. Last but certainly not least I would like to offer my sincerest thanks to my team Liz, Linda, Thobi, Jenny, Jackie and Mzamo for all their hard work, their positive approach to their jobs and for all their support.

I look forward to a wonderful new year. In closing I wish you all special greetings for the season, filled with love, peace and happiness.

Regards, Lynette Van Zyl



Comment – Chairman of the Western Cape

Since the last issue of Corrosion Exclusively we had a very interesting talk by Bruce Hendry on Water Desalination Techniques and Applications and then the finale for the year was the Annual Awards dinner which was hosted by the Western Cape – please see the separate report back.

Edward Livesey and I had the privilege of showing Dr Gasem Fallatah from NACE International around Cape Town after the Corrosion Institute Gala Dinner. Our site-seeing included breakfast at the Vineyard, a trip around to Table Mountain and Signal Hill and then lunch at Constantia Glen. We hope that our discussions will lead to a stronger and more productive partnership between NACE and CorriSA in Southern Africa as well as the rest of Africa.

It's been a great year for the Western Cape with an interesting range of site visits and presentations which were also very well attended. We congratulate Craig Woolhouse from Elcometer on winning the best presentation for the year with Development of Soluble Salt Contamination Measurement. It was a close run thing with a number of other exceptionally interesting and enlightening presentations and site visits.

We will kick off next year with a galvanizing plant site visit, details of which will be emailed shortly so

for those in the Western Cape please keep Thursday 26 January free. In February we will be holding the postponed Expo which will be taking place at Kelvin Grove on Thursday 16.

As a Western Cape region we really appreciate the inclusivity that has been extended to the regions and we think that the Corrosion Institute as a whole is benefiting fantastically by involving the regions so closely. We are currently in the process of updating our database for the Western Cape and nationally so please bear with us as we email members and non-members for their feedback and comments.

The success of the region would not be possible without the backup we receive on the administration side from Joburg so a big thanks to all for the unsung work that happens behind the scenes.

Merry Christmas and a Happy New Year! Have a fantastic break and hopefully see you at Kelvin Grove for one of our functions soon – everyone is welcome!

Yours in Corrosion

Graham Duk on behalf of Tammy Barendilla, Leonie du Rand, Flippie van Dyk, Indrin Naidoo, John Houston, Terry Smith, Thinus Grobelaar and Pieter van Riet.



Comment – Chairman of KwaZulu Natal

As 2016 draws to a close I am sure that many of you, like myself, will look back and admit that this may just have been one of the toughest years we have had to face yet.

I, myself, found time my biggest challenge. There just never seemed to be enough hours in the day to get through what was needed to be done. As a region, KZN, we have faced many challenges. We saw a massive decline in the number of people attending the monthly technical evenings, and as such, the committee has made the decision that as of 2017 we will be hosting bi-monthly meetings on the 2nd

Thursday of the month. By doing this we hope to see an increase in numbers and would like to call upon anybody who would be interested in presenting at one of these evenings to be in touch with us.

I would also like to thank Mark Terblanche for his unrelenting support and enthusiasm this year, I doubt that we would have survived if it were not for him.

On behalf of the Corrosion Institute of Southern Africa, KZN Region, I would like to wish you all a joyous festive season and all the best for 2017.

Ryan van Wyk, Chairman

GAUTENG ANNUAL CHARITY GOLF DAY 2016

The Corrosion Institute of Southern Africa – Gauteng region, held its annual charity golf day at the Jackal Creek Golf Estate on 4 November 2016. We didn't have a full field this year as we had the previous year however, there was still an enormous amount of support from the industry. It was a fantastic day to be out of the office with the weather playing its part and all golfers enjoying themselves.

The winners of the day were team Storm Machinery who had managed to beat the course record in the Stableford format.

A special mention and thank you go to the following companies:

- Topfix who once again sponsored the golf shirts—certainly the best golf shirts we have had to date. They decided to better last year's sponsorship and also supplied juice bottles and caps!
- Kansai Plascon who provided a R15 000,00 cash sponsorship.
- Jotun who, for a number of years now, enter the most number of fourballs. This year they submitted 5!
- Storm Machinery who continue to sponsor the Pink Lady Competition.

Appreciation and thanks go to all companies and individuals who submitted fourballs, donated/ sponsored prizes and assisted with the build up to and on the day – without your support this event cannot be possible and would not be as successful as it is!

The Corrosion Institute Annual Golf Day has become a highlight on the industry's calendar so we encourage you to book early for next year's golf day to be held in October/November 2017. For further information and bookings, kindly contact Donovan Edward: don@denso.co.za





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Deadline for abstract submission is 17 January 2017 Visit the congress website at www.prague-corrosion-2017.com.

Annual Awards Dinner hosted by the Western Cape

The Western Cape were privileged to be the first region to host the Annual Awards Dinner outside of Gauteng and we thank all involved for making this a possibility. The Ball Room at Kelvin Grove was the venue for this auspicious occasion. Kelvin Grove has been our home and our base for several years now and they continue to offer an exceptionally high level of service and standards which our members have come to expect.

While the evening was a team effort by the Western Cape Committee and the ladies in the Joburg head office there is always a leader and

driver of a successful operation and Tammy Barendilla is that person who has to be singled out and thanked for an exceptionally well organised evening. Thanks also to Lance Stevens, our very capable MC who kept the evening on track. We must also acknowledge the out of town contingent which included Edward Livesey our current president and his wife Kathleen, Don Slade Vice President & National Council representative, Greg Combrink Honorary Secretary, Louis Pretorius and Neil Webb (ex-Presidents), Mike Book and Ryan van Wyk, the current Chairman of KZN. A special mention also needs to go to Dr Gasem Fallatah from NACE International who made a special trip from Saudi Arabia to visit the Corrosion Institute and to take part in our Annual Awards.

The theme for the evening was Wild West and it was taken relatively literally with cowboys, cowgirls and squaws gracing us with their presence. The excellent meal also fitted into the theme with a hearty steak as our main course.

Our guest speaker Dr Piet Croucamp gave us an exceptionally interesting and thought provoking talk that is bound to have people talking for years to come.

The winners of awards and projects were acknowledged during the evening and I would like to take this opportunity to congratulate them all on their achievements. For those who won awards and for all those trainees please bear in mind that the Corrosion Institute is on



The President of CorriSA Mr Ed Livesey presenting the "Stood the test of time" award winner to Mr Neil Webb of ICP for their involvement in the Beira-Feruka Pipeline.



The President of CorriSA Mr Ed Livesey presenting the Silver Medal Award to Mr Mike Book, MD of Bulldog Projects, for his tireless contributions to CorriSA over the past number of years.



The President of CorriSA Mr Ed Livesey inbetween representatives Mr Mike Smith and Ms Vennesa Huxtable of Stopaq, winner of the Innovative Projects category.



The President of CorriSA Mr Ed Livesey presenting an Honorary Life Membership to Mr Neil Webb.



Reciprocal hand over of a NACE Membership plaque and token gift between the President of CorriSA Mr Ed Livesey and Dr Gasem Fallatah of NACE International (above centre) and the Trophy presented to CorriSA from NACE by Dr Gasem Fallatah, West Asia & Africa Area Office Manager (above right).





