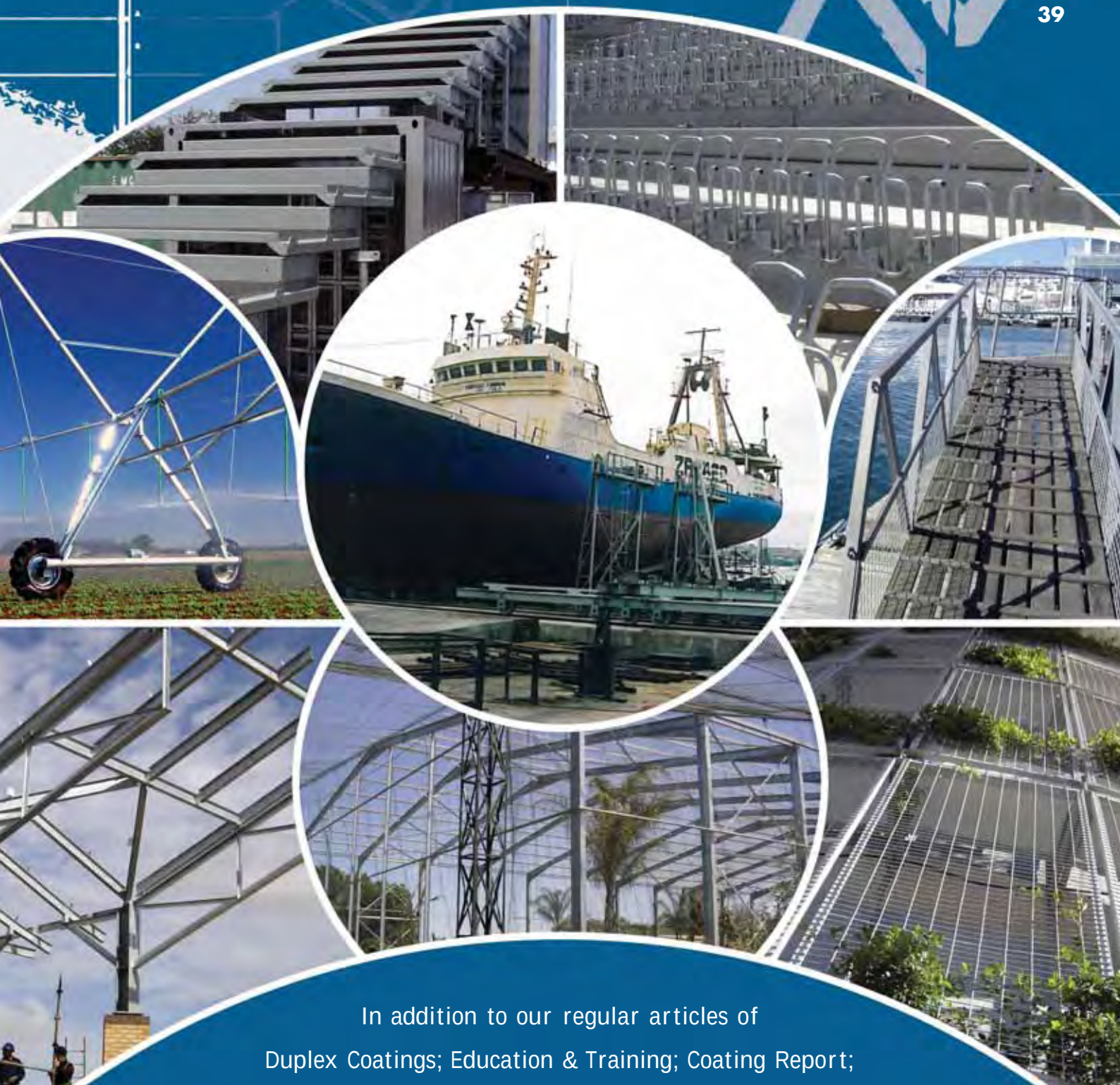
2009 Volume 6 Issue 2

HOT DIP GALVANIZING TODAY

HOT DIP GALVANIZERS ASSOCIATION Southern Africa

39



In addition to our regular articles of Duplex Coatings; Education & Training; Coating Report; "Wamosha"; Guest Writer; "Bob's BANTER"; and "On The Couch", we include an article, "The day in a life of a hot dip galvanizer" and pay our respects to the late Walter Barnett.

The Association is a technical information centre established for the benefit of specifiers, consultants, end users and its members

PUBLISHED BY:
Hot Dip Galvanizers Association Southern Africa
Quality House, Unit U4,
St. Christopher Road,
St. Andrews, Bedfordview
P.O. Box 2212 Edenvale 1610
Tel: (011) 456-7960
Fax: (011) 454-6304
Email: hdgasa@icon.co.za
Website: www.hdgasa.org.za

Office Manager: Saskia Salvatori
Email: hdgasa@icon.co.za

Receptionist: Marjorie Montgomery
Email: info@hdgasa.org.za

Executive Director: Bob Wilmot
Cell: 082 325 8840
Email: bob@hdgasa.org.za

Technical Marketing Consultant: Hendrik Steenkamp
Cell: 082 891 5357
Email: hendrik@hdgasa.org.za

Editor and Technical Marketing Director: Terry Smith
Tel: (021) 797 4735
Fax: 086 612 7284
Cell: 082 893 3911
Email: terry@hdgasa.org.za

Sub-Editor, Advertising and Sales: Anne van Vliet
Tel: (011) 462-5073
Cell: 082 775 0711
Email: mwvliet@mweb.co.za

Design and Layout: Sandra Addinall
Tel: (011) 868-3408
Fax: (011) 900-1922
Email: cbtdesign@adcot.co.za

Reproduction and Printing: Camera Press
Tel: (011) 334-3815
Fax: (011) 334-3912
Email: cpress@iafrica.com

HOT DIP
GALVANIZING TODAY

Official journal of the Hot Dip Galvanizers Association Southern Africa • 2009 Volume 6 Issue 2

39

CONTENTS

ISSN 1023/781X

Front Cover: *A kaleidoscope of photographs showing some hot dip galvanized structural steel buildings, stadium seats, a jetty and a causeway.*

Hot Dip Galvanizing – Adding value to Steel

Executive Director's Comment

As reported elsewhere in this journal, we record the passing and pay tribute to Walter Barnett, who was well known in the local and international galvanizing and corrosion industries.

Since our last journal publication we have witnessed the effects of the global economic slowdown. However, due to the requirements of certain long term contracts, a number of our members have been able to maintain turnover performance and remain active. It is times of economical slowdown that product quality and service become even more critical to the maintenance of production performance. Strict compliance to specification is required and the term "fit for purpose" should not be seen or used as a replacement for specifications.

At the Association, we have experienced a significant increase in 3rd party inspectors attending our two day Inspector's Courses. The object of these courses is to provide attendees with a working knowledge of what constitutes quality hot dip galvanizing. From this process, our members have experienced the benefits of outside inspectors who understand and appreciate what is good and bad quality galvanizing. While this is of benefit to members it also means that they are required to be more discerning with regards the production of quality galvanizing.

At the Association we have witnessed a marked increase in activities, on the part of the authorities, relating to environmental controls and waste management requirements. Members are encouraged to develop and implement action plans aimed at environmental and waste management controls. Cleaner production is no longer a "nice to have", but rather a requirement of business activities. Environmental controls have been developed by the Association and are available for inclusion in individual company action plans. Cleaner production can and does result in improved bottom line profits.

Bob Wilmot

Note from the Editor

I came to know Walter Barnett through many discussions on the development of a duplex coating system for some of the products that we at my previous company were manufacturing and selling. Embarrassed by my continual requests for information, I asked Walter if we could become members and that was the start of the Affiliate Members in 1992.

I realised as I started to work with him in February 1996 that Walter was well known, when I accompanied him to the Birmingham Galvanizing Conference but it was summed up by the comments of some visitors to our offices later on. I asked the question while Walter was on the phone, "How do you know Walter" to which the answer was, "Everyone knows Walter!"

I knew just by listening attentively to Walter amongst other times chatting on the phone to someone needing his expertise, as Walter would often have his feet up on his desk, totally relaxed with a cigarette in his hand, looking out on the veldt at our previous office, at Science Park, that I had the opportunity to really learn about corrosion and hot dip galvanizing.

Walter inspired me by the amount of work he would do over a weekend always arriving at work with a number of reports that he had concluded over the weekend for our secretary to type up. His weekends were also devoted to his golf which he thoroughly enjoyed and because of his love for laughter, new jokes heard on the golf course were often the Monday tea time topic.

I will miss you Walter, for many things you did for me including your valuable contribution to the magazine but particularly for the trust you had in me for doing what you employed me to do! May you rest in peace!

At the Association we pride ourselves in providing cost effective advice in the use of our coatings and are always happy to be involved in the evaluation and inspection of previously exposed and weathered hot dip galvanized or duplex coated components.

Should a reader require this evaluation and inspection service, kindly contact Bob, Hendrik Steenkamp or myself.

Our feature for this issue includes focus on our annual Awards event, Golf Day feedback, a Water Storage article and a Tribute to Walter Barnett, the man known as 'Mr Galvanizing'. Also included is 'The day in a life of a hot dip galvanizer' which we hope will be the start of a series which highlights an issue such as 'venting, filling and draining' and the impact its absence has on safety, coating quality, production time and therefore cost, etc.

Under Duplex Coatings, Iain Dodds of Cape Galvanising discusses the 'Rolls Royce' corrosion control system.

Education and Training, expands on our certificated coating inspectors course, an essential requirement in any coating inspectors portfolio. In addition to the regular courses in Johannesburg, we have had one in Cape Town with another one planned for September.

We also re-look at our comparison between a zinc rich paint and hot dip galvanizing.

The forth part of what's important when taking coating thickness readings, is also included.

In the Coating Report we assess the corrosivity of the site where the Coastal Education & Visitors Centre in East London was built.

Other regular articles include, Bob's Banter, where Bob Andrew chats about 'Managing the Unexpected'.

'On the Couch' includes a combined interview with Saskia Salvatori (Office Manager), Marjorie Montgomerie (Receptionist) and Hendrik Steenkamp (our new Technical Marketing Consultant).

'Members news' includes the milestones achieved by Robor Galvanizers and Galvspin one of our newest members tells us about their business.

Should a reader wish to express an opinion or provide us with an article, or comment on our articles, positively or negatively, kindly contact me.

Case History, Misconceptions and other regular articles will resume in the next issue.

Enjoy the 'magazinc'.

Terry Smith

ABECO TANKS – THE NAME THAT HOLDS WATER

Several thousand tanks successfully installed in Africa and South America

Established in 1983, Abeco Tanks is a leading innovator in the development of water storage solutions. Abeco Tanks is committed to developing cost effective solutions for water storage needs in communities with limited resources.

Products:

- Galvanized pressed steel tanks;
- Support towers for elevated tanks;
- Circular bolted tanks.

Features:

- Rugged, simple modular design.
- Guarantees safe, hygienic and durable water supplies.
- Sectional steel water tanks are easy and quick to install.
- Transportable to remote locations.
- Minimal site preparation for circular bolted tanks.

Applications:

- Mainly potable water, but also
- Hot water; effluent; fuels; corrosive liquids.

Abeco TANKS

Tel: 011 616 7999
Fax: 011 616 8355
Email: abeco@icon.co.za
www.abecotanks.com

Water challenges in a changing climate

The impact of climate change on South Africa could cost billions of rands in the near future, according to senior hydrologists and some weather experts.

The two-fold impact, which is already being felt, is likely to get worse. In some areas water scarcity will increase and there will have to be measures put in place to conserve water, while elsewhere more frequent flooding and with it increased infrastructural and environmental damage, will be felt.

There is only so much water available and because of its hydrological nature water is most often not where it is most needed. South Africa is a water-scarce country so conserving and re-using water is vital: the ideal situation would be that we recycle our annual available water supply to double the amount available for use.

However, at present South Africa actually loses more than we gain annually from natural water sources (rainfall, river systems, dams) before the water even reaches the end-users. This is due to two main factors: pollution and leakages from poorly maintained water pipes. The devastating effects from both these factors on fresh water supply will take many years of commitment from national and provincial government and municipal managers to put right.

The social impact of water scarcity on rural communities especially, is immense. The hours spent and the physical labour involved in carting water from long distances falls mainly on the shoulders of the women and children.

Access to clean water is essential for the development of children: without it, children's health is at risk. Added to that the long hours spent fetching water to meet their households' survival needs and the consequences are dire for the child's performance at school.

The Department of Water Affairs and Forestry has implemented certain interventions in rural areas that include deploying water tankers to areas in need, as well as the Play Pump Project.

Play pumps are merry-go-rounds that pump water while children play on the wheel, but these are only suitable for areas that have groundwater of a good quality.

Another intervention, for storing and distributing potable and agricultural water is the galvanized steel water storage tank. These tanks can be erected in areas that are difficult to reach by road, and have no naturally occurring aquifers or where the underground water supply is contaminated.

They are increasingly being used by local authorities, water utilities and township developments to be used as bulk water supply reservoirs. They are also used in the agricultural sector as livestock water supply tanks and irrigation tanks.

