Vol. 1 Issue 1 No. 1 | 2015

Corrosion Exclusively

INSIDE:

- Institute News and Activities
- Early History of CORRISA
- How to achieve quality corrosion control
- Essentials for appropriate substrate preparation
- Why motor car bodies no longer rust?
- Case History
- Instruments and Equipment
- Blast from the PAST; Guest Writer and Personality Profile.

The Corrosion Institute of Southern Africa celebrates its *55th year* of existence

Corrosion Institute Southern Africa

Vol. 1 Issue 1 I 2015

Corrosion Exclusively

CONTENTS

OFFICIAL MAGAZINE OF THE CORROSION INSTITUTE OF SOUTHERN AFRICA

PAGE 7

PAGE 16

PAGE 24

PAGE 29

President's Comment

Welcome to **Corrosion Exclusively** – well what's in a name – when it came to selecting a name for our magazine – quite a lot – amazing how many names with Corrosion and Africa are somehow reserved.

The name may be "Exclusive" but we need it to be Inclusive... involving all those involved in combating Corrosion.

This year we held the 41st AGM and the third at Corrisa's owned premises the Corē – the Institute has progressed over the years. It has not been easy moving from a small group with a turnover of a couple of hundred thousand Rand a year and no fixed abode to a multi-million Rand training establishment with fixed property, debt free and well on its way to becoming registered as an Institute of Higher Learning.

The cost of Corrosion has been estimated at 4% of economies GDP. It has been said that 5 metric tons of steel is degenerated every second worldwide and that 40% of all produced steel is to replace corroded steel.

By means of the magazine we certainly want to achieve the aims of CORRISA – and reach those in industry that can help make a difference – more Asset owners, specification writers and those involved with different aspects of Industry to create an awareness of the costs of corrosion and how it may be prevented.

CORRISA Members come from diverse backgrounds offering many competitive methods in which to control corrosion be it for steel, concrete or any other materials. In many instances members may compete for business or work together to achieve a synergistically competitive solution.

It is encouraging to see membership growing, some members competing out in the field but often getting together via the various Technical Evenings held at the Johannesburg, Cape Town or Durban branches of the Institute to discuss and combat a corrosion problem.

We know that time flies and it has been said that "rust never sleeps" – but I am sure we may get it to at least snooze – so please help us to get to the right folks who can make a difference and help us achieve our rightful place as Champions of corrosion prevention.

I give thanks to Council members and the regions for their support and effort in starting this initiative and particularly Terry Smith for taking on the role of editor. We know from his past achievements that this can be an incredible success. In this regard we would urge all of our members and readers to contribute not only by advertising in the magazine but also contribute articles for future editions. We require your assistance and advice in helping us to grow this magazine to become a useful tool for all those in our industry.

Bruce Trembling

OBJECTIVE OF THE MAGAZINE

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

Published on behalf of:

The Corrosion Institute of Southern Africa
38 Allan Road, Glen Austin, Midrand, South Africa
PO Box 5656 Halfway House 1685
International Tel: +27 (0)10 224 0761
Local Tel: 086 026 7772 (CORRSA)
www.corrosioninstitute.org.za
manager@corrisa.org.za

Editor

Terry Smith
Tel: 021 797 4735
Fax: 086 612 7284
Cell: 082 893 3911
Email: editor@corrisa.org.za

Advertising and Sales

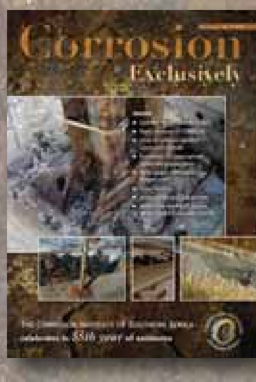
Terry Smith
Tel: 021 797 4735
Fax: 086 612 7284
Cell: 082 893 3911
Email: editor@corrisa.org.za

Design and Layout

Sandra Addinall
Tel: 011 868 3408
Email: cbtdesign@adcot.co.za

Reproduction and Printing

Camera Press
Tel: 011 334 3815
Fax: 011 334 3912
Email: cpress@iafrica.com



Cover: A collage of corroded components due to a number of reasons.

Manager's Message

Five months have passed so quickly, my feet have barely touched the ground. I walked into the CORē and was greeted with such warmth. In week one we hosted the Corrosion Awareness Day and since then we have represented the Corrosion Institute at various Expo's, we have hosted four very successful technical evenings, a family fishing day, a Council Dinner, I have seen one President step down and another succeed, I have survived my first AGM and this year still promises to deliver a great deal more.

My focus over the past five months has really been on the Corrosion Institute's day to day running's, familiarising myself with the team, training courses, the financial processes as well as the memberships. We have employed a new Financial Administrator, who is already making remarkable progress in our accounts department. New processes and procedures are being implemented and our data base is receiving a complete overhaul, whilst we have moved over to a more suitable accounting package. I look forward to continued changes and improvements which will see The Corrosion Institute progress and I am sure flourish.

I have learned so much and genuinely feel like I have been welcomed into a very close-knit family willing to share such a rich history and abundance of knowledge. I would like to take this opportunity to thank everyone for the warm welcome. I am so excited to be a part of the team and look forward to contributing to the future success of the Corrosion Institute of Southern Africa.

Lynette van Zyl, Manager – CorrISA

Comment – Chairman of the Western Cape

It's a real privilege to be able to contribute to the very first edition of Corrosion Exclusively and give you some feedback from the Western Cape. Firstly I would like to congratulate Terry and the others that have made the publication a reality as I know that a lot of hard work and challenges have been involved in making it happen. I think it's really exciting times that the Corrosion Institute and related industries now have their own mouthpiece.