Estella B. Rossouw receiving the CP2 Top Student Award (above left) and Jonathan A. Starmer receiving the CIP 1 Top Student Award (above right).



Donovan Slade from NUI receiving a Certificate of Commendation for the NUI / CorrISA Bursary.



Graham Duk and Dr Piet Croucamp.

track to be an accredited training centre of excellence and there are many more training courses on offer and opportunities of striving to further their education. To the project winners, well done on standing out in the industry and on your efforts in making a difference in combating the corrosion issue that is becoming more and more of a drain on resources in our country as well as worldwide. Special mention to Neil Webb (Honorary Life) and Mike Book (Silver Medal) for their awards.

Entertainment included Line Dancing – initially a demonstration and then an opportunity to participate which certainly provided for a test of co-ordination and dancing skills – some certainly better than others. Other fun things included a photo booth and a whole range

of outfits to try on – see the photos to get a better idea of what was available.

A few also tested their skills in horse riding with the riding being the easy part and the mounting and dismounting proving to be a test in skill, suppleness and improvisation.

All in all it was an exceptionally fun evening and we would like to extend our thanks again to our sponsors: (in order of their generosity) Kansai Plascon; Stoncor; BAMR; Stopaq; Blastrite; Isinyithi CP; (as well as our banner sponsors) Bruno Lab Consultancy; Business Connection; Corrocoat; Optima Coatings; SA Tactics & Toprope, who helped make the evening a possibility as well as all those who attended. We look forward to another fun filled event next year! 🍷

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INNOVATIVE PROJECTS CATEGORY WINNER

Kusile Power Station Chimney Project: Corrosion Protection of 316L Stainless Steel Flues

Location

Kusile Power Station

Owner and Specifier

Eskom

Project purpose

The Stopaq ETFE corrosion protection system was selected for the protection of the Stainless Steel Flues at the top of the stacks at the Kusile Power Station. The application requirements of the system, require no blasting, only minimal surface preparation as well as no specialised machinery for the application. The Kusile Power Station is a coal fired station with a wet scrubber and the three cans at the top of each smoke stack and other parts such as taps and trays were manufactured from 316L stainless steel. Processing of coal for the provision of energy causes a gaseous mix which is emitted from the top of the flues. This gas contains high levels of corrosive chemicals such as sulphides and chlorides. Because of the corrosive environment (pH1, 30,000ppm chlorides) at the flue outlet, the 316L was likely to sustain damage over time. Eskom tasked Stopaq to assist in specifying a suitable coating system to protect the Stainless Steel flues and other Stainless Steel



Lobster backs.

ancillaries, including the inspection hatches, the drains at the lobster backs, the stairs, and the access door at the 200m level from chlorides in particular.

Coating materials manufacturer and type

The Stopaq Polyisobutene material is co-extruded with a film of ETFE (Ethylene tetrafluoroethylene) which is a fluorine-based plastic, forming a single layer

system. The ETFE is the outer layer of the single system. ETFE is designed to have high corrosion resistance and mechanical strength over a wide temperature range of -200 to +165°C. The Stopaq ETFE system is extremely chemically resistant; handling PH levels of 0 to 12. ETFE has excellent weathering characteristics, is UV stable and due to its low surface energy it is non wetting and self-cleaning.

End user

Eskom

Project team

Corrosion Control Services, ASP Rope Access and Stopaq

Main contractor

Concor Karrena JV

Applicator

Corrosion Control Services and ASP Rope Access

3rd Party inspection

Eskom

Action taken to complete scope of work

The application took place at the 200m level of the stack and all personnel, material and equipment had to go through a hatch measuring 900mm x 600mm in order to get to the construction site. The lobster back drains were in the lobster backs at 50m and only accessible by rope access or scaffolding and the inspection hatches were at different



Application via rope access.



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levels within the flues accessible by the platforms at the relevant levels.

The Alimax elevator hoisted all the material, equipment and applicators up to the top platform at 180m inside the stack, and from there a safety ladder was used to get to the 200m platform. This platform was surrounded by a 1.8m wall from the stacks and this outdoor area was from where all activities took place.

The Stopaq material was packaged in wooden crates and these were hoisted through the hatch. Careful planning had to take place to ensure that sufficient material was available at all times, so as not to cause any delays in the application.

There were times when the elevator was out of order and the team faced the challenge of having to walk up to the top, using the spiral staircase within the stacks.

An additional challenge was that the Concor Karrena team were also completing various other work at the top of the chimneys at the same time and working in such a restricted space took a measure of mutual co-operation and tolerance of one another.

The application was completed largely by rope access teams and often the weather

conditions were an added challenge, since the application took place in the severely cold weather conditions of winter, including extremely strong winds and high humidity levels.

The choice to use the Stopaq system proved to be practical, cost effective and time efficient above any standard liquid applied coating system, which would have required abrasive blasting, which in itself would have been a challenge with limited access at 200m above ground level.

Holiday tests were conducted once application was complete to ensure full coverage of the surface.

Project size

3300m²

Project starting date

March 2015

Project end date

September 2015

Project value

R20 Million

Coating warranty

The client required a 50 year life expectancy from the system and a 30 year corrosion guarantee.



Application at top drain.

Technical development

The Stopaq ETFE system was specially designed for the application at Kusile and has resulted in a new and innovative system having been developed worldwide, the benefits of which extend far beyond this application. Combining the benefits of the Stopaq Polyisobutene material with the ETFE film to form a single layered coating has resulted in a new and unique coating solution over a wide range of applications where previously extremely costly and difficult to apply systems were utilised. ↵

THE CORROSION INSTITUTE OF SOUTHERN AFRICA COURSE SCHEDULE 2017



Introduction to Corrosion Engineering Course

6th - 10th February 2017	Johannesburg, GP
15th - 19th May 2017	Durban, KZN
5th - 9th June 2017	Johannesburg, GP
2nd - 6th October 2017	Johannesburg, GP

Economics of Corrosion

1st - 2nd February 2017	Johannesburg, GP
2nd - 3rd August 2017	Johannesburg, GP

Not Just Rust

31 January 2017	Johannesburg, GP
15th February 2017	Cape Town, WC
6th March 2017	Durban, KZN
2nd May 2017	Johannesburg, GP
1st June 2017	Johannesburg, GP
12th June 2017	Cape Town, WC
9th October 2017	Durban, KZN
1st November 2017	Johannesburg, GP

ECDA – External Corrosion Direct Assessment

10th - 11th April 2017	Johannesburg, GP
17th - 18th July 2017	Johannesburg, GP

CITWI – Corrosion in the water Industry

16th - 19th October 2017	Johannesburg, GP
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NACE CIP 1 – Coating Inspector Program

23rd - 28th January 2017	Johannesburg, GP
3rd - 8th April 2017	Johannesburg, GP
5th - 10th June 2017	Durban, KZN
3rd - 8th July 2017	Johannesburg, GP
14th - 19th August 2017	Cape Town, WC
4th - 9th September 2017	Johannesburg, GP
13th - 18th November 2017	Johannesburg, GP