One South African company that has been in operation since 1983 catering to the ever-increasing need for hygienic storage of water, is Abeco Tanks. Abeco realised that the greatest need for sanitary water lay in communities with limited resources and so began looking at the development of the most cost effective solutions to water storage while at the same time focussing on water hygiene and quality.

Abeco tanks can be built either with a ground base or raised on towers. The rectangular tank panels are of pressed steel, while the circular tanks are of sectional steel and all steel components are hot dip galvanized in order to increase the durability and life span of the tanks. They are very rugged and can be transported and installed using basic equipment and manual labour.

Another company serving the South African market is View Engineering, who design, supply and erect circular bolted steel tanks for use in the storage of water at ground level. The tanks are constructed from shell plates manufactured from hot dip galvanized steel plates and can be installed with minimal site preparation. The capacity of View Engineering's tanks range from

1 136 litres to 7 700 litres, although larger capacity tanks can be designed and built on request.

As South Africa moves into the future of unpredictable weather patterns, one thing is sure – global climate change will affect us as much if not more, than the more developed nations in the northern hemispheres. We have to prepare now for these changes, and local authorities and government agencies would do well to consider the cost-effective, hygienic options of installing steel water storage tanks.

By Anne van Vliet

Walter Barnett

by Bob Andrew

(27 April 1930 – 16 March 2009)

I have known Walter over a period of more than 40 years. As many of his friends, family and colleagues will attest to, Walter was a man with many fine qualities. For me his gentleness, humanity and unpretentiousness, all of which made him able to freely relate to and empathise with people from all walks of life, and his wisdom and knowledge in a wide range of subjects, were very special.

It may have been galvanizing that first caused me to meet Walter, but now as I look back, the numerous occasions on which we deeply discussed topics like climate physics, astronomy, meta physics, religion, evolution and the great unknown, as well as always exchanging jokes and telling stories, are most burnt in my memory. Walter was the type of person with whom you could discuss how to change the world, always through persuasion and influence rather than coercion and power. I now realise that he and I may not have been able to change the planet but he did change my world and for this I will forever remember him.

Walter's Memorial

by Gavin G. Barnett

When my brother Walter was barely three years old his missionary father Fred was killed by a crocodile on the Zambezi. Walter was the second of 4 children brought up by his remarkable widowed mother Dorothy. Facing a formidable future she chose to continue her work in the inhospitable landscape of mid 20th century Africa with its tribalism, tropical diseases, superstitious practices and dangers from wild animals. Sustained by her steadfast faith, this amazing lady became one of the heroines of history.

Having that kind of mother, it is no wonder that Walter grew up to become a man of integrity, compassion, friendship, courage and a giant in his profession.

Walter matriculated with distinction and after graduation he was admitted as an Associate of the Institute of Chartered Secretaries.

You have only to click into search engine Google and type in the name Walter Barnett to read professional articles by him in Engineering News and other journals, to read of his many awards and achievements, and to read about the Walter Barnett trophy presented to many a proud engineer.

Walter has been actively involved in the hot dip galvanizing industry for most of his working life. As managing director and CEO of Rietfontein and Isando General Galvanizers, he was responsible for the hot dip galvanizing of some thirty thousand tonnes of steel annually.

In 1990 he was appointed Executive Director of the Hot Dip Galvanizers Association, Southern Africa, which he developed into a highly active centre for the provision of technical information and advice to specifiers, end users and galvanizers.

He became a corrosion consultant specialising in both organic and inorganic coatings.

Amongst his successful past achievements Walter considered the introduction of hot dip galvanizing and duplex systems into the mining industry, for corrosive underground applications, to be one of the most significant.

He has, for many years, been closely involved with the Corrosion Institute of Southern Africa, where he is a Past President and honorary Life Member. In 1988 he received the Institute's Gold Medal award in recognition of meritorious service to the corrosion industry and the advancement of corrosion science and technology.

In the 70's in my business capacity I consulted Walter about mysterious water leaks occurring in a clothing factory. He produced a lucid report recommending a solution and explaining that the plumbing was

being attacked and devoured by a voracious bacterium. Imagine the sceptical reaction when I announced this to my board. A colleague asked whether some of the microbes had got inside my head. But Walter's finding was scientifically sound and his solution worked.

Walter became an internationally renowned expert in his field and was sought after to give technical evidence in court cases. Even while lying in hospital he would take calls from engineers and managers needing some technical help that could not be found in the text books. He might be called the Wikipedia of the industry.

Despite a busy career and his wife Ruth's challenges of health, they have raised their wonderful boys Graham, Trevor and Michael. Walter will be sorely missed by his family and many close friends.

As brothers we were competitive. Though 16 months younger, he was fitter, more daring and stronger than I.

The journey to boarding school took 2 weeks trekking through the wilds on foot or in a hammock. When our first bicycle arrived it was Walter who was first to clamber on to it. Watched by the 30 porters carrying our tent, food and luggage he streaked along the winding footpath, balancing like an experienced rider. Then I tremblingly mounted the frightening vehicle zigzagging uncontrollably across tree stumps and was flung tearfully into the thorn bushes to the derisive laughter of our whole travelling troupe.

Walter shared his mother's sense of humour and sometimes he triggered it off. On the deck of the SS Themistocles sailing from Durban to Melbourne in 1937, the sea was rough and we were all slightly queasy. Walter said to mum "Can I bring up the biscuit tin from the

cabin? Mum replied "you can bring up anything you like – I could!"

My eldest son Roderick telephoned from Sydney on Tuesday when he heard the news and recounted his impressions of his uncle as a strong, confident and personable man who never talked down to his nephews. Roderick also recalled the times we all spent at the piano and the duets that Walter and I would sing. Messages have also come from nephews Geoffrey in NZ, Hilton in White River and Ruth Barnett in Toronto. The whole family is grateful for your love and support.

During the week before I heard the news, a quaint old tune had been playing itself over in my mind as it often does with old people. It was a gospel song Walter and I were often invited to sing at weddings, "I'm invited to a party – 'tis the wedding feast above...".

While Walter was not well enough to attend my 80th birthday party last month, perhaps we can take comfort in the assurance that this week he was given a grand reception at that better feast above!

Gavin G. Barnett: 19th March 2009

'Mr Galvanizing' by Bob Wilmot

Walter G S Barnett was actively involved in the Southern African Hot Dip Galvanizing industry for more than 40 years. He was known throughout the local industry for his knowledge of galvanized steel as a material of construction. His interests and wider study of corrosion science extended to climatology that included the maintenance of local rainfall records for more than 40 years. His weather forecasts were on a par with that of the Weather Bureau.

As managing director of the largest Southern African hot dip galvanizing operation, at the time based on the East Rand, was responsible for the galvanizing of some thirty thousand tonnes of steel annually.

Approximately 42 years ago, Walter was instrumental in the formation of the Hot Dip Galvanizers Association Southern Africa. His concept of a galvanizers association was aimed at the improvement of the industry regarding quality of product, dissemination of technical knowhow and as a service to the wider corrosion industry.

After years of operating a galvanizing plant and a period of semi-retirement, he was appointed as the Executive Director of the Hot Dip Galvanizers Association Southern Africa. As a result of his efforts, the Association has since developed into a highly active centre for the provision of technical information and advice to specifiers, end users and member galvanizers.

Walter was highly regarded as a corrosion consultant specialising in various forms of corrosion control including metallic, organic and inorganic coatings. Amongst his successful past achievements he was instrumental with the introduction of hot dip galvanized steel and duplex systems into the mining industry.

He was, for many years, closely involved with the Corrosion Institute of Southern Africa, where as a Past President and honorary Life Member he played a leading role in the development and awareness of the destructive nature that corrosion has on steel structures. In 1988 he received the Institute's Gold Medal award in recognition of meritorious service to the corrosion industry and the advancement of corrosion science and technology.

In 2000, Walter was awarded Honorary Life Membership of the Hot Dip Galvanizers Association Southern Africa. In the same year the WGS Barnett Floating Trophy was instituted and presented to the annual winner of the project judged to best represent all the attributes of hot dip galvanizing and duplex coating systems aimed at combating the ravages of corrosion, at the Association's Annual Awards Event.

Walter's reputation was not confined to Southern African region, but was recognised internationally. At the 2002 European General Galvanizers Association meeting in Porto, Portugal, Walter was presented with a the European galvanizer's award in recognition of his contribution to the industry.

Walter was the author of numerous technical papers on galvanizing and corrosion control systems. These papers have been published in South Africa as well as internationally.

Walter's colleagues within the Association and broader galvanizers and the corrosion control industries will remember him for his refusal to totally retire and the fact that he remained active almost up until the day of his passing.

His devotion to his family, sometimes under difficult circumstances, was an example of his loyalty and his integrity as a person.

Walter's name will live on in our industry as an icon within the industry. He will be remembered as a man that had a positive influence on the people with whom he associated. His friendly approach and his desire to resolve any form of conflict was evident in his professional as well as his private life.

"The man who galvanized industry in South Africa" by Michael Brett

For those of us who knew Walter Barnett there is a particular sense of loss at his passing away on the 16th March 2009.

I have special memories of Walter which have their foundation way back in 1958 when I stumbled my way into the surface coatings and corrosion protection industry as a 1st year 'Pupil Engineer' (a polite word for an 'Apprentice').

Walter was at that time the General Manager of Isando General Galvanizers a member of The Sturrock Robson Group of Companies.

Initially Walter's main focus was on marketing and administration and his qualification was as a CIS.

Thus, becoming an expert and authority on Hot Dip Galvanizing was innocently born from Walter's enquiring mind and devotion to solving some of the daily problems of industrial corrosion and his fascination for duplex synergy.

Perhaps it was the combination of enquiring minds that led us to crack the problems of adequate sand removal from malleable iron castings (Walter on the galvanizing and quality aspects and myself on the intricacies of the surface preparation) the end result was the satisfactory adoption of Hot Dip Galvanizing for Transmission Line Hardware by ESKOM.

During the 1960's, Walter in conjunction with the then S.A.Bureau of Standards and ESKOM wrote the documentation and quality standard specifications to establish the SABS 763 Code of Practice for Hot Dip Galvanizing. Already at that stage S.Africa was being seen as a contributor to the international forum of technology in this field.

During the 1970's as a new challenge, we studied the many problems associated with Corrosion of Mine Shaft Steelwork. This included the aspects of paint protection, life cycle costs, maintenance aspects, galvanizing as an option and of course duplex coating systems (Hot Dip Galvanizing + additional paint protection).

It was gratifying when the Consulting Engineers department of the Union Corporation Mining Co gave us the opportunity to handle all the mine shaft steel for their new Kinross Mine No.2 shaft (1976).

The efforts to prove the cost effectiveness and increased life cycle on the mineshaft steel 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.

For our next challenge we studied the ways and means of reliably galvanizing spring steel rail fasteners. Together we learned and conquered the major problems of hydrogen embrittlement and how best to avoid this during the Hot Dip Galvanizing process. Subsequently we were able to successfully galvanize many millions of fasteners of both the Fist and Pandrol types.

Walter Barnett's enthusiasm, unselfish approach to sharing his expertise for common cause and his honest endeavour saw him lead the formation of The S.A. Hot Dip Galvanizers Association as far back as 1961.

The Association under Walter's leadership and guidance grew to become a notable and reputable link with industry. In his memory, the SAHDGA are forever charged with the task of providing sound technical service and knowledge, coupled with the highest of business acumen and behaviour approach.

Apart from his internationally known experiences and elevation to the stage as an authority on Hot Dip Galvanizing, Walter was responsible for bringing leading world authorities to our shores for technology transfer. The best known of these was of course Sir Ing. Jan van Eijnsbergen. (Consultant, galvanizing authority and Director of The Dutch Hot Dip Galvanizers)

Walter Barnett was for the most part a quiet and humble man and an accomplished golfer who spent many hours playing that amazing game. He and his 3 sons Graham, Trevor and Michael teamed up for a number of years to conquer the much sought after Corrosion Institute annual golf trophy.

With amazing personality and ability to relate some jokes and quips he will always stay in my memory as 'the father confessor' to all who needed to chat.

In The Corrosion Institute of Southern Africa Walter served as President for a number of terms of office.

He was a recipient of The Institute Silver Medal award (1976), the Gold Medal award (1988) and was both a Fellow and Honorary Life Member.

My memories of Walter Barnett will never leave me, they are indelible. Perhaps Walter's remit whilst with us was as a Missionary of Corrosion Science just as his Australian Mother had originally travelled to South Africa as a Missionary to Rhodesia so many decades before.

To all of his family, we humbly convey our condolences and we thank you for sharing this special man with us for so many years.