Monthly technical presentations and site visits in 2015

- **Corrosion challenges at Koeberg:** Indrin Naidoo and Flippie van Dyk
- **Experiences teaching NACE CIP in various parts of the world:** Gert Conradie
- **Emplasts' challenges and experiences at SAB in re-coating their tanks:** Gilbert Theron and John Houston
- **Latest advances in dry film thickness measurement techniques:** Craig Woolhouse from Elcometer
- **How abrasive media grading, media type and blasting technique can influence blasting profile:** Andre Huysamen (CEO of Blastrite)
- **Mini-survey of all the modern types of zinc plating, zinc plating alloys, modern generation passivates and sealers:** Tony van der Spuy (SAMFA)
- **Budgetary constraints and mandatory safety can have huge implications on corrosion control:** Mike Book and Charlene Bossert
- **The in's and outs of stainless steel corrosion:** Simon Norton – Chemical Investigation Services

Courses

- **Corrosion Engineering Course** March
- **Not Just Rust** April
- **NACE Courses** CIP 1 and 2

Where possible John Houston has recorded videos for our library of all presentations done over the past two years. Thank you John, we really value all the time and effort that you have invested.

We are pleased to announce that all future activities will be held at Kelvin Grove, Newlands.

We still have a few presentations / site visits lined up for the rest of the year and the not-to-be-missed Annual Gala dinner which will take place on Friday 13 November.

A special thanks to the rest of the committee who have really got stuck in and have made the running of the Western Cape region a smooth operation. The committee includes Tammy Barrandilla, Leonie du Rand, Simon Norton, Terry Smith, Flippie van Dyk, Indrin Naidoo and Pieter can Riet.

See you at the next presentation!

Graham Duk, Chairman – CorrISA Western Cape

Comment – Chairman of KwaZulu Natal

2015 has been a very testing year for the KZN Region, traditionally very well supported, we have seen a significant decrease in attendance over the last few years and it was top priority this year to see that change.

It was decided that we as the institute would host or present the majority of the monthly meetings ourselves. Using one of the Corrosion Institute courses, "Not Just Rust", which we broke up into sections to span 5 months (March – July). Through some timely notifications and word of mouth the meetings were warmly received and attendance was on the increase again. On the back of this, we will be looking at continuing in the same manner through 2016 and 2017.

The Corrosion Institute Golf Day, to raise funds for the Highway Hospice, was next on the agenda and once again was very well supported. This event has become a must save date on many calendars and we are very proud to be associated with this worthy cause.

Ryan van Wyk, Chairman – CorrISA KwaZulu Natal

Karyn Albrecht back in South Africa

We are pleased to welcome Karyn Albrecht back to South Africa. Karyn was the past chairperson of the KZN branch of CorrISA.

Karyn has been working extensively in and around Africa as a NACE Level 3 coatings and corrosion inspector on a variety of different industries and projects, from greenfields projects to maintenance on operational plants to name a few, in mining, paper, pulp, chemical and petrochemical industries.

Karyn will be using her wealth of coating knowledge she has gained, working in challenging environments over the years, to provide an independent inspection sevice in and around Southern Africa.

Karyn is dedicated to provide quality inspections on all aspects of corrosion protection.

The Corrosion Institute's Annual Fishing Day

by Vanessa Sealy Fisher

The Corrosion Institute of Southern Africa hosted its Annual Fishing Day on the 27th June 2015.

Every year the Corrosion Institute hosts its Annual Fishing day and this year not even the freezing weather could keep our fishing enthusiasts away. Young and old braved the very low temperatures and joined the Corrosion Institute's team and council members for a fun filled family day at Brookwood Estate Trout Farm situated in the Cradle of Mankind.

Of course such a day would never be possible if it weren't for our wonderful sponsors. This year we would like to thank the following:

Bulldog Projects; Denso; Dry Force; Dulux Centre – Bob Millenaar; Hall Longmore; Isinyithi Cathodic Protection; Jotun Paints; Minit Print; National Urethane Industries; Postern Lantern; RSC; Rustic Deck and Total Contamination Control for their sponsorship for the Fishing Day. The event has raised a substantial sum for charity and the proceeds will be donated to a wildlife organisation later this year.

Prizes for biggest fish caught, most fish bagged, oldest fisherman, best crab catchers etc. were up for grabs and the competition was tough. Nobody left empty handed and most importantly great fun was had by all.

Despite the chilly day, there was much warmth and laughter as diehard fishermen cast their lines in an attempt to gain recognition as the Fisherman of the Year. As in several years past, the Structural Applicators' team took the honours, with Tshepiso Mohlachane recognised as the best fisherman of the day with the biggest catch (2 trout) and the heaviest bag (1 816g). Devon Howarth (846g) and Byron Ferreira (556g) came second and third in the adult category and Keegan Howarth caught the only trout in the Under 16 category (650g). The more grey-haired fishermen did not have as much success but have assured us that next year it will be different!

The crabbing competition was hotly contested and numerous moms and dads were to be seen aiding their youngsters in luring crabs into buckets with fish bait, wors and even a chop! Once the art was perfected, crabs were hauled out in numbers and the winning duo of Paton van Zyl and Hannah Johnson had a total of 12 crabs in their buckets. Caleb McCormick proudly presented 4 crabs and Cora and Bryn Slade netted 3 apiece. Caitlyn Livesey managed to extricate 2 unsuspecting crabs from the river while Lesego Thulane and Darian Goodwin fished out one each from the dam.

We look forward to seeing an even greater turn out in 2016.

2014 Annual Awards Dinner, Gauteng

17th October, Wanderers Ballroom

On Friday 17th October, guests were ushered into the Wanderers Ballroom on "A Knight's Quest" for the 2014 CorrISA Annual Awards Dinner. It was heartening to see the Ballroom filled with CorrISA members and their guests for a sumptuous evening of chivalry and honour.

During the evening those students who excelled on all of our CorrISA courses as well as the NACE courses during the preceding year, were recognised. The highlight of the evening was the presentation of the 2014 CorrISA Annual Award which was presented to the Eskom Medupi Bulk Fuel Offloading & Water Treatment Plant Linings project (BKV Proline).