NACE CIP 2 – Coating Inspector Program

20th - 25th February 2017	Johannesburg, GP
18th - 23rd September 2017	Johannesburg, GP

NACE CIP 3 – PEER Review

13th - 15th March 2017	Johannesburg, GP
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NACE PCS – Protective Coating Specialist 1 (Basic Principals)

27th - 29th March 2017	Johannesburg, GP
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NACE CP 1 – Cathodic Protection Tester

8th - 12th May 2017	Johannesburg, GP
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NACE CP 2 – Cathodic Protection Technician

22nd - 26th May 2017	Johannesburg, GP
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NACE CP 3 – Cathodic Protection Technologist

27th - 1st December 2017	Johannesburg, GP
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NACE P-CAFT – Pipeline Corrosion Assessment Field Techniques

19th - 23rd June 2017	Johannesburg, GP
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NACE NPP – Nuclear Power Plant for Coating Inspectors

24th - 28th July 2017	Cape Town, WC
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NACE PCIM – Pipeline Corrosion Integrity Management

21st - 25th August 2017	Johannesburg, GP
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NACE O-CAT – Offshore Corrosion Assessment Training

23rd - 27th October 2017	Cape Town, WC
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REGISTRATION LINK: <https://docs.google.com/forms/d/1e9ZGDsMO1Sd8aXuCvys2bstXr5SrpVBxUqEQPK9IfUM/viewform?c=0&w=1>



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INNOVATIVE PROJECTS CATEGORY ENTRY

Killburn 2 Phase 1, Raw Water Pipeline

Project detail

2,1m dia x 2,2km long (15 000m²)

Location

Drakensville, Drakensberg.

Project team

Viva Engineering, NUI, ISS.

Owner

Dept of Water and Sanitation

Specifier

DWS - Petr Prazon

Main contractor and applicator

Viva Engineering

Coating material manufacturer

NUI

Product description

Ultraspray 400B199 Rigid Polyurethane is a polyol component of a two component solvent-free, prime-less rigid polyurethane spray system. The second component is the isocyanate **ULTRATHANE 500B199**. The system is designed for internal and external coating of pipes, various tanks and potable water applications. When combined together through a suitable spray machine, the products react to form a hard but tough compound, which exhibits the following properties: Resistance to Corrosion, Chemicals, Abrasion, Impact, Weather, Permeability and High temperature.

Project start date

November 2014

Project finish date

December 2015



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Specification

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Beira-Feruka Multi-Products Pipeline

Location

Mozambique

Owner

Companhia Do Pipeline Mozambique
Zimbabwe Limitada (CPMZ)

Corrosion consultants / specifiers

Michael A Brett & Partners
John Brown E&C
Correlec, ACEL and Isinyithi Cathodic
Protection

Main contractor and 3rd party inspection

Various

Coating material manufacturer

Various: 2LPE, 3LPE, FBE.

Applicator

Various: Hall Longmore, Mannesman &
Others

Other

Cathodic Protection

Project size

293km

Initial project starting and finish date

1965 to 1981

2nd phase project start and completion date

1981 to 2015

Project value

Unquantifiable – over 34 years



1960's.



Beira Pump Station under construction.



Pipeline construction underway.



Maforga Pump Station.



Beira Terminal.



Feruka Refinery.



1980's – "As found" condition after 15 years of neglect and civil war.



Cathodic protection investigations and rehabilitation.



Butter welding on a LIVE pipeline.



Localised wrapping repairs and CP augmentation.



Reclaimed pipe being wrapped.



Sabotaged bridge, intact pipeline.



Early CP station.



Shattered anodes cause delays.



Rerouting the pipe on the new bridge.



Shorted road casings.



Rehabilitated casings.



Factory coated replacement pipe and supplementary wrapping.



1990's – New factory coated pipe with tape wrap field joints.



2000's.



2014 – The changing horizons of an Integrity Survey.



2015 – Excavated groundbed.



Sectionalised anode installation.



Ring main.



Groundbed markers installed.

“STOOD THE TEST OF TIME” CATEGORY ENTRY

City of Cape Town Pylon Structures

Project detail

Inspection and evaluation of various electrical pylon structures for the city of Cape Town.

Owner and location

City of Cape Town

Corrosion consultants / coating inspectors

Hot Dip Galvanizers Association of Southern Africa

Project size

Athlone / Phillippi line: Pylon No's 11; 12; 13; 15; 16; 17; 18; 19 and 21.

Gugulethu: Pylons 7 and 11.

Mitchells Plain / Steenbras line: Sub Station gantry structure.

Stikland / Oakdale line: Pylon No's 14; 19; 26; 27; 31; 32; 33 and 34.

Project starting date

2 July 2014

Project completion date

15 July 2014

Project value

Unquantifiable

Project purpose

Surface rust staining (which can be a function of an iron/zinc alloy layer surfacing after

many years of atmospheric exposure) caused concern with the City Electrical Engineers and they requested an inspection and evaluation of a number of elevated lattice pylons within the City's jurisdiction.

Motivation

Hot dip galvanized elevated lattice pylons are scattered about the country to distribute power from power stations to the end users. Many of these pylons were erected in the early seventies and while most of them are exposed to relatively non-corrosive rural atmospheres after 45 to 50 years many are still in relatively good shape. Where many display surface rust staining. An inspection of the residual coating is advisable to evaluate the situation for sustainability and or refurbishment.

Scope of work

Access to the pylon components was either from the ground, by ladder or by a "Cherry Picker".

Only a sample number of designated components (set out by the client) were inspected and recorded. However, where necessary other components and some additional pylons, when convenient were added to the list.

All areas that were to be inspected were identified using a number related to the



pylon number, the component and the number of areas inspected on that specific component.

Once a component was identified, all surface contaminants were comprehensively removed by abrasive paper until sufficiently clean in order to take residual metallic coating thickness readings.

In most instances between 5 and 30 individual coating thickness readings were taken depending on the size, shape and condition of the component.

Corresponding photos were taken during the readings but as indicated on the tables (*not shown*) these do not necessarily match both the maximum and minimum readings. All coating thickness readings are in microns (µm).

Conclusion

Of the 20 structures inspected many of which were in excess of 40 years old, 85 to 95% of the components could be left as they are. ↗



“STOOD THE TEST OF TIME” CATEGORY ENTRY

Pond B Floor Grating Components

Project detail

Inspection & evaluation of various hot dip galvanized floor grating components at Pond B, RBM.

Location

Richards Bay

Owner

Richards Bay Minerals

Corrosion consultants / coating inspectors

Hot Dip Galvanizers Association of Southern Africa

Project size

Not known

Project starting date

06 February 2014

Project completion date

14 April 2014

Project value

Unquantifiable

Project purpose

Hot dip galvanized floor gratings at Pond B which were installed in position in 1989 (25 years). In order to evaluate whether hot dip galvanized gratings could be used in a similar plant location at a new RBM project a short distance from RBM along the South Coast, the residual coating and therefore the durability of the Pond B floor gratings needed to be assessed.

Motivation

Should the hot dip galvanized gratings have a reasonable residual coating after 25 years of exposure to this hazardous environment, there would be sufficient evidence to with confidence specify hot dip galvanizing again for the new plant along the South Coast.