A stalwart is no longer with us – may you rest in peace, Walter.
Carl Havemann
CORROSION & TECHNOLOGY CONSULTANTS
Remembered always for your kindness and wonderful assistance.
IZASA
INTERNATIONAL ZINC ASSOCIATION - SOUTHERN AFRICA
Walter will always be remembered as the person who put galvanizing on the South African map. The industry owes much to his foresight and tenacity. With Walter's passing, this is not lessened as there is a legacy that many recognize and benefit from and will continue to do so. Only through the vision of a champion do causes progress. Walter pursued galvanizing with a fervour and zeal often only seen in spiritual activities. Walter promoted galvanizing wherever he went. Internationally this was recognized in Berlin in 2000 where he received the EGGA (European General Galvanizers Association) pin.
Rob White remembers the many afternoons and early evenings spent in Walter's office where the bar was generously opened after four. "Many of us visited Walter to enjoy the conversation no matter where it went. The beverages stored in the side of the desk were stocked to satisfy the most discerning visitor. Time was never an issue and one always left with the feeling of something gained".
Frank Goodwin remembers that in 1994, Walter took him along to inspect one of the first mines that had been built with galvanized buntons. This was Frank's introduction to deep mines, and the visit coincided with a maintenance day when it was possible to ride in a cage under one of the cars, with an open floor – above a 1.5km deep shaft! Walter brought along a permeascope and camera to record the condition of the steelwork during the descent – all was in very good shape. After a few hours of this, and a quick trip back to the surface and cleanup, Walter decided that enough had not been seen so off they went to Gold Reef City to see the museum, have a few beers, and see the mineworkers dances! In Frank's words – "He was the best of hosts".
Many people were supported by your kindness and stewardship and we all thank you for this. We will miss the humour and council – rest in peace.
With fond memories.
25 YEARS
Wearteck will always remember you.
Denso
LEADERS IN CORROSION PREVENTION AND SEALING TECHNOLOGY
Walter Barnett was a man of solid business ethics and will be sorely missed in the industry.
GALVADIP (PTY) LTD (EDMS) BPK
Steeledale Mesh
THE AVENS GROUP
in loving memory of WALTER BARNETT...

robor

Your contribution to the corrosion protection industry was immense... and lives on.

GALVRITE Galvanising (Pty) Ltd

Thanks Walter, for all your efforts and the contribution you made to galvanizing in South Africa.

steel Southern African Institute of Steel Construction

Having dealt with Walter since the early 70's, looking back in those days when relationships counted above all else, when business was done on the shake of a hand trust basis, it is clear to me that Walter really epitomized that generation of trustworthy, reliable, quiet spoken and competent gentlemen. When things did go wrong (and they did!) Walter was always there to sort it. Given this relationship it is no surprise that the business relationship, friendship really, continued and flourished.

And a lighter note to recall the large plate Girder that had to be made 3 times... testing the relationship to its maximum... The first one twisted beyond repair in the galvanizing kettle. The first replacement galvanized well but was "lost by the mining company somewhere in the bowels of the earth awaiting installation". The second replacement, made and galvanized in record time, was successfully installed.

The greater structural steel and galvanizing industries have really lost one of their old stalwarts, a true friend and gentlemen. We will be the poorer for his loss, knowledge, experience and the way he went about his business.

galvanizers ASSOCIATION OF AUSTRALIA

We send our deepest sympathy to Walter's family, friends and colleagues. You all must be very proud of Walter's distinguished career in the hot dip galvanizing industry and his contribution to the advancement of the industry worldwide. He will be sadly missed by everyone.

Our close ties with the HDGASA were forged by Walter, truly a great man.

With best wishes from Members of the Galvanizers Association of Australia

B&D Est. 1985

Thanks for all the help over the years. You loved to share your knowledge.

nordic GALVANIZERS

With our respects for the great job Walter has done for the hot dip galvanizing industry.

Baltimore Aircoil Company

"Thanks for the many pleasant hours and memories in our many discussions and meetings together and the sage advice which is still applied today."

Walter was instrumental in my appointment in 1983 as the first Executive Director of the Association. He was subsequently appointed to this position. In his latter years Walter became an invaluable consultant to the Association and also served many years as Chairman. He represented the Association internationally and became known as a world expert in galvanizing and corrosion protection. Needless to say my dealings with Walter were extensive. He was a talented force in the development of the Association and his name will live on through the knowledge he left behind.

Prof. Denis Twigg,
Nelson Mandela Metropolitan University

Supergalv (Pty) Ltd

PPT Pipeline Performance Technologies

Walter, you will be sorely missed.
Rest in Peace -
from all staff at PPT.

27th April 1930 — 16th March 2009

ICP
Isinyithi Cathodic Protection

Walter Barnett:
Mentor, Colleague
and Friend

Isinyithi
Cathodic Protection

Metsep
Metsep SA Pty Ltd
Tel: 011 626 2425

Walter was the person that introduced galvanizing in its correct technical and practical form to the Department of Water Affairs. His knowledge, conviction and courage enabled him to propose solutions where others did not dare. His deep sense of consideration and trust in others produced a high level of respect.

V.W. Kohlmeyer
Chief Engineer: Mech. Eng. Services

Walter Barnett selflessly devoted more than 30 years of his time and expertise to the Corrosion Institute of Southern Africa. During this time, his service was without equal and he served in every position on Council on several occasions, including two terms as President and four terms as vice President. He was intimately involved with the organization of several International Conferences and Exhibitions, and Corrosion Schools. He was author of the chapter on "Metallic and Inorganic Coatings" for the textbook "Corrosion Control in Southern Africa". He also lectured on two modules of the "Corrosion Engineering" course from its inception. He worked closely with SAQCC (Corrosion Protection) and co-developed, and taught on, the level 2 module for Coatings Inspectors. Training and mentorship were always very close to his heart. On the social side, Walter also organized and played in virtually every Gauteng Region annual Golf Day for 30 years. The Barnett Family was always the fourball to beat for the trophy.

Walter was recipient of every Institute award including the Gold Medal, the highest honour that is bestowed. This prestigious award has only been conferred on eight occasions in almost 50 years. He was both a Fellow and an Honorary Life Member.

Walter, you touched and inspired so many people. You were always a true gentleman, and will be sorely missed by all of your many friends in the Institute. May your unselfish approach be an example to all of us in the Corrosion Protection Industry. Our condolences go out to his wife Ruth and sons Graham, Trevor and Michael.

SAMFA
South African Metal Finishing Association

The European general galvanizing industry received the news of the death of Walter Barnett with great sadness. Walter was held in high regard by his European industry friends, following many years of collaboration and exchange of information on topics such as duplex coating technology. His commitment to the growth of our industry was demonstrated by his excellent work with the Hot Dip Galvanizers Association of Southern Africa. It was in recognition of this that, in 2002, Walter became one of the few non-European recipients of the prestigious E.G.G.A Pin. He will be remembered, with respect and affection, by us all.

European General Galvanizers Association

CWI
Consolidated Wire Industries (Pty) Ltd

CAPE GALVANISING

GEO STOTT
AND COMPANY (PTY) LTD

Walter Barnard –
we salute you and thank you for your contribution over the years.

From the management and staff
of George Stott and Company

May you rest in peace...

A day in the life of a hot dip galvanizer!

5:00am

Beep, beep... beep, beep..., beep, beep..., Damn!! Rise and smile – it's the start of another day – what issues will today bring?? The mind, awake for only 10 minutes, is already working feverishly as the warm shower gets the brain into gear!

Shave, shower and shampoo – complete a quick 5:30 breakfast and off to work.

6:30am

The 'guys' are already filtering into the plant as I arrive. *Sawubona, Suwabona* – the greeting fills the crisp morning air.

Into the office, log onto the system check the overnight e-mails – mostly junk anyway – and delete!

6:45am

It's time for the early morning 'trek' into the plant to get an update on the night's production – 3 colleagues join in and the conversation jumps from incoming material to next week-end's fishing excursion, to beam loading, to last night's red wine consumption, and finally the flux temperature!

7:00am

The day-shift is underway – the priorities for night shift have been met – the Production Planner is smiling – things must be going OK.

The trailers have been loaded, and the rigs are moving out – check the previous 24 hour intake tonnage, and tons despatched! Great!!... we're on target for the month!

Safety matters are of prime importance – we spot some bad stacking – local supervisor is assigned the task to sort it out.

7:45am

Back in the office – a strong cup of coffee goes down well while giving more thought to the day's priorities.

continued on page 14...

8:00am

Time for the production meeting – catch up on customers' specific requirements and priorities – there always are so many!! Job No 4236 has insufficient drainage and venting holes – please contact the customer to rectify. Job 4221 has paint on – customer to be informed – material will require shotblasting – that means both a delay and a cost!!

What are the dross levels, and acid strengths? When will we need to replace the acid in Tank No. 3? Do we need to work this coming weekend?

9:00am

Must get the zinc order in today – it's deadline time with Zincor. Check the zinc stock; what's our production forecast for the month – will need 120 tons for the month – have 40 in stock, so order 100!… that'll make Zincor happy!!

Jimmy's on the line – has a breakdown at the mine – needs pipes and fittings galvanized urgently – if he delivers by 11:00, can he have them back by 3:00 this afternoon? Into the plant – interfere with the production plan and squeeze it in – after all, it's only 1 flight beam!!

While out in the yard, check customer material awaiting collection – must chase up those customers who seem to have forgotten all about their material – or are we just too quick with the galvanizing? Quickly check the vehicles being loaded, and what material has been sent in so far today – looking good – some nice heavy columns, beams and frames.

11:00am

Gosh – it's already 11:00!! A quick cup of tea to quench the thirst – and, that meeting with Frik regarding the replacement of the cladding on the process building. Sheeting prices have just been increased – that's going to push up the cost quite a bit! Need to get it done before the rainy season – when can you start?... and finish? Must be quicker than that!

Take a walk together... check the building... what can we do different to shorten the time?

Back in office – call from Jim re the Randfontein project! Looks as if they're going to run with it – need an updated price – looking at 2 000 tons of medium to heavy structural! Great – can do with that tonnage – pull the previous costing – done 2 years ago – needs a serious update and re-calc.

Do the calculations – get John in Sales to give his input and check the numbers – its now 12:30 – call Jim back with the numbers – looks good – wait to hear – probably 2 - 3 weeks!!!

Koos, the 3rd Party Inspector on the Jameson project is waiting in reception. Needs clarification on differential coating thickness and different colouring on galvanized material. Explanation given – he reluctantly understands – definitely need to get him on the HDGASA Inspector's Course.

12:45pm

Just enough time to have a few bites of an apple, and then off with John to our appointment with Fred at ABC Engineering! It's quite a drive but we'll be there for our 2:00pm appointment. All depends on this damn traffic and road works. A real time waster and killer these days.

Gives us time to chat about the week-end's sport, discuss the expected demand levels, and where our focus should be for the next few months.

14:00pm

Fred briefs us on his new order for stadium seating for the 2010 Soccer World Cup. There are 80 000 pieces – venting is a problem, and the main contractor won't allow holes to be drilled because of the aesthetics. Some sample items are inspected, and solutions sought. The main contractor joins us, and a compromise is reached.

It's now well after 3, and it's a long drive back – plenty of discussion around the stadiums – what is being done elsewhere in the country at other stadiums? A short detour to visit A-Z Fabrication, who have a small problem with handling damage during transit. The affected material is inspected and a repair procedure recommended!

17:00pm

We're finally back at the plant! The Day Shift has already left, and the night shift is starting to arrive. A quick venture into the plant to check that everything is OK – once again, production for the day looks good – there are a few priorities for the Night Shift, highlighted on the planning sheet! Great – doesn't appear to be any crisis!!! What a relief!!

17:30pm

Time for an ice-cold frostie – and then home!

Another day in the life of a galvanizer is over!!!... let's see what tomorrow brings – it's bound to be a lot different!!

The Association wishes to thank Geoff Colloty of Robor Galvanizers, for this article.

2009 HOT DIP GALVANIZING AWARDS




The 2009 Hot Dip Galvanizing Awards Evening will be held in The Ballroom of Montecasino, Fourways, Johannesburg on Friday the 28th August.



The sponsors of this exciting annual event are:

ARMCO GALVANIZERS

BULLDOG PROJECTS

EXXARO BASE METALS – ZINCOR LTD

GALVRITE GALVANISING

HARRISMITH GALVANIZING

LIANRU GALVANISERS (PTY) LTD

METSEP SA (PTY) LTD and

ROBOR GALVANIZERS.

A total of 22 nominations have been received for consideration this year, ranging from projects such as the Pretoria National Library and the Nelson Mandela Museum in the Eastern Cape right through to certain strategic components on fishing trawlers.

The panel of independent judges appointed to adjudicate this year's awards are:

Andrew Barker of Andrew Barker Development Consultants, Spencer Erling of the South African Institute of Steel Construction, Darelle Janse van Rensburg of Orytech, Basie Smalberger of Trans Africa Projects and Louis van Loon of Louis van Loon and Associates.

Submissions will be available for your perusal on the Association's website after 12 June 2009. Details on the evening itself will be available soon.

The objective of the Hot Dip Galvanizing Awards is to recognise and promote the development, application and use of hot dip galvanizing and related technology as a corrosion control system.

Kindly contact the Association for further details on (011) 456-7960 or hdgasa@icon.co.za

The Hot Dip Galvanizers Association 2009 Golf Day

The Association held its annual Golf Day at the Glenvista Country Club on Thursday the 5th March 2009. It was gratifying to the Association to have a record field of 116 players arrive to battle it out for the top prize.