Special thanks go to our organising committee: Brenda Maree, Charlene Bossert, Kevin Richardson, Marilise Moolman and Sansie van Niekerk who worked tirelessly to plan and co-ordinate the wonderful evening. We look forward to another glittering event in 2015.









Some of the Corrosion Institute members and their guests enjoying the evening at the 2014 Annual Dinner and Awards Evening in Gauteng.

Instrument donation from Elcometer and BAMR

Elcometer, the leading supplier of inspection equipment, and BAMR their partner in southern Africa, recently sponsored a training room at the Corrosion Institute in Johannesburg. They also donated a number of instruments to be used in the training courses run by the Institute so that students have access to the latest technology in coating inspection. Thanking Elcometer and BAMR, the President Bruce Trembling said "the Corrosion Institute really appreciate this donation and sponsorship and with extra instruments it provides the students more time to use and practice before the NACE exam day." Seen here are Lynette from CorrISA, Rob and Graham Duk from BAMR and Craig Woolhouse and Daniel Leonard from Elcometer.

Western Cape Annual Gala Dinner 2015

The Corrosion Institute celebrates 55 Years

Join us for this year's Western Cape Annual Gala Dinner. Cape Town people know how to host a party and this year will be no different as all seriousness is left at the door and our Comedy Night kicks off. Comedian Dalin Oliver will be making us laugh and memories will be captured in our photo booth with fun props. The Kelvin Grove Ballroom venue is the epitome of classic luxury and only the highest quality food comes out of the kitchens. This night will be a memorable one as people from the industry gather together in a more relaxed atmosphere to socialize and mingle after a hard year's work.

2014 WESTERN CAPE GALA DINNER – A NIGHT AT THE OSCARS

Some of the Corrosion Institute Members and their guests enjoying the evening at the 2014 Annual Gala Dinner Evening in Cape Town.

2015 SAISC Steel Awards – Western Cape

Some CorrISA members including guests from Advanced Galvanizing and the media enjoying the evening at the recent Steel Awards in Cape Town.


ANY
Project
Size
Specification
We have the solution.
carboline
www.carboline.co.za
stoncorsa@stoncor.com
Carboline offers a variety of linings and coatings specifically formulated for pipeline new construction or rehabilitation.
GLOBAL COATINGS LEADERS™
RIGHT PEOPLE · RIGHT PRODUCTS · RIGHT LOCATIONS

41st Annual General Meeting

10 September 2015

The 41st Annual General Meeting of the Corrosion Institute of Southern Africa was held on 10 September 2015. A record attendance highlighted the fact that CorrISA has become increasingly relevant within the anti-corrosion community.

This year saw the induction of Mr Edward Livesey as President, supported by Messrs Donovan Slade and Vernon Kok as Vice-Presidents. Mr Greg Combrink remains Honorary Secretary and Mr Armin Schwab was welcomed as Honorary Treasurer. After serving two years as President, Mr Bruce Trembling picks up the Immediate Past President portfolio.

For the first time in the history of the Institute, there were twice the number of nominees as there were available seats on Council! Those members not voted onto Council have been / will be seconded onto sub-committees where they can still provide valuable input to CorrISA and her members.

The remaining Council Members for the 2015 – 2016 year are: Aaron Raath; Charlene Bossert; Donovan Edward; Frances Bradfield; Mboneni Muravha and Ross Mahaffey.

With this committed team at the helm, we have no doubt that CorrISA will continue growing from strength to strength.

Gauteng Annual Charity Golf Day 2014

The Corrosion Institute of Southern Africa – Gauteng region, held its annual charity golf day at Jackal Creek Golf Estate on 14 November 2014. We had an enormous amount of support from the industry with a total of 31 fourballs entered into the competition and had to turn away a number of companies as we had reached the maximum allowable number of teams who can enter. We could not have asked for a more perfect day with the weather playing its part and all 124 players thoroughly enjoying themselves.

The winners on the day were team Bull Dog and Hempel who played exceptionally well. Appreciation and thanks go to Jackal Creek Golf Estate staff who were excellent and accommodating from the start to the end of the day. Finally, to my golf committee team who, without their hard work and commitment, this day would have never been as successful as it was!

Please book your fourballs for this year's golf day to be held, once again, at Jackal Creek Golf Estate on Friday 30 October 2015. To avoid disappointment and secure your place at this year's prestigious golf day, kindly contact Donovan Edward for more information don@denso.co.za.

Donovan Edward, CorrISA Golf Committee

Members and their guests enjoying the golf day.

CorrISA Training Courses and Technical Events

CorrISA TRAINING COURSE SCHEDULE 2015/2016

Course Name	Oct 2015	Nov 2015	Dec 2015	Jan 2016	Feb 2016	March 2016	April 2016	May 2016	June 2016	July 2016	Aug 2016	Sept 2016	Oct 2016	Nov 2016
CorrEng (5 day Exam)					8th - 12th JHB			23rd - 27th JHB				5th - 9th JHB		
Eco of Corr (2 days)		4th - 5th JHB				14th - 15th JHB					1st - 2nd JHB			
C-NJR (1/2 day)			2nd JHB	20th JHB		2nd JHB	20th JHB			13th JHB			28th CPT	
CITWI BPA Course (4 days)		9th - 11th JHB												
NACE CIP1 (6 Days)		2nd - 7th JHB			1st - 6th JHB		11 - 16th JHB		20th - 25th DBN	4th - 9th JHB	15th - 20th CPT	12th - 17th JHB		14th - 19th JHB
NACE CIP2 (6 days)								16th - 21st JHB					17th - 22nd JHB	
NACE CIP3 (Peer) (1 day)	17th - 19th												23rd - 25th JHB	
NACE CP2 (6 days)				25th - 30th JHB										7th - 12th JHB
NACE CP4 (6 days)		23rd - 28th JHB												
NACE O-CAT		9th - 13th JHB												
NACE CP Interface	26th - 31st JHB													

If you are interested in any of the above pending courses, have a related course that you would like to offer or would like to use our facilities, contact CorrISA. Provided the suggested course or presentation meets our various terms and conditions, CorrISA would be interested in adding it to our offering.