Scope of work


Identify a number of known aged floor gratings. Once a component was identified, all surface contaminants were comprehensively removed by abrasive paper until sufficiently clean in order to take residual metallic coating thickness readings.

In most instances between 5 and 10 individual coating thickness readings were taken depending on the size, shape and condition of the component.

Corresponding photos were taken during the readings but these do not necessarily match both the maximum and minimum readings.

All coating thickness readings are in microns (μm).

Conclusion

While most of the hot dip galvanized floor gratings were covered in dirt, grime and airborne surface contaminants, giving the impression that the coating may have been compromised, yet following thorough cleaning with an abrasive paper till the surface was silvery grey and taking coating thickness readings, the minimum reading (86,4 μm) was still well above the original minimum coating thickness required by SANS 121. The mean coating thickness taken was still about 220 μm . Proving that specifying hot dip galvanizing for the new project would be sensible and cost effective. 



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In Loving Memory of MICHAEL BRETT

1951 - 2016

Michael's Memorial

by Dr Colin Alvey

Michael Arthur Ashley Brett was born in Cheam, County Surrey, England during the Second World War and arrived in South Africa with his family in 1951.

His early schooling took place in England and after arriving in South Africa he attended both Hilton College in Kwa-Zulu Natal and St Stithian's College, Johannesburg, where he matriculated. During his school years he excelled on the sports field and played 1st team cricket and rugby and as short as he was he held the school 100 yards and shared the 220 yards sprint records.

Cricket was his first love and after school he played senior league cricket for various clubs up to the mid-1970s and then participated in social cricket whenever he got the chance. He also became a keen golfer. He could be found on the first tee at The Wanderers Golf Club at 7 o'clock every Saturday morning playing with the SAMS Saturday Mornings Group.

Although small in stature, Michael was a giant in presence, ability and ambition. He can best be summed-up by his nick-name at the Wanderers Golf Club where he was affectionately known as Michael 'Walk Tall' Brett.

Michael started out on the contracting side of the corrosion industry in the late 1950s as a pupil trainee with Corrosion Engineering SA on construction sites all over Southern Africa, receiving training in all types of surface coatings and linings, cathodic protection and other corrosion protection related systems.

In 1962 Michael opened his own contracting enterprise providing specialist corrosion contracting services to industry in South Africa. In 1965 the company was bought out by the Hume Pipe Group of companies. He spent 5 years with this organisation rising from Chief Corrosion Engineer to Managing Director of both corrosion protection interests as well as galvanizing operations.

I first met Michael in 1969 when I was a third year Metallurgical Engineering student at Wits University. Our corrosion lecturer, Dr Paul Robinson, instructed us to start attending the Monthly Technical evenings of the then South African Corrosion Council, the precursor to the Corrosion Institute of Southern Africa. The first meeting I attended was at the Copper Development Pavilion at the Milner Park Show grounds in Johannesburg where I was introduced to 'Mr Brett'. That was the start of a 47 year friendship with Michael, with 32 of these years being business relationships, firstly as a partner of Michael A Brett &



Partners (MAB&P) with Michael, Charlie and later Neil Webb and secondly as a member of Corrosion Advisory Technical Services (CATS) with Michael. For my final year dissertation in 1970 I studied the effects of cathodic protection over-voltages on a number of proprietary coating systems. Michael arranged for my test samples to be coated at the Hume Monoweld Corrosion Protection facilities. It was this interaction that kindled my interests in the protective coatings field in which I served for 40 years before my recent retirement.

At the end of his service contract with the Hume Group in 1970, Michael launched South Africa's first independent Corrosion Consulting practice, MAB&P, carrying out new project design, corrosion failure investigations, material development and independent quality control inspection, operating on major projects both in South Africa and internationally and eventually employing some 30 specialist corrosion personnel. He pioneered the concept of the professional corrosion consultant and due to his foresight and perseverance established the technology alongside the other engineering disciplines in which consulting engineers have practiced for a number of decades.

One of the largest MAB&P contracts in the 1970s was the Sishen Saldanha Iron Ore Exporting Project for Iscor. MAB&P were responsible for all of the corrosion protection specifications and quality control inspections for the steelwork and equipment for both the Sishen Mine and the Saldanha Bay ore handling facility. This contract was in progress when I joined the practice in 1975. Although I had just returned from my post-graduate studies at UMIST in the United Kingdom with sound technical knowledge on corrosion, I had no practical experience. Michael became my mentor and started my training by sending me out as a paint inspector for some 6 months driving to an untold number of vendors on the Reef with a paint thickness gauge taking and recording thousands upon thousands of paint thicknesses to confirm that the applied coatings met the specification requirements. Each item inspected had to receive a yellow SS sticker to confirm that it had been inspected and accepted. Years later at CATS I had reason to visit the Sishen mine and some of the old yellow SS stickers were still visible.

*The best things in life are the people we love, the places we've been
and the memories we've made along the way.*

During the 1970s, before the advent of Quality Assurance, the focus was on 'hands-on' Quality Control where every aspect of the coating application activity was checked and signed off by the independent inspector before the next operation was allowed to start. This required a high level of coordination between the applicator and the inspection authority as inspection delays between the various coating application activities could be disruptive and costly. MAB&P solved this problem by fitting Citizen Band (CB) type radios to the vehicles of its inspection staff. At that time Michael's father, Colonel 'Paddy' Brett, managed the Inspection Department. The radio in our Braamfontein offices was known as 'control' and each vehicle had a unique 'mobile' call number. The 'Colonel' had served in the Royal Tank Regiment in the British Army during the Second World War and from his 'control' radio set he 'commanded' the movements of the various 'mobile' inspection vehicles around the Reef like a squadron of Churchill tanks at the battle of El Alamein.

Together with his friend of many years, Walter Barnett, Michael introduced 'duplex coating systems' (hot dip galvanizing + additional paint protection) into the mining industry in South Africa for the protection of mineshaft steelwork. The first shaft steelwork to be duplex coated was at the Union Corporation Kinross Mine No 2 shaft in 1976. Their efforts to prove the cost effectiveness and increased life cycle on the mineshaft steelwork were not too long bearing fruit. Subsequently these systems became common practice in the mining industry with huge corrosion cost losses and maintenance replacement costs being substantially reduced.

Consistent with his ambitions for MAB&P to succeed, Michael became a workaholic and burnt the candle at both ends. The unfortunate result was a series of heart attacks in early 1982, at the age of 41. One of the worst phone calls of my life was when Michael's physician at Sandton Clinic phoned me after the third heart attack with the recommendation that I contact the practice's lawyers to dissolve the partnership as he said that even if by some miracle Michael survived, he would 'be a vegetable in a wheelchair'. Fortunately for us the Umpire ruled 'not out' and a week later Michael was directing the affairs of MAB&P from his bed in ICU. A month after that he was back in his office at MetBrett House in Rivonia. He remained at the crease for a further 34 years.