The winners of the 2009 Association Golf Day, with a score of 57, were Steve, Grant, Carl and Fernando who were hosted by O-line Support Systems.

The Pink Lady, sponsored by Robor Galvanizers, had only 5 teams in the running at the end, with many players reporting that their pink ladies were lost on their first shot. Well done to Gianni, Willie, Werner and Ken of Metsep for persevering.

Second place was awarded to the team hosted by Armco Galvanizers, consisting of Johan, Ralph, Anton and Ivan, who achieved a score of 56.

With a score of 52, Flip, Francois, Eugene and Frits, were awarded third place and were hosted by Supergalv.

Fourth place, based on a count out, went to the Robor team consisting of Shaun, Nico, John and Benny who scored 52.

Nearest the Pin was awarded to Christoff and Benny hit the Longest Drive.

Thank you to our sponsors for their contributions, without which we would not be able to hold a Golf Day. The sponsors were: Africa Cellular Towers, Armco Galvanizers, DSE Structural Engineers & Contractors, Lianru Galvanisers, Off the Edge Marketing and Photography, Robor Galvanizers, Absolutely Water, Cape Gate, Duplex Coatings and Exxaro Base Metals/Zincor.

The 'Rolls Royce' system

While blasting and Zinc rich primers can be considered an excellent corrosion protection system once over coated with the correct intermediate and final coats it remains a mystery to our industry that where it is possible to hot dip galvanize and then over coat with a paint system this is not always considered to be the first choice in an aggressive environment.

Duplex systems must be considered to be the "Rolls Royce" of the corrosion protection systems for a number of reasons which I will mention below. The disadvantages are minimal providing certain guidelines are adhered to in the application of the paint.

Why hot dip galvanize as a primer coat as against apply only a zinc rich paint primer? Here are ten good reasons.

1) Hot dip galvanizing on its own will outlast any zinc rich paint primer and the former is normally comparable in aggressive environments with two or three coat paint systems.

2) Speed of dipping. It is generally far quicker to hot dip galvanize large tonnages of steel than to blast and prime. This is only the case where very large contracts are involved and not one off items.

3) Where structural steel is to be processed any profiles of 5mm upwards will have a far heavier coating than when compared to a normal zinc rich paint primer. For example a 5mm profile would

continued on page 18...

Cape Town duplex coated foreshore freeway lighting masts were installed in excess of 20 years ago.

have a minimum of 100 microns of zinc and this coating can be easily 250 microns for 12mm + 16mm thick steel. These heavy coatings are not well advertised in the galvanizing industry but are a definite fact as the steel profile gets thicker and the immersion time in the zinc is longer. Normally heavy profiles are silicon killed steel rather than aluminium killed.

Profile		microns zinc, approximate
2 to 4mm	=	50 to 100
5 to 6mm	=	100 to 125
8 to 10mm	=	125 to 175
12 to 20mm	=	175 to 250

4) Galvanizing withstands mechanical damage better than any paint system. A certain amount of mechanical damage is inevitable.

5) Reliability – A hot dip galvanized coating will be more reliable as it alloys with the steel to provide a metallurgical bond and the thickness of the coating is more consistent than a hand applied paint coating. The coating is adherent to the steel to 20/30 M.P.A. This is significantly more than most other comparative coatings.

6) The cost of hot dip galvanizing will be the same as a SA2$^1/_2$ blast and application of a zinc rich primer for a 6mm profile of 42m^2 per ton of steel on large projects.

All structural steel work at the Table Bay Hotel in the V & A Waterfront, Cape Town was duplex coated about 12 years ago.

7) Hot dip galvanized coatings provide 50% greater zinc coverage on edges of profiles as against flat surfaces especially on large contracts. This is the direct opposite of paint coatings.

8) Hot dip galvanizing provides cathodic protection on small uncoated areas (for the life of the coating).

9) In hot dip galvanizing the coating you see is the coating you get and any defects in the coating are very visible.

10) The combination of paint and hot dip galvanizing provide the synergistic effect of extending the lifetime disproportionally as follows: Hot dip galvanizing + Paint = Lifetime of 1 + 1 = 3.

11) Industrial paint is a sophisticated product and must be treated this way if the coating is to be successful. However, it is said by many paint contractors that about 70% of the success of a paint system comes from the preparation and application of the paint. Specification and application variables can enormously reduce the success of a paint system!

CHOOSE THE ROLLS ROYCE

Errors and omissions

'Zinc rich coatings for repair purposes'

Just some comments on the article *'Zinc rich coatings for repair purposes'* by RS Thompson of Physmet which was featured in Hot dip Galvanizing Today 2009 Volume 6 Issue 1.

In the paragraph – *Sample preparation* on *page 31*, the following inaccuracies were reflected:

1. Welding of the panels was undertaken using the shielded arc process (SAW) – the correct name is shielded metal arc welding (SMAW) as SAW stands for submerged arc welding.
2. Using the commonly available ER7024 filler material. The correct version should be E7024 which refers to an electrode used with the shielded metal arc welding process. ER refers to a wire or rod used with the gas metal arc welding process – no consumable such as ER7024 exists.
3. The welding settings were 110 amperes at 30 Volts (DC+) – normally with SMAW one would only be able to set the amperage – the voltage is a function of the electrode and power source – as the user you have no control over the settings.

John du Plessis – Technology Manager, Southern African Institute of Welding

Thank you for your comments John, these have been discussed with Russell Thompson and he is in agreement – Editor.

ERRATUM: In the coating report that featured in magazine No 38, we spelt "Toblerone" as "Toberone", we apologise for this.

The downside of painting on hot dip galvanizing is:

1) Preparation of the galvanized steel before painting. This must be done with care and due diligence. It may also be necessary to remove unsightly lumps and runs. This should only be done by experienced operators in order to prevent over cleaning of the coating, resulting in uncoated areas.

2) The appropriate paints must be applied. Thin coats of acrylic paints (20 to 30mm) applied to components exposed to the sea air will require annual maintenance and over coating as the paint coating is quickly breeched. Heavy duty paint coatings in excess of 200 microns are required in aggressive environments such as areas from the splash zone to about 500m from the sea.

3) The budget must allow for maintenance and re-painting on a fairly regular basis.

In aggressive marine environments the application of a duplex system is a ***non negotiable rule*** as each of the individual coatings exposed on their own will fail prematurely, and a combination of both systems is essential to provide long term protection.

All new projects in aggressive marine atmospheres should include a ***Duplex Coating System*** wherever possible.

The Association wishes to thank Iain Dodds of Cape Galvanising for this article.

Editor's comment:
Life is full of choices; it would seem that those specifiers that continually evaluate their previous coating choices for performance in aggressive environments, generally end up choosing the "Rolls Royce" system.

FEATURES FOR 2009

August/September (No. 40):

- Annual Awards
- Cable ladders and trays.

November/December (No. 41):

- Safety and security
- Continuous sheet and wire galvanizing
- The world of hot dip galvanizing around us
- The sustainability of the industry – including the regeneration of pickling acid.

NOTE: FEATURES MAY BE SUBJECT TO CHANGE

Life-cycle assessment recognises the green benefits of zinc

Zinc is an essential mineral found in every cell of every living organism in every ecosystem on the planet. Naturally present in the air we breathe, the water we drink and the earth we cultivate, zinc now is surfacing in the building specifications of eco-savvy architects and engineers across the globe. Zinc offers a combination of versatility, durability and sustainability that makes it an attractive choice for many projects.

Zinc manufacturers have long touted the environmental attributes of zinc, but sustainability leaders, like the Washington, D.C.-based U.S. Green Building Council, have been slow to recognize the metal's value as one of the few building materials that can be recycled indefinitely without loss of physical or chemical properties.

Life-cycle assessment is gaining prominence as a way to measure a product or material's green attributes. According to the Washington-based U.S. Environmental Protection Agency, LCA assesses the environmental aspects and potential impacts associated with a product, process or service by compiling an inventory of relevant energy and material inputs and environmental releases; evaluating the potential environmental impacts associated with identified inputs and releases; and interpreting the results to help you make a more informed decision.

Because LCA is a better way to assess a material or product's environmental attributes from cradle to grave, architects and engineers are turning to LCA to assess materials for their projects. The Portland, Ore.-based Green Building Initiative already is using LCA in its Green Globes green-building rating system, and USGBC is considering integrating LCA into its LEED system. In short, that means zinc finally is being viewed in a new light.

Building a case

The International Zinc Association, Brussels, Belgium, currently represents 42 members and 87 affiliate companies, which account for more than 80 percent of the Western-world's zinc production and 50 percent of world production.

IZA is using LCA data to establish, improve and communicate the environmental advantages of using zinc products manufactured by its members. In 2006, IZA launched Zinc for Life, a three-year marketing program dedicated to providing sound scientific information about the sustainability attributes of zinc.

Boston-based Five Winds International, a global-consulting firm in the fields of sustainable development and environmental performance, is working closely with IZA to produce a solid base of LCA data that product manufacturers, architects, engineers and other key stakeholders can use when modeling their products and projects.

In accordance with international standards regarding LCA, such as ISO 14040-14044, Five Winds International is working to track and document zinc's environmental impact from resource extraction through disposal. "We are looking at some of the key end uses for zinc and getting decision-makers in those sectors the information they need to make choices that contribute to sustainable development," explains Jennifer Cooper with Five Winds International's Toronto office.

Through LCA studies like these, IZA hopes to provide a scientific benchmark for demonstrating zinc's potential for improving the overall environmental performance of a building, as well as for reducing zinc's impact at the end of its useful life.

LEED is probably the most recognized green-building rating system on the market today. While many of its categories are areas in which the use of zinc can contribute to a building's environmental attributes, the one category conspicuously absent from the list is end-of-life recycling. This is something that IZA has been working closely with USGBC to change. According to Scot Horst, a sustainable materials consultant with 7group, Kutztown, Pa., and chair of the LEED Steering Committee, a new version of LEED incorporating LCA is expected to debut this fall, pending consensus by the organization's membership.

Giving credit where it's due

In this day and age, using materials that pollute during manufacture, use and disposal falls far short of green-building initiatives. During the last 40 years, roofing materials have accounted for 7 to 10 percent of existing landfill space.

Zinc, on the other hand, is far less likely to enter the waste stream. When properly installed, a zinc roof or wall system can last up to 100 years. In fact in Europe, where zinc use is more prevalent, roofs, gutters and railings have been known to last for generations. After their "useful life" these products are then recovered and reused at an impressive rate. In Western Europe, for example, an extraordinary 90 percent of rolled zinc is recovered from roofs and rainwater systems every year, amounting to the equivalent of 110,230 tons (99999 metric tons).

Zinc also is recycled at all stages of production and use. Furthermore, the level at which zinc is recycled increases each year in concert with advances in zinc production and recycling technology. Today, more than 80 percent of the zinc available for recycling is actually recycled, and that percentage is likely to improve as demand for zinc products grows.

As the building industry migrates toward green practices, zinc will continue to play an increasingly important role in the development of truly sustainable buildings.

The Association wishes to thank Rob White of IZASA for this article.

Guest Writer

Our guest writer for this edition is Spencer Erling, Education Director of the SAISC.

Methods of preventing hydrogen embrittlement in hot dip galvanized high strength steel fasteners

Spencer Erling of SAISC, who together with several other parties, including HDGASA, discussed some recent Grade 10.9 fastener failures and as the Guest Writer provides some combined solutions to the failure issues!

Grade 10.9 S hot dip Galvanized bolts – how to achieve the desired quality

Grade 10.9S HSFG hot dip galvanized bolt failures have raised their ugly heads again!

Failures have occurred using high strength friction grip (HSFG) bolts that have been hot dip galvanized or alternatively zinc electroplated. Such brittle type failures have been traced back to either Hydrogen Embrittlement (HE) or causes associated with the quality of the stock (raw) material and/or the heat treatment requirements needed to achieve mechanical properties, during and following manufacture of grade 10.9 fasteners.

At a meeting of leading bolt manufacturers, Hot Dip Galvanizers Association, an end user and the SAISC, proposals were discussed aimed at the modification and improvement of the specifications/ quality controls in order to eliminate the potential for any form of fastener embrittlement.

What then are the causes Hydrogen Embrittlement of fasteners when hot dip galvanizing or zinc electroplating? How is this potential problem to be eliminated during manufacturing and subsequent corrosion protection processes?

What causes Hydrogen Embrittlement?

Pre-treatment cleaning for both hot dip galvanizing and zinc electroplating, is normally achieved, by pickling fasteners in either hydrochloric acid

(HCl) or sulphuric acid (H_2SO_4.). This is commonly referred to as (acid) pickling. Acid pickling results in the release of latent Hydrogen ions (H^{+1}) that can penetrate the grain boundaries of steel. H^{+1} ions, being unstable, combine to form stable Hydrogen molecules (H_2) on the grain boundaries, (including microscopic surface cracking) leading to weaknesses and failure when high strength fasteners are subjected to tensile loads.