CorrISA reserves the right to cancel or postpone a course, should the need occur. Numbers may affect the status of the course.

TECHNICAL EVENINGS
Gauteng

TECHNICAL EVENINGS
Western Cape

TRAINING COURSES
Western Cape

A collage of photos randomly taken at recent technical events and courses.

Early history of the Corrosion Institute of Southern Africa

On the occasion of the 55th Birthday of the Corrosion Institute we include a summary article on the early History with a few photos of the early stalwarts.


Dr. Brian Callaghan.


Dr. Colin Alvey.


Mr. M.A.A. Brett.


Prof. F.P.A. Robinson.


Mr. Walter Barnett.

In October 1981 the magazine Corrosion and Coatings South Africa published a letter from Mr. Muirhead, which started thus:

"Dear Mr. Greyling,

Now that it is 21 years since the Council came into being, as its first founder member I thought you would like to learn some of the vicissitudes of its formation. It all started round about 1959/1960 when Dr. Ken Mathieson, the then editor of the SA Chemical Institute journal and the owner of a small recycling plant, dropped into my office one afternoon. I was then a group secretary of the Transvaal Chamber of Industries responsible for some 14 odd Associations and Committees including that of the Transvaal Chemical Manufacturers' Association and Ken's firm was a member of the TCMA.

I was surprised to see him until he explained that his plant was out of commission due to corrosion". And from there, the idea of forming a Corrosion Institute grew.

The South African Corrosion Institute was constituted in 1974 but its history started fourteen years earlier. In mid-1960 the South African Corrosion Council was established by a small group of individuals working within different industries, who were all concerned about the problems of corrosion. At their inaugural meeting, which was held in the boardroom of the Transvaal Chamber of Industries in August that year, representatives of various industries, institutes, research organisations, universities, and various government, quasi-government and municipal organisations were in attendance. Dr. K. Mathieson of Oceanic Refineries was elected as the first Chairman.

A standing committee of twelve, elected at the same meeting, met again the following month and decided on three main courses of action: to consider a constitution for the new organisation; to make proposals regarding financing; and to organise lectures, symposia and exhibitions. The elected committee members were not wasting any time in laying the foundations for the establishment of the new South African Corrosion Council.

By the end of 1960, arrangements had been made to hold a meeting which would be addressed by various prominent speakers, with the theme of 'The cost of corrosion to South Africa'. The meeting was a great success and gained the Corrosion Council valuable publicity and support. Applications for membership were being received at a heartening rate.

Less than a year later, on June 22, 1961 the first AGM was held, at which the constitution was adopted and an Executive Committee was elected. Two months later, at the first meeting of the new Executive Committee, the South African Corrosion Council unanimously elected Mr. J. Muirhead from the Transvaal Chamber of Industries as the first Honorary Life Member in recognition of the valuable role he had played in the development of the Council from its inception.

Now the work of the Executive Committee commenced in earnest. One of its first tasks was to find a journal that would act as mouthpiece for the Council and eventually


The committee of the newly formed Cape Branch of the Corrosion Institute.


Plascon-Parthenon delegates to the conference, Rolf Johannsen (left) and Dudley House talking to SACI president Michael Brett.

The Industrial Chemist was chosen. By the time the second AGM was held in June 1962 membership had increased to 34 ordinary and 33 corporate members, and funds stood at R855.14. By now, the Executive council was meeting on a monthly basis and lectures on corrosion and corrosion protection were being organised, as well as the design of an emblem and membership certificates for the organisation.

In April 1963 the second Honorary Life Member was elected: Commander W.J Copenhagen who wrote several technical papers including Metals and Minerals, considered by some to be the father of corrosion science in South Africa. That year saw the establishment of the Corrosion Council's own official journal, *Corrosion and Metal Finishing – South Africa*. The scope of the Council had been expanded to include electro-plating and metal finishing.

By the time the fourth AGM came around in September 1964, it had been decided to follow it with a dinner, a very successful annual practice which has continued to this day. The first Corrosion Conference, organised in conjunction with the CSIR was held at the University of Cape Town in November of 1965 to great acclaim. It was opened by the Minister of Defence, J.J. Fouché, who later became State President of the Republic, and featured several overseas speakers. The South African Navy acted as hosts to the delegates for one day, but the excitement of a trip in the frigate President Steyn turned to misery when most of the guests were sea-sick. The conference was extensively covered by the December issue of the new journal *The South African Corrosion Journal,* which had taken over from the previous publication due to financial problems.

The Corrosion Council (becoming an Institute in 1974) continued to grow in membership and stature over the next two decades. The following are some noted highlights from those years.

1967

- In conjunction with the CSIR a two day symposium on Cathodic and Anodic Protection was held in November.
- A Gold Medal Award was instituted for meritorious achievement in the field of corrosion science.
- A second Honorary Life Membership was conferred on Dr. W. Linnhoff.
- The SA Bureau of Standards was approached to prepare a Code of Practice for the Protection of Pipelines.

1968

- A symposium on Corrosion Resisting Steels was held in September and opened by the Minister of Finance, Dr. N. Diederichs.

1972

- The second International Congress (formerly the Corrosion Conference of 1965), in conjunction with the CSIR, was held in March on board a ship travelling from Durban to Beira and back. Again, international speakers participated and the delegates were able to enjoy not only the technical aspects of the conference but also the great selection of Italian wines on board.

continued on page 14

Some of those who attended the Association's AGM were, from left, Mr Jim Bratton (Treppo Metallisation), Mr Niel Webb (Michael A. Brett & Partners International), Mr Geoffrey Jochelson (Flame Sprayers), Mr George Murray (Projects Expedited), Mr David Haywood (Robert Skok) and Mr Eric Duligal (SABS).