During 1980 to 1982 Michael founded Corrosion Education Productions (CEP), which researched, wrote and produced what was then the world's first fully comprehensive audio-visual training course in corrosion technology. Comprising 54 programmes each of some 30 minutes duration, these programmes had over 300 users in 50 different countries. The company owned the worldwide copyright and all marketing and distribution was undertaken by the National Association of Corrosion Engineers in Houston USA. In 1992 CEP was awarded the South African Corrosion Institute Industrial Award for the international work and development of education in the science and technology of corrosion.

In 1983 the practice of Michael A Brett & Partners International Incorporated was sold to the TUV Rheinland Group of Companies from Germany and Michael remained as Consultant to the practice until 1986. He carried out this function from the MAB&P Durban office as he had relocated to the coast for health reasons. During his subsequent restraint of trade period and until 1990, he

acted as Technical Director and Consulting Advisor to Denso SA, part of the Winn and Coales (DENSO) International Group. In 1990 he returned to the consulting field in private practice.

In 1993 he formed Corrosion Advisory Technical Services (CATS) which was subsequently split into two Close Corporations, Corrosion Advisory Technical Services – Durban (Sole Member – Michael Brett) and Corrosion Advisory Technical Services – Randburg (Sole Member – Dr Colin Alvey).

A tireless worker for the cause of the corrosion industry as a whole, Michael was a founder member of the South African Corrosion Council in 1960 and was elected to the committee in 1965. He was elected vice chairman of the Council in 1970 and chairman in 1972. In 1973 it was decided to convert the Corrosion Council to the South Africa Corrosion Institute. The name was later changed to the Corrosion Institute of Southern Africa. Michael served as a council member of the Institute from 1974 to 1984 serving a term as president from 1978 to 1980. Also in 1980 he was awarded the Institute Gold Medal for contributions to corrosion science and engineering in South Africa. When he relocated to Durban he became equally active in the Natal Branch of the Institute, serving on the branch council from 1984 to 1999, being chairman from 1992 to 1994. Michael was an Honorary Life Member of the Institute.

With Michael's 58 years of contributions to corrosion and surface coatings, his name and corrosion technology in South Africa are inseparable.

My Brother Mike

by Charles Brett, Bedford, Eastern Cape Province

I was very pleased to be asked by Colin Alvey to contribute to a memorial tribute article to my brother Michael Brett. What appealed to me most was that I knew that the other contributors would do ample justice to recording Mike's career as a Corrosion Consultant and Technologist leaving me free to just chat about my brother.

My earliest memories of "My Brother Mike" go back to the autumn of 1951. Our family were living at Chalkpit Cottage, Monxton near Andover in Hampshire England. We were a family on the move as my father had recently received notice of a posting with the British Army to South Africa so it was time to get ready for quite an adventure. News of the imminent arrival at the house of the local army doctor for the purpose of administering a number of travel immunisation injections was cause enough for Mike and my sister Jenny to devise a plan to hide yours truly in our barn so that on the doctor's arrival I was nowhere to be found. As could be expected parental discipline prevailed and I was dragged kicking and screaming to my fate and to face traditionally "blunt needles" that the army was notorious for.

Having arrived in Cape Town on the RMS Edinburgh Castle at the end of November we travelled up to Pretoria by train to settle at 56 Cameron Street, Muckleneuk, our new home. Mike was enrolled at the nearest suitable school, Christian Brothers College (CBC) as a day boy and we spent time together in the afternoons and school holidays. Being 8 years my senior games were scaled

Some people come into our lives, leave footprints on our hearts and we are never the same.

down to enable me to take part and I was coached in the game of cricket whilst standing in front of a fruit crate wicket and holding a miniature bat.

Mike, being a keen and talented sportsman participated in all his school sports activities whilst at CBC and was also a member of the pipe band as a side drummer. Much to our enjoyment he also found himself cast as a dancing girl in the musical operetta "The Maid of the Mountains". The makeover was amazing and here was 'My brother Mike' in Spanish costume, long black ringlets, dancing shoes and tambourine, very becoming indeed.

The Pretoria years came to an end when in early 1954 our family moved to Witkoppen (Bryanston) and to our home Glory Hill where we were destined to live for a period of 38 years until 1992. Mike by 1954 had moved on to Hilton College – Natal so we were only to be together during school holidays. After three years at Hilton my parents decided that Mike should complete his schooling closer to home. For his final two years he attended St Stithians College – Randburg where he excelled on the sports field at cricket, rugby and athletics. This was a good move from my point of view as I was also a St Stithians boy by then, and as Mike was a weekly boarder I got to see him now and again over weekends.

The summer school holidays were often taken up with major cricket contests on the extensive front lawn at Glory Hill. Phantasy test matches 10 wickets per side took place with some assistance from our Bull Mastiff – Alex as 12th man and retriever of the leather covered cricket ball which soon became fairly moist. Great treats were also in store as Mike always took me along to watch real test cricket at the Wanderers Stadium and I have vivid recollection watching the Springboks play against both Australia and the MCC.

It was soon my turn to be bundled off to boarding school and away I went to Hilton College – Natal in January 1960. Boarding school miles away from home was a tough call in those days and there was no question of seeing my parents during term time at any stage. What did happen on a number of occasions however is that Mike would arrive from wherever he may have been working at the time and treated myself and a schoolmate to a visit to Durban over a half-term weekend. Quite simply put Mike was always there for me.

Much later on and during 1971, I eventually joined Mike at the then newly formed Michael A Brett and Partners and remained with the practice and its various structures until 1995, with a few breaks here and there in between. During this time I was privileged to work alongside Colin Alvey and Neil Webb as partners in the practice and all in all we had a great deal of fun and success.

It was only later on when I made a move away from my daily diet of Corrosion related matters and into the front line of the Telecommunications Industry that I realised how much knowledge of general sound business practice I had gained from "My Brother Mike". To my surprise I was equipped to take on major challenges and succeed in what is an extremely competitive business environment.

It was his integrity, drive, generosity, commitment, concern for his team members and downright decency in his approach to daily life that made "My Brother Mike", respected and indeed loved by not only his family but everyone who knew him.

A Personal Tribute to Michael Brett

by Barry Claxton, United Kingdom

In 1972 I arrived in South Africa with my wife Liz, on a six year contract with the UK company for whom I had worked for 8 years. This company was Winn & Coales(Denso)Ltd. The purpose of this contract was to create a South African subsidiary company. Prior to this the company had been represented by agents Expandite Ltd.

Within days of arriving I had been advised by a contact at Expandite, that without doubt the person most able to assist to me in achieving some success, was one, Michael Brett.

In a matter of days I made contact with Mike and from that day on he became not only a fantastic help in business but one of the closest friends I have ever made in this world! Mike became not just a friend but a brother! He had the most fantastic effect on, not only my life but that of my wife and later, my children. In fact to this day my daughter and son both still refer to him as uncle Mike.

At the end of my contract with Denso S A Ltd, as it was then known, I joined Mike and his partners to create the company Corrosion Education Productions Ltd, which created an audio visual corrosion education course.

In life Mike was a great example of a knowledgeable Corrosion Engineer, a fantastic employer and an amazing companion and friend.

I have no doubt that all who had the good fortune in life to meet Mike, work with him and have him as a friend will know just how blessed they are!

A great example to all, God bless him!