In SANS 10094 specification (the use of high-strength friction grip bolts), Annex B, a code of practice was established for processes of hot dip galvanizing grade 10.9S fasteners aimed at reducing the potential for HE. In terms of paragraph B.1.1 a) "to restrict the pickling times to less than 15 minutes" is detailed.

How can HE be eliminated?

As a result of recent experience it is proposed to totally eliminate acid pickling of class grade 10.9 fasteners. Pre-treatment cleaning is to be achieved by means of mechanical cleaning, i.e. shot or sand blasting. Changing pre-treatment cleaning to a mechanical process, the generation of hydrogen ions is eliminated and so HE cannot then develop in the case of hot dip galvanizing.

Warning! High strength fasteners that are zinc electroplated are susceptible to HE while being zinc coated. To remove the potential for HE in zinc electroplating fasteners a 'heat soak process' at 200°C is required drive off hydrogen ions / molecules from grain boundaries.

Other possible causes of embrittlement/ failure of grade 10.9 fasteners.

To achieve the correct mechanical properties required for grade 10.9S (HSFG) fasteners it is necessary for the stock material, which is used to produce the fasteners to undergo a heat treatment process before hot dip galvanizing. *Note: Grade 8.8 (830MPa tensile strength) fastener material is not subjected to the same pre galvanizing heat treatment and quality controls as fasteners that have a tensile strength requirement in excess of 1 000MPa.*

It has been found that poor quality control, during this heat treatment process, has been a major source of the problems experienced with friction grip bolts and nuts.

In order to achieve the correct hardness (and hence tensile strength and other mechanical properties required for grade 10.9 fasteners) As you can imagine if a bundle of bolts (or nuts or both) are simply "chucked" into a heat treatment furnace there is the distinct possibility that the bolts on the outside of the pile will be heated differently from those in the middle of the pile.

continued on page 22...

It has also been found that problems are often found to occur when the process has been a rushed late order resulting in a "special favour" to get the bolts to site urgently". In such cases not enough attention has been paid to the detail requirements to meet the specifications. For example, bolts are not carefully packed in a furnace to ensure even heating of all bolts. Sometimes the work is done "on night shift" where controls are not as carefully managed as during day shift.

Futhermore, poor quality heat treatment can result in bolts that are so soft (ductile) and yielding that when attempts are made to tighten the bolts they "stretch into a coca- cola bottle profile" or alternatively are so brittle that bolts and nuts sometimes fail long before "hand tightening" has been achieved let alone torquing or stretching of the bolts commence. Clearly neither of these problematic scenario bolts are suitable to do the job they have been designed for.

The best advice we can offer is ensure that:

1) Hot dip galvanized grade 10.9S bolts should be supplied by reputable suppliers
2) Material certificates are required for stock material used to form the fasteners.
3) Certificates of conformance for heat treatment that includes results of testing for mechanical properties and in compliance with ISO 898-1 for bolts and ISO 898-2 for nuts.
4) It be required that 3 samples from each heat treated batch of fasteners are tested, by the manufacturer, to ensure pre-galvanizing compliance. A further 3 samples are to be tested, by the fastener manufacture, following the hot dip galvanizing operation.

Editorial Comment:

When hot dip galvanized fasteners fail, the local industry is normally fingered with the blame. We wish to place on record that some 10.9 hot dip galvanized fasteners that failed after being used at Green Point Stadium, were in fact imported! The proposals suggested in Spencer's article (Guest Writer) will hopefully comprehensively eliminate failure by HE with all local hot dip galvanized grade 10.9 fasteners in future!

NOW WITH CPD POINTS

Galvanizers Inspectors Course

Hot dip galvanizing is one of the most widely used methods of protecting steel from corrosion. As a final step in the process, the hot dip galvanized coating is inspected for compliance with the appropriate specifications.

This Galvanizers Inspectors Course has been designed to provide delegates with sufficient knowledge to test, inspect and interpret test results.

Following the course and successful result in a three-part exam, the delegate will be issued with a certificate, and if required, registered as an approved HDGASA inspector. Registration will be confirmed on an annual basis. Successful inspectors will become Individual members of the Association for the year.

The course is usually run from the Hot Dip Galvanizers Association in St Andrews, Bedfordview but from 2009 it will be available in Cape Town. Bookings are limited to 10 people on a first-come-first-serve basis.

COURSE CONTENT

- Introduction to corrosion
- Inspection before hot dip galvanizing
- Quality assurance in coating applications.
- Understanding zinc coatings
- Inspection after hot dip galvanizing

COURSE DURATION

This is a 2-Day Course comprising lectures on the first day, a Plant Tour in the morning of the second day, and the qualifying examination in the afternoon.

DATE AND TIME

Courses commence at 08h00 sharp and end at 16h30. Lunch and refreshments will be provided. Comprehensive course notes can be collected from our offices two weeks before the course.

Johannesburg:
February 17 - 18; April 7 - 8; June 9 - 10; August 4 - 5; October 6 - 7 and Nov 24 - 25.

Cape Town:
May 20 - 21; September 9 - 10

COURSE COST AND PAYMENT TERMS

R2 394.00 per person inclusive of VAT. Should you have 2 or more delegates from the same company, course costs will be R2 166.00 per person inclusive of VAT. Please note that payment is due on the first day of training. Cheques to be made payable to "Hot Dip Galvanizers Association SA". Members qualify for a discount.

SHOULD YOU BE INTERESTED, KINDLY CONTACT SASKIA SALVATORI AT THE ASSOCIATION.

NOTE: All professional Engineers, Technologists, Technicians and Certificated Engineers are required to achieve a certain number of points for Continuous Professional Development (CPD). By attending the Association's two day Coating Inspection Course, you will obtain 2 points (accredited by ECSA).

Zinc rich paint and epoxies versus hot dip galvanizing

It has been claimed, usually by individuals and organizations that have a vested interest in the subject matter, that zinc rich paints and epoxies have the same characteristics as that of hot dip galvanizing.

As the Hot Dip Galvanizing Association Southern Africa, we also have a vested interest in this matter. However, as representatives of our segment of the corrosion control industry, our interest extends beyond the pure commercial aspects of the subject and relates rather to that of informed technical knowhow.

In order to examine the fundamentals of the subject matter of this article, one needs to return to the basic requirements of what constitutes a corrosion cell involving different metals. Such corrosion cells are also referred to as a Bi-metallic couple or galvanic corrosion *(figure 1)*.

In order for such a corrosion cell to exist, four conditions must exist. These four conditions are listed below and illustrated in the simplistic diagram below:

1. Anode, from which electrons flow,
2. Cathode into which electrons flow,
3. An electrolyte, which will represent the corrosive environment in which the cell exists, and
4. A return external electrical circuit.

Remove any one of these four components and we can effectively stop corrosion. This of course is easier said than done.

Having briefly discussed what constitutes a corrosion cell, we can now introduce the two 'different' metals that comprise a specific corrosion cell, viz. zinc and carbon steel. As a result of the relative positions of zinc and carbon steel within the galvanic series of metals, the zinc will always constitute the anode (electro-negative to carbon steel) and carbon steel will be the

continued on page 24...

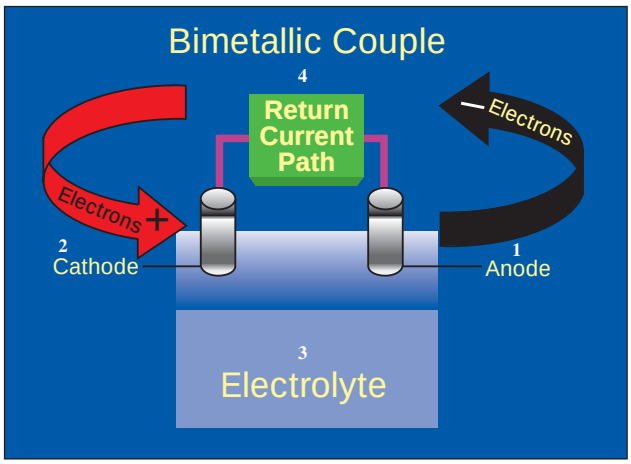


Figure 1: This diagram is designed to illustrate the four requirements of a corrosion cell or bi-metallic couple or galvanic corrosion. It does not represent the more scientific model, which would normally include the chemical reactions.

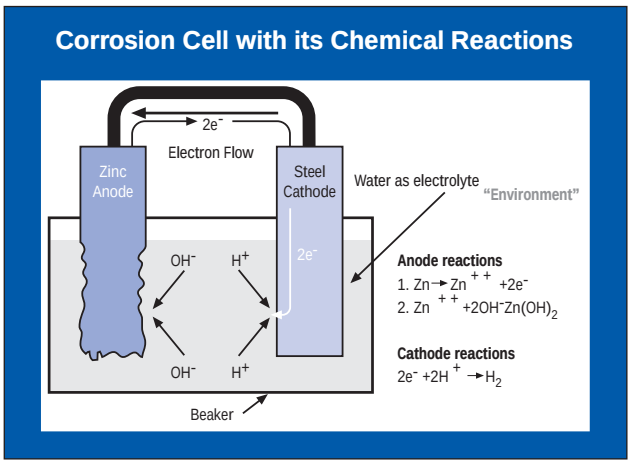


Figure 2: Note how the electronegative zinc anode will sacrifice itself to protect the electropositive carbon steel cathode. From this physical characteristic of these two materials we can say zinc will provide cathodic protection to the carbon steel.

cathode (electro-positive to zinc). Using these two different metals within a corrosive environment (electrolyte) and providing an electrical connection, we have complied with the requirements of our corrosion cell.

It is for this reason that we define a corrosion cell as an electro-chemical reaction within its environment.

Figure 2 illustrates the point.

All forms of corrosion protective coatings applied to carbon steel provide one or other form of 'Barrier Protection', separating the corrosive elements within the environment (electrolyte), from making electrical contact with the carbon steel. By fully coating and electrically insulating the carbon steel from the corrosive elements in the environment, we achieve a form of corrosion control.

Having established the basics of a corrosion cell, as applied to two identified metals (zinc and carbon steel) and introducing the primary means of corrosion control, (being that of a barrier protection), we can now examine 'How Zinc Protects' carbon steel.

How does zinc (Zn) protect?

Introducing a 'new and clean' zinc sample to the atmosphere, it will oxidise to form unstable water soluble zinc oxides (ZnO), zinc hydroxides ($Zn(OH)_2$), which depends on the atmospheric moisture content, and finally an insoluble dense zinc carbonate ($ZnCO_3$) patina.

The first two products of corrosion, (ZnO and $Zn(OH)_2$) are unstable and easily removed and provide no barrier protection. The $ZnCO_3$ layer, by contrast, is stable, not easily removed; matt grey in colour. It is this stable patina that forms the 'Barrier Protection' for corrosion control of carbon steel. *Figure 3* is a simplified illustration of this corrosion process.

We often refer to zinc as a 'wasting' material, due to the fact that it will

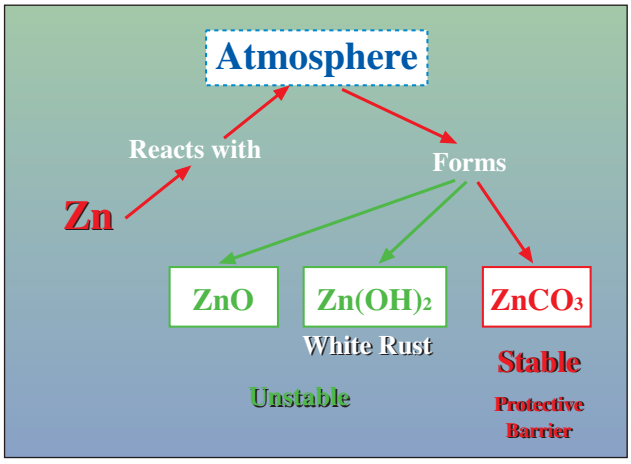


Figure 3: Pure 'new zinc' reacts with the atmosphere (oxygen, moisture and carbon dioxide) and forms three products of corrosion. These corrosion products are zinc oxide, zinc hydroxide and zinc carbonate.

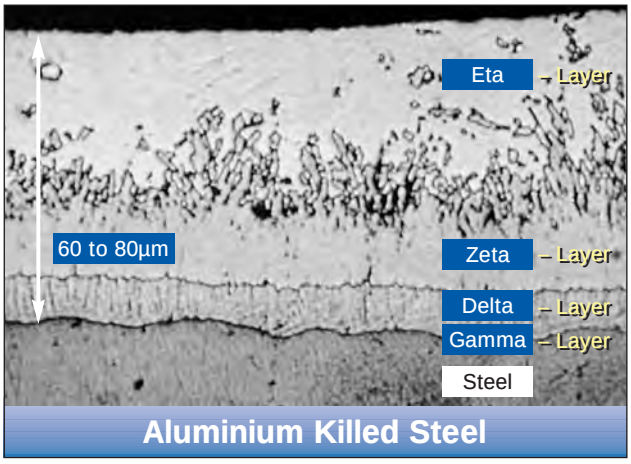


Figure 4: Micrograph of a typical hot dip galvanized coating. Coatings range from 60 to 120 microns plus. The metallurgical process of hot dip galvanizing follows the fundamental laws of physics, "If the steel is not perfectly cleaned, it will not galvanize".

sacrifice itself to provide corrosion control of carbon steel. It therefore follows that the more zinc (thick coatings) available, the longer the service life performance.