Among those at the Natal Section AGM were, from left, Mr W. Wieczorrek (the guest speaker of Bayer AG West Germany), David Williams-Wynn (chairman), Martin van Rensburg, Ken Piggott (vice-chairman), Tim Henning, Laurie Saunders, John Gush (symposium chairman) and Roley Eglington (the new SA vice-president).

- At the 99th meeting of the Executive Committee it was unanimously decided to award the first Gold Medal to Dr. Paul Robinson of the University of the Witwatersrand for his contribution to the council and to corrosion science in general.
- The first Corrosion Exhibition was held in September at the Carlton Exhibition Centre.
- Mr. L.A. Woodworth was the third person to be conferred Honorary Life Membership in recognition of his role in the formation of the Corrosion Council. He was also considered to be the first person to install an operational cathodic system in South Africa.

1974

- The first Silver Medals were awarded jointly to Messrs. James, Marks and Filter for their authorship of the paper 'Developments in Cathodic Protection'.
- *At the 14th AGM in September, the proposal to convert the Council to an Institute was accepted. Professor Paul Robinson was elected as the first President of the new South African Corrosion Institute.*
- A symposium of 'Zinc Coatings on Steel' was arranged, in conjunction with the CSIR, the SA Hot Dip Galvanizers' Association, Zincot and the SA Bureau of Standards.
- The constitution and bye-laws were translated into Afrikaans.
- The Institute's logo is designed by Dr. C. Roffey, who submitted the winning design chosen from a competition. The logo symbolises the electrochemical nature of corrosion and of protection against corrosion by electrical means.

Libby Robb of Southern Cross Steel with the company's well-known stainless steel Renault.

At the joint Transvaal OCCA and Corrosion Institute end of year meeting were: Rob White, Dave Howarth, Meryl Nixon, Ron Cromaty, Peter Quorn, Neil Webb and Illona Bing.

1975

- The Institute's first AGM is held in September.

1976

- A Conference on Zinc Coatings is held in Swaziland in March, and opened by the Swaziland Minister of Works, Power & Communication, Dr. Allen Nxumalo.
- Silver Medals were awarded to Messrs M.A. Brett and Walter Barnett for their paper on 'Hot Dip Galvanized Steel in the Gold Mining Industry'. Mr. J. Van Heerden also received a Silver Medal for his paper 'Consignment Inspection and Quality Control in the South African Galvanizing Industry'.

1977

- A Corrosion School was held in July.
- A conference on 'Concrete in Aggressive Environments' was held with the CSIR and the Concrete Society of South Africa in October, attended by approximately 200 delegates.
- A Silver Medal was awarded to

Mr. P. Nardini for his paper on 'Corrosion implications of the Apollo Project'.

- Mr. H.W. Ahrens is elected Honorary Life Member for his work in drawing up a constitution for the Institute.

1979

- The Corrosion Exhibition is held at Milner Park Showgrounds and attracts over 9 000 visitors.
- A successful two day corrosion school is held at Wits University in July on the subject of Protective Coatings.

1980

- The third South African Corrosion Conference is held at the CSIR Conference Centre in March, with more than 200 attendees and 11 overseas speakers.
- Honorary Life Membership conferred on Mr. T.G. Edwards.
- Silver Medals are awarded to Mr. T.G. Edwards; Professor G.C. Wood (Professor of Corrosion Science at the University of Manchester for his joint paper with C.E. Alvey on 'The mechanical properties of porous anodic oxide films on aluminium'); and Dr. B.G. Callaghan (from the National Building Research Institute of the CSIR for his paper 'The corrosion of architectural and structural metals and metal coatings in South Africa').
- Second Gold Medal (the Institutes highest award) to be awarded (the first was in 1972) goes to Mr. M.A.A. Brett. Motivation for this award was Michael's lifelong service to the corrosion industry, starting with supervising corrosion coatings on the mines, studying various corrosion protection technologies in the UK. Launched own contracting and sand blasting service company. Sold company to Hume Pipe Ltd and formed corrosion division within this company, ending up as MD and board member of Hume Monoweld Corrosion Protection Ltd and Monoweld Galvanizers (PrtY) Ltd. Left Hume Group to establish private consultancy. Involvement in the Corrosion Institute included Vice Chairman, Chairman, Vice President and President from 1970 to 1980. Michael is also a Fellow of the Institute of Corrosion Science and Technology in the UK and has written 20 papers most of which have been published.
- It was suggested that few others have served more diligently and with greater effect, the interests of South African Industry in the specialised field of corrosion protection.

Bob Andrew; Walter Barnett; (two unidentified guests); David Haywood; Malcolm Voules and Alan Lyall.