My Memories of Michael Brett

by Rob Cochrane, Wolseley, Western Cape

It was greatly saddening to hear of the death of Michael Brett.

I first met Michael in 1978 when he interviewed me for a position at MAB&P. At that time he asked me if I would be prepared to go to Koeberg Nuclear Power Station as part of a team. I was always grateful to Mike for giving me this opportunity which marked the beginning of a career path in the Nuclear Power Industry which lasted until 2013.

Later we traveled to France together with Colin Alvey and Brian Statham of Eskom. Mike was very amused when I arrived at Tricastin NPS in an ambulance which doubled as the local taxi! When we visited Paris we all enjoyed lunch on the Bateaux Mouches on the river Seine. This became a tradition during all future visits made by the Eskom Corrosion Control Group.

I last met with Mike in 1994 when we had lunch together at Blouberg Hotel on my return from China's Guang Dong Nuclear Power Station. We did, however keep in contact over the years.

Mike was not only a colleague but a valued friend. He was a good man who was well liked and respected by everyone who knew him.

*Those we love don't go away... they walk beside us every day,
unseen, unheard but always near.*

Michael Brett

by Graeme Stead, Sandton

The best time I spent with Mike was in 1978 when he was invited by our Company to attend the "Copon Conference" in Italy. It was held in a hotel in Sirmione, situated on a peninsular that juts into Lake Garda (Lago di Garda) in Northern Italy.

I met him and his wife Yvonne and his little girl Candy (I have ever since called her 'Candy-Apple' because she was the apple of his eye) in Milan and we drove to the hotel in a hired car together. That trip was memorable! We were in a Fiat 1600. I asked Mike what was the speed limit on the Autostrada? His reply was: 'As fast as the car can go'!

The time in Italy was quite memorable. Our host was none other than Bruno Stoppani the multi-millionaire. He had little interest in the technical program and most days were cut short because the tour bus arrived early to take us to the next gourmet experience at, for instance, the nearby university town of Bergamo 'a hilltop medieval town, surrounded by 16th-century defensive walls'.

We shared the conference with Copon 'licensees' from all over the world – USA, Japan, France, Australia etc. This Conference set the pattern of future conferences. The Frenchman appointed himself as leader of the early morning run (and invariably got lost!) and this was a tricky exercise as we had by then just gone to bed, having been competing in the beer drinking competition with the Australians and Americans all night! (We were young then!)

Then we travelled back to Milan in the same hectic fashion as when we arrived. We were all destined for London. I had booked weeks ahead but my flight was delayed until midnight. Mike hadn't booked and took the precaution of handing over a fist full of money with his passport at the ticket sales counter. The little Brett family was ushered onto the next plane and arrived in London in the light! He had taught me yet another good lesson in foreign diplomacy!

Centre: Michael and Josef Turza fighting about who was the tallest.

Right (top to bottom): Michael and the Committee members Malcolm Smith, Andrew Stuart, Michael Brett, Anthony Dos Santos, Chris Botha; Michael and his team winning the game; For many years he acted as compere for the prize giving.

Left (top to bottom): Michael Brett with Anthony Dos Santos, Richard Elsas and Josef Turza from Southey Richards Bay; Michael Brett with Graham Pole and Josef Turza; Michael Brett.

Those were some memorable few days with Mike and his family. Needless to say, his presentation of 'Copon corrosion protection of the ERGO thickeners' was excellently conducted and made me proud of our South African contribution!

Michael Brett

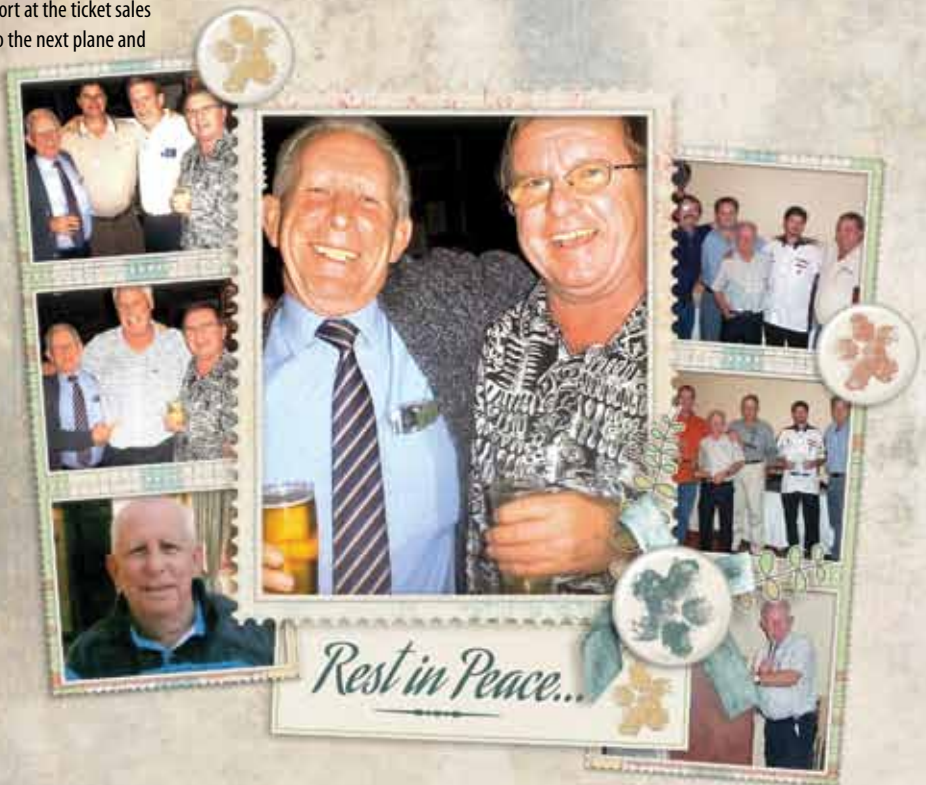
by Malcolm Smith, Australia

I first met Michael Brett during March 1975 when I joined Michael A Brett and Partners as a Coating Inspector.

My first job for MAB&P was working on the Sishen Saldhana Iron Ore Export Project and being accompanied by Michael's Father Colonel Paddy Brett visiting all the Vendors to carry out dry film thickness testing and general inspection. The best part was listening to his war stories of campaign's against Rommel in the 2nd world war where he fought at El Alamein and the Desert war as a Tank Commander. He was highly entertaining and commanded great respect from the Contractors visited. A couple of years later I also came under the chain of command with the car radio and list of radio instructions - 10.4 over and out.

After 6 months of initiation I was told to pack up my belongings including one child plus all our furniture and proceed to Saldhana Bay as Coating Inspector for the Stacker Reclaimers, Ship Loaders and kilometres of Conveyor Systems.

Starting 10 years of travelling with MAB&P with two children now on board on various contracts and jobs around South Africa. Pamela my wife was easy to please. We lived in 12 different homes and moved all over South Africa and making many friends eventually to settle down 1986 in KZN working with Michael again and Lt Colonel Henry Oakden. Back to army stories. He was with the Ghurkha's Regiment. Michael was on fire and had all kinds of ideas he was



When someone we love becomes a memory... that memory becomes a treasure

involved with. Under his guidance I did a survey of a Galvanising Plant. We did work at Richards Bay Minerals and we started surveys and maintenance painting on NATCOS Tank farm near the airport as it was called then. We did work on Tioxide. We were always busy due to the boss. Eventually he withdrew from TUV/MAB&P but I still had dealings with him at the Corrosion Institute (KZN) region.