From the above we can now understand how zinc reacts to form its barrier protection, i.e. the $ZnCO_3$ patina. We can refer to this as zinc's 1st line of defence against the corrosion elements within a given environment.

Unlike other coating systems, zinc has a second line of defence. Zinc (anode) being electronegative to carbon steel (cathode), will provide cathodic protection of the carbon steel. This is also referred to as zinc being sacrificial to carbon steel. As an aside, this process is also referred to as a galvanic reaction and from which the term 'galvanic corrosion' is derived.

Zinc rich paint versus hot dip galvanizing

It has been claimed that zinc rich paint is equivalent to hot dip galvanizing. This claim is based on the fact that paint, being organic or inorganic, contains zinc metallic dust particles.

(Ref 1) "In order for a galvanic process to occur on steel painted with a zinc-rich coating, three conditions must be satisfied:

1. *The zinc particles in the coating must be in electrical contact with each other.*
2. *The zinc particles must be in electrical contact with the steel.*
3. *A continuous electrolyte must exist between the zinc particles and the steel.*

The first two conditions are met by zinc-rich coatings containing sufficiently high zinc content. The third condition is fulfilled when a steel panel bearing a zinc-rich coating is wetted by a film of electrolyte such as a salt solution.

There are two stages in the protective action of zinc-rich coatings. The first stage is a relatively short period in which galvanic protection of the steel by zinc particles is in effect. After this period, the galvanic action between the steel and zinc gradually disappears. The second stage is a longterm barrier protection that is attributed to a greater resistance of the coating to the permeation of aggressive species such as water, oxygen, and salts because the pores in the coating are blocked by the zinc corrosion products. The galvanic action generally decreases with time. The loss of galvanic protection is due to (1) the loss of electrical contact between zinc and steel as a result of corrosion of zinc particles and the formation of nonconductive corrosion products at the interface; (2) the loss of electrical contact between zinc particles as a result of the formation of corrosion products on the surface of the zinc particles; or (3) blockage of the coating surface by zinc corrosion products."

From the above referenced extract, all three conditions are required to be

continued on page 26...

simultaneously applied for cathodic protection to be activated. Consider the following comments in terms of these three requirements:

1. *The zinc particles in the coating must be in electrical contact with each other.*

   This condition is most unlikely to occur due to the fact that the zinc particles should are separated by the paint matrix in order to maintain the 'Barrier Protection'.

2. *The zinc particles must be in electrical contact with the steel.*

   As with condition 1, the paint matrix will tend to electrically insolate the majority of zinc particles from the steel substrate.

3. *A continuous electrolyte must exist between the zinc particles and the steel.*

   This condition is self defeating, in that should the electrolyte be allowed to penetrate to the steel substrate the steel will corrode due to the lack of 'Barrier Protection'.

We would suggest that the degree of cathodic protection, with a sufficient quantity of zinc dust in the paint, can only be assumed to be, at best, limited. Further, within a short period of time, if cathodic protection was to be active, the individual zinc particles would corrode and thus insulate themselves and cathodic protection would cease all together. The value of the zinc rich paint is not so much that of cathodic protection, but rather that the zinc particles at the outer surfaces of the paint coating, will form corrosion products (ZnO and $ZnCO_3$) and thus assist to maintain and provide 'barrier protection'.

Turning to the characteristics of hot dip galvanizing, the coating consists of zinc and zinc / iron alloys that are metallurgically bonded to the steel *(figure 4)*. The electrical contact to the steel is guaranteed at the same time the zinc is exposed to the environment. It follows that with hot dip galvanizing, cathodic protection only becomes available and is activated should the steel be exposed by some small chip, scratch in the coating or a cut edge. This characteristic is generally referred to as zinc's second line of defence.

CHARACTERISTIC	ZINC RICH PAINT	HOT DIP GALVANIZED
Barrier Protection	Yes, but a function of quality and thickness of coating. Zinc corrosion products assist to maintain the barrier protection.	Yes, follows metallurgical laws, forms a $ZnCO_3$ patina as the barrier protection. (1st line of defence)
Cathodic Protection	Limited to 80 days or less and a function of the zinc particles within the DFT of the coating.	Yes, always available as long as zinc remains present. Only applicable if steel is exposed. (2nd Line of defence)
Impervious Coating	Yes, but dependent on painter skills, specification and coating thickness.	The metallurgical process ensures an impervious barrier independent of operator skills.
Coating Thicknesses	± 20µm per application, up to 75µm with multiple applications. Dependent on the skill of the applicator.	The process produces a coating that ranges from 60µm to > 120µm dependent on steel thickness and chemistry. Achieved through a single dipping into molten zinc at 450ºC.
Adhesion to the Steel	Mechanical bonding, which is a function of preparation in order to 'key' the coating to the steel surface. Applying an inorganic coating when the RH is below 50%, without sufficient subsequent curing, can result in poor inter-coat adhesion of the topcoat.	Follows metallurgical laws (no curing) and is independent of operator skills. If the surface is not clean it will not galvanize. Easy to inspect.
Estimated Service Life in a C4 environment based on ISO 9223	Zinc rich paint generally is never used on its own to provide comprehensive corrosion control without a top coating, which combined will generally achieve a life of 8 to 10 years to first maintenance, dependent on specification and quality of application	20 to 40 years with an average of 30 years service life to 1st maintenance.
Quality Control of the application	Numerous hold points and interim inspections for quality control.	2 hold points, one before galvanizing and one after galvanizing.
Application and process controls	A number of controls and environmental conditions must be in place before a coating application can be carried out.	Factory applied, independent of environmental conditions, but limited to process bath sizes.
Limitations	Not limited to size or site location, but limited by access to all steel surfaces.	Limited by component size, factory applied, but all surfaces are accessible.
Continuity and Uniformity	Dependent on the skill of the operator and generally thin at corners and sharp edges.	If the steel is not clean, such areas will show up as uncoated spots immediately after removal from the molten zinc.

Table 1.

The first line of defence is not cathodic protection, but rather that of a barrier protection. A hot dip galvanized coating is impervious from the day it is produced. As described above, the 'clean new' zinc will react with its environment to form three basic products of corrosion. Zinc must react or 'corrode' and develop the stable $ZnCO_3$ layer. This layer constitutes the barrier protection or first line of defence against corrosion of carbon steel. One can conclude by saying hot dip galvanizing guarantees both barrier protection as well as long term cathodic protection as long as metallic zinc and zinc iron alloys remains available.

In order to illustrate the fundamental differences between the two forms of corrosion protection, we can use the micrographic examples of the two systems *(figures 4 & 5)*.

Conclusions

The differences in the two forms of corrosion control of carbon steel can be summarised as shown in *table 1*.

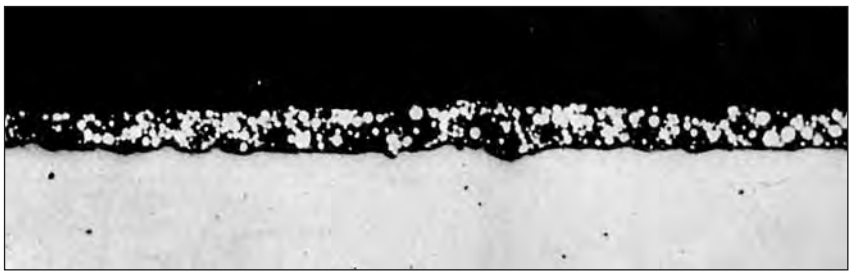


Figure 5: Micrograph of a typical zinc rich paint coating, applied by a skilled or semi-skilled operator. Coatings can range from 20 to 70 microns, but usually require multiple applications in order to build a suitable coating thickness, which again is dependent on the type of paint.

Hot dip galvanized coatings were first used approximately 170 years ago. In this time, the basic technology has shown little or no significant changes. Hot dip galvanized steel over 100 years ago is fundamentally similar to hot dip galvanized steel today. The same metallurgical laws that applied then are the same laws that apply today. The international reputation of hot dip galvanizing has stood the test of time and has proven its natural ability to provide corrosion control in the majority of environmental conditions encountered in the modern world.

Zinc rich paints on the other hand, have been subjected to numerous changes aimed at improved performances. There is no question that a suitably specified and applied zinc rich paint or epoxy coatings will provide excellent corrosion control performance. However, as is the case with most paint coatings, the quality of the application is a significant factor in the determination of long term performance and service life of a particular system.

Zinc rich paint specifications usually publish the quantity of metallic zinc dust in the dry film thickness as a percentage of zinc by weight. Zinc is approximately seven times as dense as the paint binder material and therefore the actual volume of metallic zinc in the coating is in fact a lot less. When zinc is employed for corrosion control, the concept of 'more zinc one has the longer the service life' is applicable.

When we compare hot dip galvanizing to any form of zinc rich paint or epoxy, the characteristics of the two systems are certainly not equivalent in terms of corrosion control and specifically in terms of cathodic protection.

Reference 1: Xiaoge Gregory Zhang: Corrosion and Electrochemistry of Zinc *– page 340.*

Bob Wilmot

Measuring coatings on metal substrates (Part 4)

Probe Placement

It is most important to place the probe at 90 degrees to the plane of the surface. Otherwise, readings will be higher and inconsistent. Pressing the outer cylinder or sleeve of the probe against the test surface and holding it there for one second will ensure this.

Small tubes and large wires should be located in the V shape cut at the end of the probe sleeve. Larger diameter items will require the use of the Vee Probe Adaptor (*below left*), which fits over the outside of the probe and can be positioned for the best effect. The probe can be inverted and the sample placed onto the end of the probe if that makes it easier to measure.

When measuring on surfaces with a small radius, remember to recalibrate to the same curvature first. Wires must be kept straight so there is only one curve. A compound of curves will give higher and lower readings not representative of the thickness of the coating.

Consistency

This is very important. The probe must contact all the samples in the batch in the same way. On a complex curved surface, it must be placed in a similar spot with similar curvature to that it was calibrated on. To make placement easier, users have made plastic holders and blocks to fit their complex items, drilling holes where the probe should go. This way, inspection becomes quite a simple and repeatable affair.

Smaller parts must be held firmly to avoid small changes in position distorting the measurement.

A Probe Placement Jig (right) helps in this case because it can be adjusted to both hold the sample and to place the probe consistently. The operator may choose to use the remote switch to lower the probe rather than do it by finger.

Special fixtures can be made to hold awkward samples. An example is the orange mould compound used to hold zinc plated steel pop-rivet heads.

Probe placement jig and vice.

Achieving our desired future means managing the unexpected

We normally understand 'time' to be something like an unseen line that has been with us since we were born: it has taken us through the past, is accompanying us in the present and will be with us in the future until we die. We know what the past has been, we manage the present as best we can, but most of us have great difficulty in comprehending the future. But, we have a great desire to know the future and many people make very serious attempts to do so, like beliefs in prophesy, divination, astrology and forecasting. The practice and art of Futurology, or Future's Thinking, postulates possible, probable, and preferable futures, seeking to know and understand what is likely to continue, what is likely to change, and what is novel.

We are all Futurologists at heart-it's in our genes. We have to know what the future will hold for us. We are often quite exact in our predictions and are encouraged to be like this by our parents and family, our religious beliefs, fortune tellers and motivational speakers, who tell us that if we believe strongly and positively, we surely will get what we want. Anticipation and expectation are large parts of our make-up as human beings.

What we often fail to do, however, is to know and understand what we have to do to get to where we want to be and what can go wrong along the way. These two things are nowhere near as pleasurable as just anticipating and expecting.

In the harsh real world, personal anticipation and expectation must be matched by knowledge of what is required to achieve the end result, and importantly, to know how to deal with the unexpected and unanticipated. Our greatest challenge is not just to visualize the future but to know how to deal with the unexpected. We may have the right intention, we may take the right action, but because of uncertainty, actual events may not coincide with planned actions and the outcomes may be unexpected.

Our failure to deal with the unexpected is often on account of not having enough time to think of everything, failing to plan ahead and not focusing enough on, or attending to, what we have to do. We also often take too long to recognise that our expectations are being diluted and that problems are growing more severe. Once we belatedly recognise that the unexpected is unfolding, our efforts at containment are misplaced.

To manage the unexpected, we need to organise ourselves in such a way that we are better able to notice the unexpected in the making and halt its development and impact on us. This approach is often called being 'mindful' and, simply speaking, it means continually updating our interpretation of the external environment with respect to the context of our intentions, recognising problems and identifying solutions. Mindfulness gives us the ability to recognise potentially damaging signals and to act with purpose. It gives us the capability to see significance in what's happening around us and to incorporate an understanding of the continually occurring unexpected in the context of our plans.

Having a view of the future and a personal vision are wonderful characteristics of human beings. The probability of achieving our vision is, however, a function of how well can we manage the unexpected.