Recipients of Gold Medals

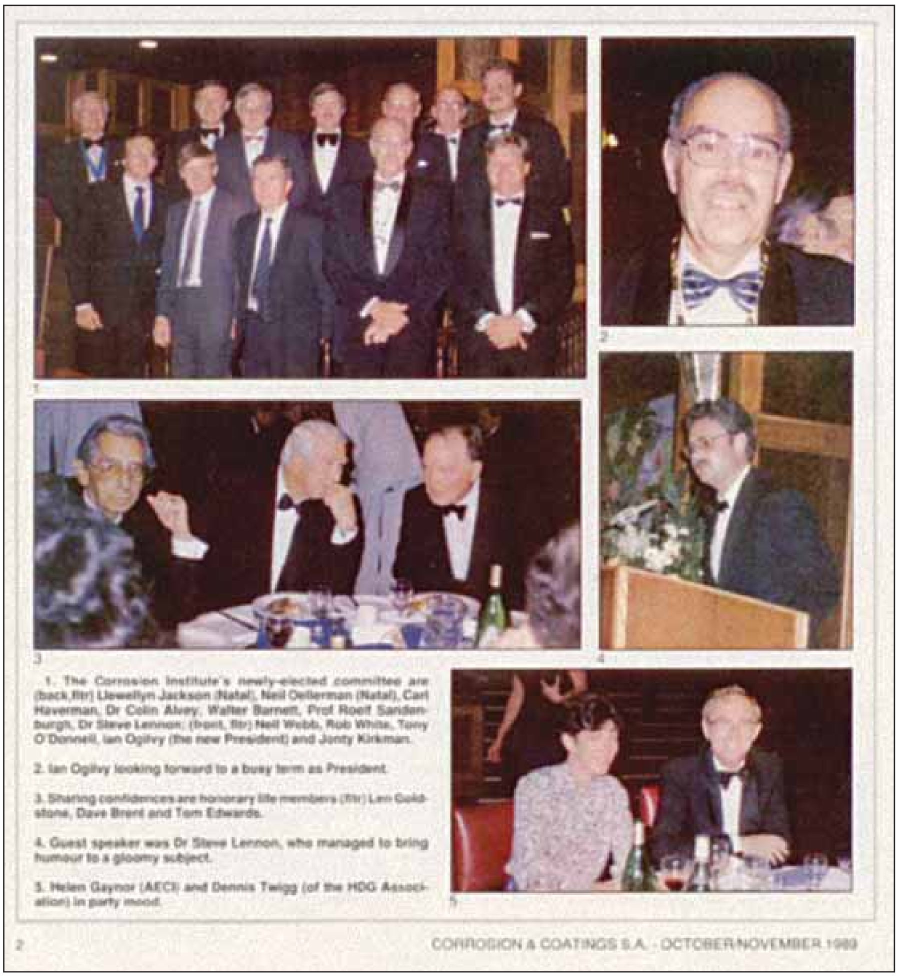
- ☐ Awarded to Prof F.P.A. Robinson on 3 August 1972 for his long and untiring service to the Council, and the extremely important role he has played in furthering the cause of the Council and corrosion science in general. He was the first Chairman of the Council, and was twice Chairman thereafter — a total period of eight years.
- ☐ Awarded to Mr M.A.A. Brett on 7 August 1980 for his valuable service to the Council over a long period. He was twice Vice-chairman and twice Chairman on the Corrosion Council, and twice Vice-president and twice President of the Corrosion Institute.

Silver Medals

- ☐ Messrs L.H. James, R.G. Marks and H.E. Filter as the joint authors of a paper entitled 'Developments in cathodic protection' delivered at a Corrosion Council technical meeting on 2 November 1972.
- ☐ Messrs M.A.A. Brett and W.G.S. Barnett for their paper 'Development in the use of hot-dip galvanised steel and duplex coatings in the SA gold mining industry' delivered at the Swaziland Conference on Zinc Coatings in March 1976.
- ☐ Mr J. van Heerden for his paper 'Consignment inspection and quality control in the South African galvanising industry' delivered at the Swaziland Conference on Zinc Coatings in March 1976.
- ☐ Mr P. Nardini for his paper on 'Corrosion implications of the Apollo project', delivered at a Corrosion Institute technical meeting on 5 August 1976.
- ☐ Mr H.W. Ahrens for his paper 'Plastics in corrosion control', delivered at a Corrosion Institute technical meeting in November 1978.
- ☐ Prof F.P.A. Robinson for his Inaugural Lecture 'Stainless steel — the miracle alloy', 5 April 1979.
- ☐ Prof G.C. Wood (University of Manchester) for his paper 'The role of flaws in the initiation of pitting of aluminium and crevice corrosion of stainless steel', delivered at the Third South African Corrosion Conference in Pretoria, 17 — 19 March 1980.
- ☐ Dr B.G. Callaghan for his paper 'Corrosion of architectural and structural metals and metal coatings in South Africa', delivered at the Third South African Corrosion Conference in Pretoria, 17 — 19 March 1980.
- ☐ Mr T.G. Edwards for his paper 'Choosing protective systems for particular environments', delivered to the Corrosion Institute on 5 June 1980.

In all, thus, two gold medals and 12 silver medals have been awarded.

Recipients of Gold and Silver Medals up to August 1980.



Some of the members and their guests at the 1989 annual Corrosion Institute Dinner in Johannesburg.

What designers and fabricators need to do to achieve a quality corrosion control system

Spencer Erling, Education Director, SAISC.

Background

The starting point for all coating systems is to clearly define what duty the system must perform (paint or for that matter hot dip galvanizing or any other system) which by and large include:

- Corrosion protection
- Architectural finish (decorative), or
- A combination architectural/ corrosion protection.

When it comes to architectural/ decorative finishes, it is, I would like to believe, commonly accepted that hot dip galvanizing is a very cost effective corrosion protection system for the right applications and in more recent years has become, along with paint, the coatings of choice for architectural decorative finish to steel structures.

The importance of this definition becomes obvious once one considers (at the risk of upsetting paint manufacturers and suppliers) that in an enclosed project in Gauteng, one could get away with no paint or maybe a one coat paint or coating system. I know of several 50 year old partially open to the weather factories where 99% of original zinc chromate primer on a poorly wire brushed system is still in remarkably good condition.

Specifications

Having made up our mind what the purpose of our coating system is, it becomes necessary to specify the system using technically correct language, which should reference SABS (or other international) specifications, codes of practise and or paint manufacturer's data sheets.

Sadly many specifiers do not compile a performance specification using national reference standards such as SANS 1200HC, which still is based on sound reasoning. However, SABS have adopted ISO 12944, now as SANS 12944, which is a far more comprehensive standard on which to base their specific project performance specification. *See next issue for the scope of all eight sections.*

I therefore suggest that one has three choices on which to compile a performance specification:

1. Follow the guidelines of SANS 1200 HC and/or SANS/ISO 12944.
2. Approach a "friendly" paint manufacturer and
3. Make use of a reputable corrosion consultant.