In 1991 Michael was the instigator of the Corrosion Institute KZN Golf day at Mount Edgecombe Golf Club where he had been playing since his move to KZN in 1984. George Howell and myself helped him with persuading teams to play and donate prizes etc. It was a fantastic success with companies throughout the industry putting in teams and inviting clients to play. We had a full field. Teams from Richards Bay also came to play. Competitive as ever Michael and his team of Mount Edgecombe Golfers took the honours. This prestigious event became an annual event. Michael persuaded one of our major abrasive suppliers to donate collared shirts for every golfer and every year as clients arrived they would be asking "what's the colour this year" Such was the popularity of the sponsor and event. Above that all our profits each year were donated to the Highway Hospice which from 1991 to 2013 was a tidy donation to this charity by the Institute. As a thank you for helping with the golf day, Michael gave George and myself gold plated golf ball markers engraved (Corr I 1991) that I still have to this day.

Michael was member of the Corr I KZN 1984 – 1999. He was region Chairman 1992-1994. He was a tireless promoter of the Institute. He and Stuart Folkard organised many interesting events during the 2 years of his chairmanship. I remember they organised a Seminar in Durban consisting of a Conference and Exhibition.

In 1993 TUV MAB&P was closed and I joined Corrosion Advisory Technical Services. CATS for short. Working again with Michael for a further 20 years with a fair and magnificent boss and above all great friend. I spent most of those years on the Engen Refinery as resident Coating Inspector. Eventually saying good bye in 2013 after 38 years to follow family who had emigrated to Australia. Michael A Brett will never be forgotten. He was a tireless worker for the Corrosion Industry.

A Tribute to Michael Brett

by Neil Webb, Sandton

I was at my desk in the Richard Ward building at Wits in 1976 when a small man in a dark suit walked past my office en route to a meeting with Prof Paul Robinson. Over the next 2 years whilst working on a post graduate research project I met Michael Brett several times via his involvement with Prof Robinson and the Corrosion Institute, which held its regular technical meetings in room 303. One day Prof Robbie (as he was affectionately known) stuck his head in my door and said "Brett's are looking for a graduate metallurgist". Initially I wasn't interested, as Brett's were "the paint people". Anyhow, I went for an interview, got the job and joined Michael Brett & Partners in February 1978. That was the start of a 38 year association with this amazing man which went from boss to partner to business colleague, and always a friend and mentor.

Michael set high standards, particularly in report writing and technical competence, and built up a reputation for excellence, impartiality and integrity which few could emulate. I well remember an incident when we were evaluating tenders on behalf of a client. This was before the days of procurement departments. One of the tenders had an envelope stuffed with cash inside it - Michael took the envelope, put it inside another envelope addressed to his favourite charity, took the tender and wrote across it "disqualified" without even opening it.

Michael was a man of vision, and his launching of the CEP audio-visual training project was probably 20 years ahead of its time. My involvement with this project handling most of the photographic work has stood me in good stead throughout my career.

I never followed Michael's love of golf, but many a project was negotiated and problems resolved through that medium. We regularly had cricket matches between CorriSA and OCCA at Tom Edwards' estate, and I remember being in Michael's bad books for some time after giving him out LBW when I was umpiring (not the sort of thing a junior engineer should do).

Although Michael was small in stature, he was a big man in every other way. He orchestrated the joint venture between MAB&P, CHEL and TUV for the Richards Bay Coal Terminal project - a move which created a formidable metallurgical and non-destructive testing service provider and independent inspectorate. This ultimately led to the creation of the TUV Group, which unfortunately did not survive the combination of international business politics and the end of the mining boom in South Africa.

In spite of the fact that our paths diverged somewhat after Michael left the TUV group, Michael & I remained good friends and I treasure the relationship that we had which enabled me to pick up the phone and ask for advice or a second opinion, be it technical or contractual. I enjoyed many a beer with him at the News Cafe near his house in Durban when I had a free evening during a site visit.

Michael's dedication to the industry set an example which is hard to emulate, and his is truly one of the great names to be remembered in the South African corrosion protection industry. 🍷



*Losing a loved one leaves a heartache no-one can heal
but their loving memory is a precious gift that no-one can steal.*

NACE CIP 1 TRAINING COURSE: Johannesburg



NACE CIP 2 TRAINING COURSE: Johannesburg



TECHNICAL EVENT: Cape Town





NACE COATING INSPECTION PROGRAMME Level 1 (CIP1)



Description

This course provides both the technical and practical fundamentals of coatings inspection work for structural steel projects. This course provides students with knowledge of coating materials and techniques for surface preparation and application that prepares the student to perform basic coating inspections using non-destructive techniques and inspection instrumentation. Although specifically designed for coatings inspection trainees, this course will benefit anyone interested in gaining a better understanding of coatings application and inspection.

Aimed at

- Inspectors
- Corrosion industry suppliers
- Quality assurance managers
- Contractors
- Plant managers and operators

Recommended entry requirements

- English Literacy
- Matric or higher qualification
- **1yr industry experience**
- CIP1 for CIP2
- CIP2 for CIP3

Supplied

- Course manual and workbook
- Lunch, light snacks and refreshments

Duration

- CIP1 & 2 - 5 days plus 1 for practical exam
- CIP 3 – ½ day peer review interview and test

Date : 23rd – 28th January 2017

Venue: The CORē, Midrand

For More information contact:

LINDA HINRICHSEN
COURSE ADMINISTRATOR

Tel: +27 010 224 0761
Cell (071) 388 3179
Office (086) 126 7772 (CORRSA)
Fax: (086) 726 0318
email: courses@corrisa.org.za



Corrosion – Not Just Rust



Description

This course is intended to provide the bigger picture as to why and how corrosion affects us and touches on the ways we can prevent those effects. In the end, the delegate would have an idea as to where they fit in the field of corrosion and how they can grow further.

The course is designed to stimulate conversation in a comfortable environment. Delegates will see corrosion take place and discuss defensive mechanism with a multitude of interactive activities.

Aimed at

- All new comers into the corrosion field
- Those looking to enter the corrosion field
- Those in the corrosion sector looking for direction
- Staff working in the corrosion field who have yet to grasp the enormity of the corrosion challenge

Subjects covered

- What is corrosion and why should we care?
- Where does corrosion happen?
- Defences against corrosion
 - o Material selection
 - o Structural design
 - o Environment management
 - o Protective coatings
 - o Electrically induced protection

Minimum entry requirements

- English Literacy



Date : 31st January 2017 15th February 2017 6th March 2017
Venue: The CORē, JHB Cape Town Durban KZN

For More information contact:

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The RUST Spot...



in conversation with Peter Quorn

Born and educated in Essex England on a sunny day in 1936. Whilst studying for a silver medal in pianoforte at the London Academy of Music and Dramatic Art I decided I would be less hungry pursuing a more commercial activity. Applying for laboratory employment in a nearby rare earth company aptly named Thorium but luckily for science they declined my services. Undaunted I found a vacancy in the laboratories of a large well established (circa 1777) paint manufacturing company and through an industrial indenture training scheme gained valuable hands on experience throughout all their laboratories augmented by college studies in City & Guilds paint

technology and the National Certificate in Applied Chemistry leading to a LRIC of the Royal Institute of Chemistry.