The Association wishes to thank Bob Andrew who is a consulting value engineer and honourary member of the Association for his article. He can be contacted on anneve@iafrica.com or boband@mweb.co.za

Coastal Education & Visitors Centre at Nahoon Point

When considering the corrosion control of any new steelwork project and a cost effective solution is considered important, a proper evaluation of a similar coating exposed to the same environment could lead to considerable long-term savings for the client. We include for your reading, this report by the Association.

Upon visiting the offices of an East London Consulting Engineer, I was introduced to Anton Coetzer and Dawie Herselman, who enthusiastically asked about the sustainability of hot dip galvanizing adjacent to the sea. The reason for the question was that a project, the Coastal Education & Visitors Centre was to be erected adjacent to the sea at Nahoon Beach and all steelwork was only to be hot dip galvanized. I offered to evaluate the performance of any known hot dip galvanized coating at the site and express an opinion as its sustainability.

The site is about 100 to 150m from the sea. As no hot dip galvanizing other than on fencing wire was to be found at the site, we turned our attention to the East Bank Reclamation Works, which is about 500m away from the sea and higher up the bank, for some indications of the performance of hot dip galvanizing.

Although the coating in all instances was very much intact with very little corrosion other than on the North side of the reception signpost, most of the items evaluated were additionally reasonably protected by way of sand dunes and flora *(see photos 1 - 3)*.

The hot dip galvanized coating on a water pipe leading to a tap (6 years old) and some lighting poles which had been installed since inception of the plant (20 years), proved to be in a sound condition *(see photos 4 - 11)*.

According to Mr Francois Fraetas who is the Senior Operator at the plant, the reception sign post was installed some 6 years ago, whereas the hot dip galvanized light poles were installed about 20 years ago.

Although the hot dip galvanized coating in the case of the light poles is in excellent condition, it must be borne in mind that they are relatively

Photo 1: The reception signpost was supported by a hot dip galvanized pole, which only on the northern side seemed to be taking flak.

Photo 2: Although not indicated by the above photo, coating thickness readings on the scraped area on the northern side recorded mean 54µm; min 2.8µm and a mean of 92µm.

Photo 3: 29 Coating thickness readings were taken both the east and south sides and averaged 63µm, see above for east side coating thickness reading.

Photos 4 - 5: Although the hot dip galvanized water pipe had been wrapped with a material, the part adjacent to the water tap was exposed. Coating thickness readings proved that the coating was still intact.

Photos 7 - 11 above: The hot dip galvanized coating on two lighting poles that were installed some 20 years ago, were in a sound condition, and would conservatively provide a further 20 years of maintenance free life.

protected from the sea air by the flora and the sand dunes that surround the East Bank Reclamation Works.

Recommendations

Through the experience of this organisation and exposure tests carried out over the years, we have found that in general terms, the conditions at the sea alter by upwards of 80% within the first km from the sea, altitude above the sea generally has a semi neutralising effect. However, heavy offshore winds, combined with big wave action and inadequate rainfall from the same direction, will exacerbate the situation and increase the aggressiveness of the environment. In these situations added protection by way of a duplex coating system, (appropriate paint system plus hot dip galvanizing) is necessary for externally exposed hot dip galvanized steel.

As a general rule unless an exposed insitu hot dip galvanized coating of known life is found where the residual coating can be assessed for its performance, it is wise to err on the conservative side and paint the hot dip galvanized coating with an appropriate paint coating (duplex coating), to ensure a reasonable maintenance free life.

Should you wish to discuss the inclusion of a duplex system in your specification for the protection of the hot dip galvanizing exposed to the conditions at hand, kindly contact us and we will gladly provide you with further details.

Terry Smith

On the couch with

Association staff – the rest of the team

This month we have a 'crowded couch' – we proudly introduce our HDGASA staff, *(from right)* Saskia Salvatori, Marjorie Montgomerie and Hendrik Steenkamp.

What is your function at the HDGASA?

SS: Official title – Office Manager, although Bob often introduces me as *The Boss!* Main functions include administration, accounting and promotional activities. Administration involves queries, meeting arrangements and monitoring of Association activities.

MM: My main functions are answering the switchboard, welcoming people to our offices and updating our database and then of course everything else in between i.e. washing the dishes!

HS: Technical Marketing Consultant. I promote hot dip galvanizing, by educating and training from manufacturers to engineers to QA personnel – essentially the metal industry. I also conduct site inspections and help with product design suitable for galvanizing, queries and concerns.

Tell me a little about yourself

SS: I was born in Johannesburg and matriculated from Sandringham High School, then did a National Diploma in PR. My third year practical was at the Highveld Blood Transfusion Service as a Junior PRO. After being retrenched I joined a presentation company as 'Girl Friday' and worked on developing myself. A few years and a couple more companies (and retrenchments) later I joined the HDGASA.

MM: Born in Edinburgh, Scotland, came to SA in 1948. Lived in what is today known as the Southern Suburbs of Johannesburg. I was what they called a 'War' baby, born after the men came back from the war. My two sisters were twelve and ten years older than me respectively so I was definitely the baby of the family.

HS: Born in Johannesburg, then moved to Pretoria. Studied Entertainment Technology. Went to the UK on a 'traveling working' holiday. Started my own business which led to my previous job, which paved my way to the HDGASA.

How did you get into this business?

SS: Fate or Luck! Again retrenched at a previous job and responded to an advert, went for the interview and the rest is history! People often see retrenchment as a negative thing, but in my instance, it led me to where I am today, fulfilled! I love my job, the industry and the challenges one faces. After 10 years, I still wake up every morning and look forward to going into the office.

MM: Right place at the right time. My husband had just passed on and I needed to find a job. A friend told me about the HDGASA vacancy, I applied and here I am!

HS: I was looking for something more stable and preferably something in a 'technical industry'. Someone told me about the job at the HDGASA and I applied.

Which part of your job do you enjoy most?

SS: Definitely the variety and unpredictability. I love organising the Awards evening but come 22h30 Awards night, I breathe a sigh of relief and say "thank goodness we pulled it off again; but how are we going to make it better next year". I enjoy month-end because numbers either balance or they don't – it's challenging!

MM: I enjoy the interaction with people and working with the team, whether it means making sure Bob doesn't have too many biscuits with his tea or Terry has a clean comfy place to stay away from home (although I'm sure I drive Saskia mad when I 'lose' files on the computer!).

HS: There is never a dull moment! The process stays the same, but the project, product and people involved change.

When you leave the office:

SS: Second shift starts (mom to boys aged 8 and 12)! So the usual follows: homework, dinner, lunches and general madness until 8pm, when I can sit down with a good book or watch TV.

MM: I look forward to seeing my cats and dog, 'meals for one' and watching my soaps or reading a good book!

HS: Love spending time with my wife and son. Also a bit of a DIY junkie and off-road bike fanatic!

Quick Q&A:

Saskia, most extreme thing ever done? Tandem skydive in 2006!

Marjorie, Zinc or Stainless? Zinc obviously, very good for your health, especially in my case – no Zinc – no job!

Hendrik, Sharks or Bulls? BULLE!!!

For more info, visit the HDGASA website – www.hdgasa.org.za

The Association wishes to thank Desere Strydom for this contribution.

Assessment of 'rusted' hot dip galvanized floor gratings

"Wamosha" which in Zulu means inappropriate use, misuse or messing about, is the name for this column. The column will feature articles where we find hot dip galvanizing misused or where other zinc coatings that are often inappropriately specified when general hot dip galvanizing is preferred, have been inappropriately used.

Following your request for our Association to conduct a site inspection of certain hot dip galvanized floor grating, installed at a petroleum producing plant, I report on my 14 November visit. My inspection was conducted in the presence of Chris from OTB and Brian, who advised me that he is a Civil Engineer employed by the company.

The company had expressed concern due to the development of surface rust that has developed on recently installed hot dip galvanized floor grating.

It was reported that the grating had been in service for the past 12 to 18 months.

During my inspection, I removed (scrapped away) the surface rust contamination *(photos 2, 3 & 4)* and found that the hot dip galvanized coating remained fully intact and effective.

Conclusion with regards 'Rust Staining'

The rust contamination, seen on site, is the result of grinding and/or cutting in close proximity to the newly hot dip galvanized grating. The process of grinding or abrasive disc cutting of the galvanized grating, results in carbon steel residues (iron filings) being deposited onto the zinc surface where it will corrode and result in rust staining. This is what was found on the hot dip galvanized grating currently causing the client's concern.

Once the cause has been removed, i.e. removal of the "iron filings", the stains will gradually disappear. The amount of rust staining, whilst aesthetically concerning, it will not significantly affect the corrosion control ability of the hot dip galvanizing or the long term structural integrity of the floor grating.

Other Concerns

Inspection of the installation did however, raise other concerns regarding the kickplates and banding. It is understood that these had been added on site, to the hot dip galvanizing floor grating panels. Results of these post galvanizing activities are illustrated in *photos 5 - 8.*

continued on page 34...

Photo 1: Local of the newly installed hot dip galvanized floor grating. The grating in question is installed on the platform indicated by the circle.

Photo 2: Surface rust on the hot dip galvanized floor grating. Installation was reported as being completed within the past 12 to 18 months. Note the corroding welding rod that will also contribute to the surface rust staining.

Photo 3: Surface rust staining caused by an uncoated piece of carbon steel being left on the hot dip galvanized grating. I moved the piece of steel from its original position so as to expose the rust staining.

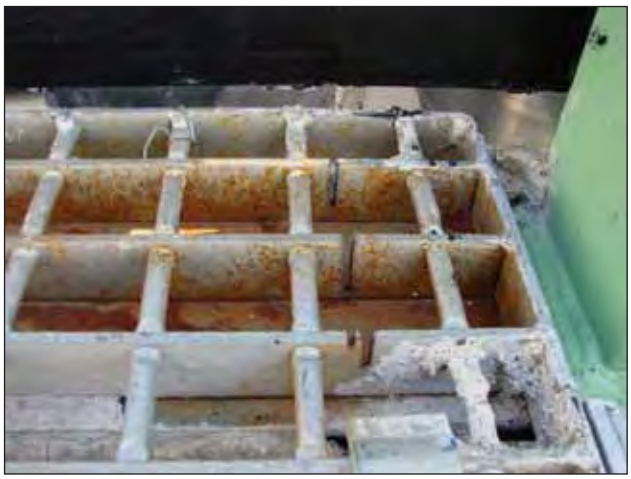


Photo 4: Further evidence that abrasive disc grinding and cutting has taken place in close proximity to the hot dip galvanized grating.

Photo 5 illustrates an example of cutting and welding on site, post hot dip galvanizing, followed by inadequate coating repairs.

In terms of the specification, SANS 121 (ISO 1461:1999), renovation of post hot dip galvanized carbon steel,

Photo 5.

Photo 6.

requires that the affected areas be cleaned of weld slag and other contamination, followed by a zinc rich coating, to a thickness of 30µm more than the original 'unaffected' hot dip galvanized coating. This has not been achieved.

Welding on site followed by a coating of zinc rich paint will not achieve the required coating thickness of 100µm, i.e. original specification of 70µm + 30µm. Using a zinc rich paint, it is not possible to achieve the required coating thickness (100µm) without multiple applications *(photo 6)*.

It is for this reason that we specify a zinc rich epoxy as a suitable repair material. Epoxy is self curing, and easily able to achieve the required coating thickness with a single application.

'Zincfix', supplied through the Association as a service to industry, is a zinc rich epoxy repair material conveniently packed in squish packs, which once mixed with its activator, must be applied within 30 minutes, due to the fact it will cure and harden.

It is understood that the banding and kick-plates were added on site and painted with a zinc rich paint.

This process is inadequate and will not provide the corrosion control requirements that are the equivalent to that of the hot dip galvanizing process.

The "oval" on the *photo 7*, indicates one of numerous other sites of painted banding.

Photo 8, taken of previously installed 'older gating', reported as having been in service for the past 12 to 15 years, illustrates what will develop on the 'new' kickplates and banding.

Zinc rich paint does not provide the same corrosion control that is achieved by hot dip galvanizing.

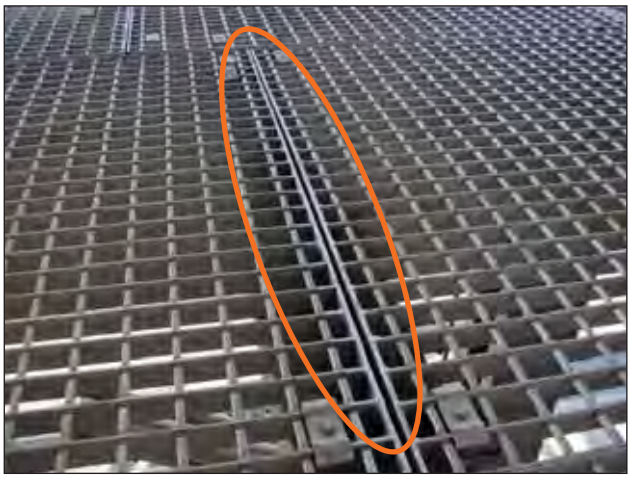


Photo 7.

Photo 8.