To this end we usually approach either our friendly paint manufacturer or a corrosion consultant for their advice as to what system to use for what environments. The paint manufacturer recovers the cost of this consultation in the selling price of his paint. This could lead to the temptation to over specify systems with a view to profit for the company. On the other hand a corrosion consultant will charge for his advice.

When it comes to seeking advice about what steps to take when applying the paint system to ensure a good quality end product, both SANS 1200 HC and SANS 12944 are useful standards. These documents are full of useful "do's and don'ts" such as not painting in humid conditions, very cold weather or for that matter on very hot steel and so on.

After that we need to rely on the paint manufacturer's instructions to get a good quality coating. If asked to do so the manufacturers will do a quality overview of the application and will also provide guarantees for the life of the system.

Make sure any offered guarantee is specific to the needs of what the project team requires, eg. failure of entire coating system to a specific RI condition? Many times the client says he has a guarantee but does not know what is guaranteed? (Also get a guarantee for the colour not breaking down due to UV exposure)

Preparation for the system, preparation and more preparation

Those were very wise words my first boss after graduation taught me about corrosion protection. The success of the system will always be totally dependent upon how well the preparation of the steel surface has been

Photo 1.

Photo 2.

Photo 3.

done. By preparation we could include the following separated into those falling under the planning stage and those during the fabrication process.

1. **Plan the steelwork at design and detailing stage to suit the chosen process.**

a. Before a draughtsman puts finger to "the proverbial key board" to commence the production of structural steel detail drawings he needs to understand:

i. *Is this an architectural finish project where "spit and polish" and high quality finishes are required?*

ii. *What corrosion protection or decorative system has been chosen for the project?*

iii. *Will the steelwork be accessible for future maintenance work if necessary? If not, then a more comprehensive specification may be necessary.*

iv. *Other specified requirements.*

b. Is continuous welding (all be it seal welds in some cases) a corrosion protection requirement, or conversely should welding be kept to an absolute minimum to prevent possible distortion which could impact on the finished product? Always remember the 6 metre rule, if a part of structure is 6 metres or more away from any seeing eye then that eye will not pick up imperfections in the finish, so it is not necessary to go crazy with the "spit and polish routine"

c. If a paint system is chosen for corrosion protection, one would try to avoid welded double angle construction with a small gap between the heels of the angles because it is impossible to paint properly between these angles. This could be solved by using bolted construction and doing the full paint system before doubling up the angles or by using a "Tee" bar profile to emulate the double angles. The latter is obviously preferable when future coating maintenance is required?

d. This form of construction with hot dip galvanizing can present a similar problem. Providing there is at least a 2mm gap between the two surfaces, cleaning and subsequent galvanizing will not present any problems, however, with smaller than 2mm gaps (not recommended), sealing with molten zinc may not necessarily occur and the crevice may lead to weeping of acid salts (from the previous cleaning processes) from the crevices following water quenching and cooling. Weeping of acid salts can be cleaned and if necessary after cleaning, sealed by some sealant or product such as "Galvpatch or Zincfix" recommended by HDGASA.

e. Specifically for architectural finish hot dip galvanized steelwork requires some additional up front planning

i. *It is important to ensure that the steel ordered for this purpose falls into an ideal range of so called silicon killed steel. Certain alloying elements found in steel, in particular Silicon and Phosphorus, depending on their percentage presence can lead to very thick coatings when hot dip galvanized. In theory from a corrosion point of view, thick coatings will have a proportionally longer life, but in practise these thick coatings can damage easily (which for technical reasons is not detrimental to the life of the system) but more importantly from a decorative point*

continued on page 18

Photo 4.

Photo 5.

of view these thick coatings also do not oxidise their surfaces into that delightful patina (spangle finish) that architects so love. The Hot Dip Galvanizers Association of SA (HDGASA) have good advice available in this regard.

ii. *In the galvanizing process, steel components get dipped into various solutions as well as molten zinc. It is important not to have any enclosures in the steel component where air can be trapped preventing the liquids from doing their intended work or to trap molten zinc on withdrawal. To prevent this it becomes necessary to add suitable "drain/ breather holes" into corners where such air entrapment can occur. This should be done by showing holes on steel detailed drawings. Once again HDGASA has good information on the subject.*

iii. *If in doubt ask you friendly galvanizer or HDGASA to come around and advise you!*

2. During the fabrication process

a. Cutting those breather/ drain holes

i. *It is preferable to drill these holes, and 3D detailing packages talking directly to NC controlled drilling machines will insert holes into their exact position. See photo 1*

ii. *With the advent of oxy-fuel and plasma plate centres, it is now possible to cut part holes to an inordinately high standard. See photo 2*

iii. *Oxy fuel hand cut holes should be avoided at all costs. They are usually poorly done and are unsightly as example photo 3, taken at the high profile Eden project in England indicates. These hand cut holes are perfectly placed at eye level for all to see, what a shame! Photo 4 shows an inappropriate air pocket leading to an uncoated area and photo 5 solidified zinc traps as a result of inadequate or non-existent coping holes or snipes.*

b. Removal of sharp edges and corners

i. *We know that neither paint not molten zinc will stick to sharp edges*

ii. *This process falls under the generic name of fettling which the Oxford dictionary defines (amongst other definitions) as to "make ready, put in order, to scour"*

iii. *The Oxford dictionary defines scour (amongst many others) as cleanse or polish by hard rubbing.*

iv. *In our workshop we commonly use the term grinding to describe how we remove the sharp edges and corners.*

v. *Do not forget to remove sharp edges or burrs for safety reasons. Photo 6 clearly covers all of these points.*

c. Remove substances that will be harmful to the process that follows:

i. *Paint and wax will prevent molten zinc from reacting / alloying with the surface of the steel in those areas.*

ii. *Removal of oil based paint marks will have to be removed for hot dip protection.*

iii. *Boilermakers yellow wax crayons should never be used on steelwork intended to be hot dip galvanized, grinding just spreads the wax over a greater area.*