Luckily this was during a period of compulsory national conscription into the military service for which I was granted exception until unluckily the Government decided that they required all those crafty characters to participate before they abandoned the programme. Joining the RAF to see the world I was thwarted once more and required to spend 2 years at Hendon to guard London without an aeroplane and moreover as they had too many qualified airmen no luxurious paid officer commission. The nearest occupation they conferred in the circumstances was as medic (notoriously bound it was said to the Geneva convention of one bullet for the patient and one for the medic if captured).

As there was a lack of opportunity to become a hero in peacetime I settled for the furtherance of studies at Her Majesties expense in Polymer Chemistry at London Borough Polytechnic.

Released from guarding the realm I forged ahead in the paint industry:

Positions held throughout three countries included chief Chemist British Cellulose Lacquers (UK), Vice President Gregg Co (USA), Group Technical Director Advanced Coatings (S.Afr.). I also lectured paint courses in London and Johannesburg.

On joining Chemrite Coatings I became a member of the Corrosion Institute in 1983.

As the company specialised in corrosion protection through Carboline USA technology it keenly supported the institute. The MD Eric van Marcke served on the council and vigorously encouraged staff members to attend meetings to advantage at Wits & Science Park.

I have seen many advances in the Industry over the years: Not least improved quality of RM's i.e. dispersion as against grinding pigments & extenders. Additives galore. With the advent of electronics more reliable and stable testing equipment. The metric system, computerisation swifter cost and business control and instant communications (electrical power permitting). Can you but imagine how long it took to cost a single formulation in pounds shillings & pence with units of tons hundred weights, quarters pounds and ounces, gallons quarts, and pints and fluid ounces on a slide rule!

Presently corrosion prevention advances in the coating field abound with the advent of new chemistry and I am encouraged with the pace of development by our company (StonCor Africa) and its competitors.

I hope to continue keeping abreast of industrial and technical developments until concluding my ever humble pursuit of excellence in all things shortly in the UK and no doubt (with the end of the oil age looming) return to peddling to the factory by bicycle coming full circle In life.

Peter Quorn (pquorn@stoncor.com)

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Weartech.....	Inside Back Cover

To the Editor,

Thank you for the copy. I found it a most interesting read and would like to receive copies of future editions. Is it possible to obtain an electronic copy of the first volume. Just for the record the reference to SANS 10267 on the cover should have read SANS 10237.

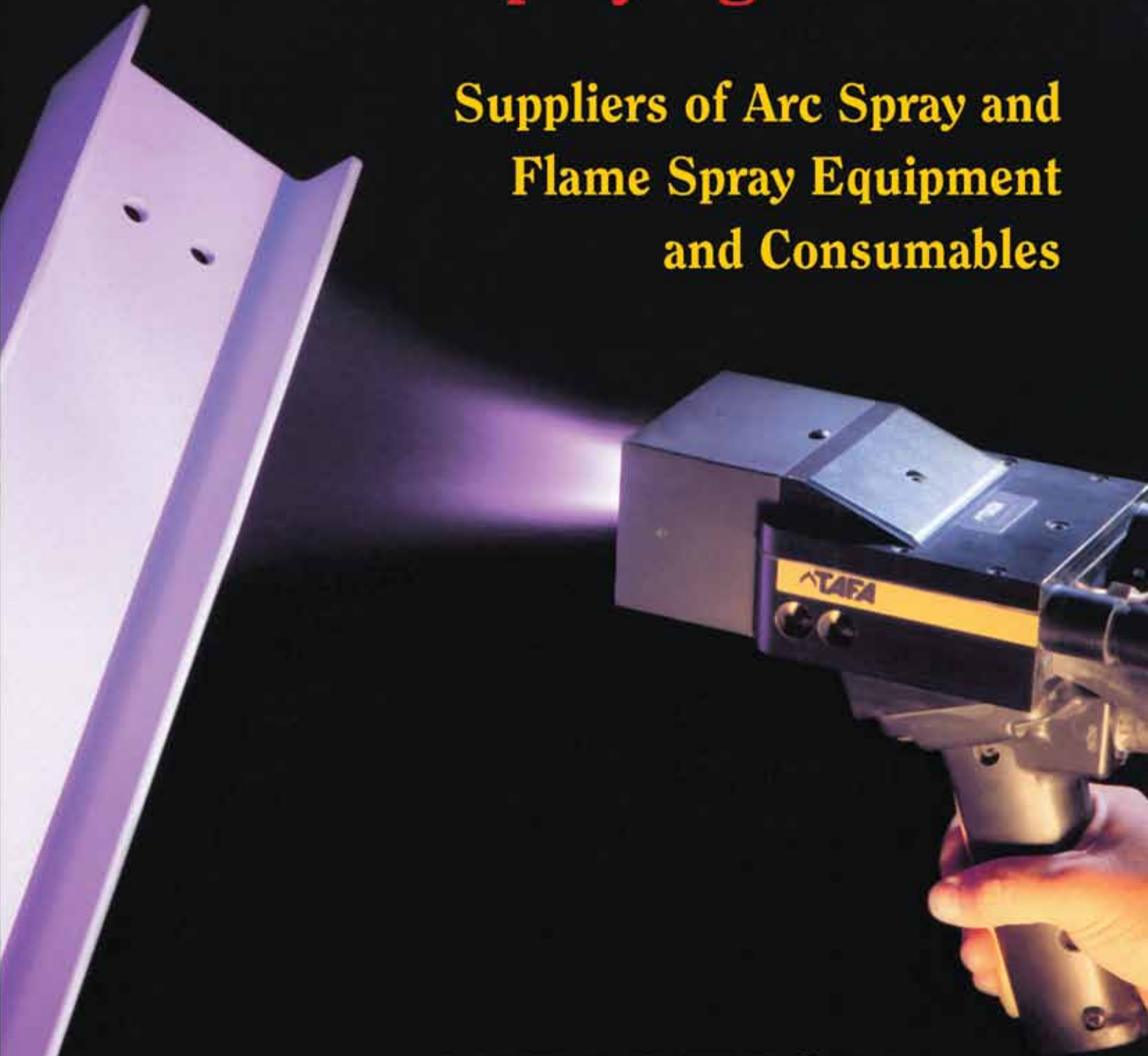
In my opinion the content was well balanced and interesting including the articles outside of my main field of interest. Visually the cover is a winner. I look forward to a long and mutually beneficial relationship between our two associations.

Dennis White (SAMCRA)

Editor's reply: Apologies for the incorrect standard number but also for not acknowledging the source of the article "Metal Cladding and the Environment" (Vol 2 Issue 2-2016) by Dennis White of SAMCRA.

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