Recommendations

While the rust staining is unsightly, the underlying hot dip galvanized coating will provide adequate and effective corrosion control of the carbon steel floor grating. At the exposed "rusted" sites, the surrounding zinc will provide cathodic protection and prevent any form of under coating corrosion creep.

Areas where zinc rich paint has been applied as a repair material, it is my opinion, that this is totally inadequate and should be redone. The process to be followed should consist of cleaning the areas to be repaired and zinc rich epoxy applied to and final coating thickness of 100µm. The alternative to this recommendation, and one that will provide the client with the optimum results would be to remove the grating, return the panels to a hot dip galvanizer, with instructions to strip and re-galvanize. This recommendation may well prove to be impractical.

The above report represents a summary of my site visit findings and recommendations. As an additional exercise, I suggest that I prepare a suitable power point presentation, using my site visit findings, and at an appropriate time to suit the company, deliver such presentation to site personnel. Consider this proposal as an opportunity to provide technical knowhow on the pros and cons of hot dip galvanizing as a corrosion control "material of construction". I would appreciate the opportunity to use my site visit, as a case study, and to illustrate how to effectively employ hot dip galvanizing as a corrosion control system.

Bob Wilmot

The Association would like to acknowledge the advertisers and thank them for their support

Differential aeration or "necking corrosion" re-explained

Differential aeration or "necking corrosion" is a corrosion form which frequently occurs on partially buried steel at the interface between the buried portion and that exposed to the atmosphere. It can also occur but to a lesser degree, where steel structures are cast into concrete bases and slight shrinking of the concrete during curing results in a small gap or crevice at the interface between the steel and the concrete.

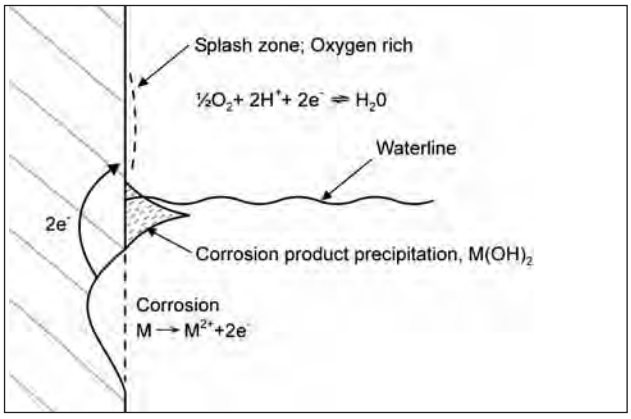
The cause of this corrosion mechanism is a depletion of oxygen where the steel surface is buried or submerged in water, compared with the oxygen rich atmosphere in contact with the exposed portion. The result is a corrosion cell where the steel exposed to an oxygen lean environment constitutes the anode in relation to the exposed steel which is the cathode *(see sketch 1)*.

What is the solution?

Corrosion which is brought about by differential aeration is prevented entirely, simply by applying a paint coating onto the buried portion of a hot dip galvanized structure, prior to erection. The paint film should extend a distance above and below the ground level, ideally in total about 200mm. Coal tar epoxy has proved to be singularly effective for this purpose.

The following photos taken at one of Cape Town's older stadiums, shows the evils of this type of corrosion.

Refer also to previous article in Magazine No 26 – 2006 Vol. 3 Issue 1.



Sketch 1.

The general appearance of differential aeration on a handrailing balustrade.

Coating thickness at the top of the bar (265µm).

Coating thickness just above the necking (186µm).

The full effects of differential aeration.

Galvspin Galvanizers

Galvspin Galvanizers cc was established in 2000 and employs highly trained staff in all fields of the galvanizing process.

In the handrailing market, the company has proved that it can obtain high quality galvanizing on all handrailing products. Galvspin Galvanizers has eight centrifugal spinners which makes it a leader in the spinning market.

The business philosophy of Galvspin Galvanizers is based on quality of product and service delivery. This relationship has involved extensive knowledge transfer between all the role players in the hot dip and spinning industry, and has resulted in the additional benefit of the end users' credibility of its galvanizing and process control systems.

Editor's comment:

We at the Association welcome Galvspin as members, particularly for their abiliity to successfully hot dip galvanize sensitive high strength fasteners such as grade 10,9 to SANS 10094 Annex B, including the latest suggestions outlined in Spencer Erling's 'Guest Writer' article.

Robor Galvanizers

Robor Galvanizers has recently achieved two milestones, which further adds value for it's client base.

First, they have been formally audited by NERA, an accredited BBBEE institution, on their BBBEE status, achieving a score of 72.79%, which translates into a Level 4 contributor. This means that 100% of the customer spend on hot dip galvanizing and other services from Robor Galvanizers, counts in the Preferential Procurement pillar of the BBBEE Scorecard. This also places them in a 'Full Value' category.

Secondly, they have attained ISO9001 certification after being audited by the SABS.

Geoff Colloty

Association staff convey their sincerest condolences to Rob and Charlene Bossert of Bulldog Projects on their recent bereavement.

COMPANY	LOCATION	CONTACT	TELEPHONE	E-MAIL	MAIN CLASS OF WORK
CORPORATE MEMBER – CORPORATIONS WHICH HAVE INTERESTS IN THE ASSOCIATION					
Exxaro Base Metals - Zincor Ltd	Springs	Owen Tennant	011 812 9500	info@zincor.co.za	Producers of refined zinc metal for the galvanizing industry
INTERNATIONAL MEMBER – A GALVANIZER OR RELATED COMPANY BEYOND THE BORDERS OF SOUTH AFRICA					
Giardina SRL	Milano, Italy	Ugo Giardina	+3902 606 119	impianti@giardina-srl.it	Exclusive agent in Italy for W. Pilling. In cooperation with Scandiuzzi, GIARDINA SRL designs and implements full plants and components such as: chemical processing tanks complete with vapour suction and scrubbing systems, zinc exhaust collection enclosures and bag filters for scrubbing. Giardina also sell zinc pumps, drossing grabs and centrifuges.
Gimeco Srl	Trezzano Rosa, Italy	Ermes Moroni	+3902 9096 0751	gimecoita@tin.it	Engineering and manufacturing of hot dip galvanizing lines
Kingfield Equipment (Pty) Ltd	Victoria, Australia	Geoff Lisle	+613 9876 9090	geoff@kingfieldequipment.com.au	Suppliers and designers of hot dip galvanizing equipment and furnaces.
ASSOCIATE SUPPORT MEMBER – SUPPORT COMPANIES THAT PURCHASE AND SELL TO THE INDUSTRY					
Africa Cellular Towers Limited	Tulisa Park	David van Staden	011 907 7364	david@africacellular.co.za	The ACTOWERS Group offers full turnkey solutions inclusive of tower design, manufacture and installation as well as GSM shelter manufacture. Our portfolio of products and services supports the Telecommunications and Power Line industries and the Group operates over most of the African continent.
Chemplus	Roodepoort	Pari Ligeris	011 760 6000	chemplus@mweb.co.za	Manufacture of speciality process and finishing chemicals to the hot dip galvanizing industry.
Galvaglow	Factoria	Gina Gerber	011 955 5200	gina@acsupports.co.za	Galvaglow is a subsidiary of AC Cable Support who manufacture trunking and channeling for the electrical cable industry for both commercial and industrial buildings as well as mines. AC Cable Support manufacture cable ladders and cable trays.
Highveld Steel and Vanadium Corp Ltd	Witbank	Mike Hilton	013 690 8616	mikehil@hiveld.co.za	Supplier of hot rolled structural sections, plate and coil.
Metsep (Pty) Ltd	Denver	Robert Watchorn	011 626 2425	robert@metsep.co.za	Supplying pickling plants with inhibited hydrochloric acid and removing and regenerating the spent pickle liquor in an environmentally friendly manner.
Orlik Metal Chemicals	Bedfordview	Clare Hennion	011 457 2400	clare.hennion@chemstystems.co.za	Manufacture of speciality metal finishing chemicals to the hot dip galvanizing, electroplating, anodising, wire drawing and powder coating industries.
Pro Roof Steel Merchants (Pty) Ltd	Vereeniging	Charles Domingo	016 450 5800	charles.domingo@proroofgroup.co.za	Pro Roof Steel Merchants are distributors and manufacturers of a comprehensive range of high quality flat and long products, fencing, coldformed sections, tubing and roofing from our strategically positioned Service and Distribution Centers located in Vereeniging, Cape Town, Durban, Pretoria, Pietersburg and Nelspruit.
Speccoats Paints (Pty) Ltd	Modderfontein	Mervyn Cohen Graeme Stead	086 137 2468	graeme@speccoats.co.za	Manufacturing and distributing of specialised liquid coatings. Supply locally manufactured products to the architectural, commercial and industrial markets such as Zincfix.
Surface Treatment Technologies	Jupiter	Donavan Jones	011 626 2255	sttchem@mweb.co.za	Manufacture, supply and servicing of speciality metal treatment chemical products and coatings to the hot dip galvanizing, powder coating, wire drawing, anodising and paint market.
AFFILIATE COMPANY MEMBER – COMPANIES THAT SELL HOT DIP GALVANIZED ARTICLES					
Advanced Roof Technology Foundation SA	Illovo	Rick Norwood	011 605 2510	Info_artf@mweb.co.za	Advisory and practicing Association of advanced level consultants, engineers, inspectors and paint applicators, in the roofing field.
Andrew Mentis (Pty) Ltd	Elandsfontein	Chris Green	011 255 3200	cjgreen@mentis.co.za	Manufacturer of steel products including expanded metal, steel floor grating, Mentrail guard rail and industrial handrailing systems.
Bakone Minerals (Pty) Ltd	Thabazimbi	Cliff Duncan	014 772 2887	cliff.bakone@gmail.com	Structural steel construction, corrosion control and duplex coating systems.
Bosal Afrika	Pretoria	Desere Strydom	012 391 1000 031 910 3400	deseres@bosal.co.za	Manufacturing of exhausts, jacks, towbars, roll bars and grill guards, catalytic convertors and irrigation systems.
Bulldog Projects cc	Wadeville	Michael Book	011 827 4221	mike@bulldogprojects.co.za	Specialists in the painting of hot dip galvanized substrates.
CWI (Pty) Ltd	Vanderbijlpark	Craig Viljoen	016 980 3111	craigvil@cwi-wire.co.za	Manufacture of galvanized wire and wire products.
Eskom NW		Sakkie vd Vyver	051 404 2053	Isak.VanDerVyver@eskom.co.za	Performance contracts with industrial customers to keep energy costs low and process efficient.
Galvfast Trading	Birch Acres	Arthur Harwood	011 391 1510	arthureh@mweb.co.za	Specialist supplier of hot dip galvanized and industrial fasteners to the construction industry.
Hi-Tech Elements (Pty) Ltd	Boksburg	Andre Goosen	011 894 3937	andre@hi-techelements.co.za	Design and manufacture of heating elements, systems and control for the hot dip galvanizing industry.
O-line Support Systems (Pty) Ltd	Selby	Edzard Verseput	011 613 8527	o-line@o-line.co.za	Electrical and mechanical support systems and powder coating.
Rand York Castings	Umhlanga Rocks	Justin Corbett	031 561 1023	sales@randyork.com	Fabrication of special steel profiles for civil and mining sectors.
Robor Pipe Systems	Isando	Jim Begbie	011 974 3351	jimb@robor.co.za	Supply of value added steel pipe and complete piping systems with various protective coatings.
SA Galvanizing Services (Pty) Ltd	Pretoria	Johan du Plessis	012 996 0458	sagalv@eject.co.za	New hot dip galvanizing plant design, installation and project management technology experts.
Southern African Institute of Steel Construction	Parktown West	Tiana Venter	011 726 6111	tiana@saisc.co.za	The mission of SAISC is to develop and promote the health and wealth of the steel construction industry in Southern Africa.
Strutfast (Pty) Ltd	Denver	Pieter Uys	011 622 9969	sales@strutfast.co.za	Suppliers of electrical cable support systems.
T & E	Chamdor	Jack Siebert	011 762 1084	trucking@trucking.co.za	High and low pressure piping, stainless steel, steelwork and platework.
Weartech (Pty) Ltd	Wadeville	Simon Wintle	011 824 6010	simon@weartech.co.za	Suppliers of zinc thermal spray equipment, spare parts and wire.
AFFILIATE PROFESSIONAL MEMBER – SPECIFIERS WHO HAVE AN INTEREST IN THE ASSOCIATION					
Corrosion Technology Consultants	Bedfordview	Gerald Haynes	011 456 7960	gjhaynes@icon.co.za	Reputable independent Corrosion and AC Mitigation Consulting Engineers and Project Managers.
AFFILIATE GALVANIZING INSPECTOR MEMBER – APPROVED GALVANIZING INSPECTORS					
Keith Moodie	Polokwane	-	015 291 2020		
Stephen Herholdt	Garsfontein East	-	082 568 3414		
Robert Bossert	Southdale	-	082 331 6897		
Paul Eksteen	Superbia	-	082 456 3326		
THERE ARE MANY MORE INSPECTORS, BUT ARE NOT AVAILABLE FOR WORK OUTSIDE OF THEIR COMPANY					