iv. *Hydrocarbons (oils and grease) and other dirt are usually chemically removed by dipping in the case of the hot dip process into caustic and acid solutions, or by using water based grease removers for painting systems (shot or sand blasting will only spread the hydrocarbons over a greater area with sometimes disastrous results with paint not adhering to these areas).*

v. *Welding spatter and slag fall under this subject usually removed mechanically.*

d. The glaze like silicon slag layer from Mig/Mag welding process also needs to be mechanically removed (using a needle scabbler machine) *Photo 7 refers.*

e. Prepare the surface to receive the system

i. *This will always include remove mill scale and rust which process can be done by wire brushing, sand or shot blasting and or acid dipping*

ii. *Paints that are suitable for corrosion protection do not stick to smooth surfaces, so mechanical wire brushing which tends to polish the steel is not great for preparation for corrosion protection systems.*

iii. *Sand / shot blasting does roughen the surface, we are looking for a profile of between 40 and 80 microns to get a good paint adhesion.*

iv. *Fortunately shot/ sand blasting is well specified in internationally accepted specifications. Swedish specification SIS05 59 00-1967 "Pictorial surface preparation standards for painting steel surfaces" was the original document in this regard. An updated version has been released in the form of ISO 8501-1:2007. These documents have a series of full colour pictures that show what the various defined levels of cleanliness of the steel after preparation will look like based on the degree of surface rust before the cleaning process begins. ST specifications cover wire brushing, SA specifications cover sand/ shot blasting.*

v. *These documents do not touch on surface roughness requirements. (The guidelines for the profile requirements comes from the paint manufacturers). Refer to ISO8503 which covers "Surface roughness characteristics of blast cleaned substrates"*

f. Quality assurance requirements.

i. *There are a few simple steps that if followed could implement a quality assurance program for painted surfaces*

ii. *As the SAISC always does, we recommend that the contractor set up a quality control plan (QCP) which covers every step in the preparation, cleaning and painting process based on:*

1. *Engineers/ architects specifications*
2. *Do's and don'ts from SANS 1200HC and SANS/ISO 12944.*
3. *Paint manufacturers recommendations*


Photo 6.


Photo 7.

4. *Blast/wire brush requirements*
5. *Record measurements taken at relatively close centres on each piece of steel being treated such as visual inspection for removal of hydrocarbons etc, surface roughness, visual inspection of grade of cleanliness (arguments in this regard can be settled by making sample pieces before work commences of what is agreed to be (say) SA2.5, one kept by the applicator, one kept by the inspector), wet film and dry film thicknesses, etc.*
6. *Overview records of temperature and humidity read (say hourly)*

Conclusion

There is no doubt that whatever corrosion protection system you choose to use, good preparation is basic to a long lasting life of the system.

This means attention to detail at every stage from detailed drawings, through cutting shaping and holing the steel right through to welding and final fabrication inspection, followed by hot dip galvanizing and/or painting with intermediate and/or final inspection.

By just taking a short cut bypassing any one of the preparation steps, your selected corrosion control systems could end up fatally flawed.

Editor's note:

Spencer says he knows of several steel structures exposed to a mild environment where a zinc chromate paint (on its own) has survived 50 years. Sadly there are no photos but if possible, we hope to visit the site sometime in the future.

Essentials for appropriate substrate preparation

Blastrite research concludes that essential gains can be made by properly optimising equipment and choosing the correct sized abrasive.

Highlights

- *Blast pressure has the biggest influence on production speed and surface profile.*
- *Abrasive media sizes have the second biggest influence on production speed and surface profile.*
- *The perception that production speed of a blast nozzle held closer to the surface is greater than a blast nozzle held further away is incorrect.*
- *Surface profile and production speed change according to nozzle standoff.*

Blastrite, South Africa's market leader in abrasives and surface preparation equipment, conducted an extensive research programme to determine the factors that affect both the speed at which a specified cleanliness standard and surface profile can be achieved during conventional sandblasting or abrasive blasting. The objective being to determine the key factors which will influence both surface cleanliness and profile.

André Huysamen, Chief Executive of Blastrite said: "We embarked on this research programme in response to customers seeking advice and, in some cases, expressing their dissatisfaction at results achieved."

The questions received by the Blastrite team are not uncommon. These related more specifically to the grades and media types which should be used to achieve a specific cleanliness standard and production speed. Blastrite established that the key lay with customers understanding the differences between surface cleanliness standards, the surface profile requirement during surface preparation, and that production speed relates to the number of square meters that are abrasive blasted to a specific cleanliness standard at the required profile level in an hour.

The research highlighted that adopting the familiar 'rule of thumb' approach could be potentially problematic. The 'rule of thumb' approach states that the required surface profile is controlled by the type of media and its size range. Therefore, after the required surface profile is matched to the correct type and size of abrasive media, the operator is required to focus only on the cleanliness standard generated during abrasive blasting.

Huysamen explains that the above, regrettably, rarely generates the desired outcome. During the process the customer often realises that the surface profile being achieved is either above or below the required standard. It is during this stage that the contractor points to the abrasive media supplier claiming that the product is not adhering to specification.

The test bench developed and manufactured by Blastrite.

When Blastrite initially embarked on the research programme there were inconsistent results. Realising that the human factor had to be eliminated, Blastrite developed an abrasive blasting test bench. The completed test bench (depicted below) provided Blastrite with the capability to adjust input parameters during testing:

- Traverse speed (the speed the blast nozzle travels across the plate);
- Standoff distance (the distance between the blast nozzle and plate);
- The angle of the blast nozzle in relation to the plate;
- Nozzle orifice size;
- Compressed air pressure at the blast nozzle;
- Abrasive type;
- Abrasive size range; and
- Abrasive feeding rate (mixture density or mass flow rate).

Through various configurations it was found that all the above parameters influence surface profile, cleanliness and production speed. The most critical of these parameters are discussed below[1].

Blast pressure

Research has shown that customers commonly abrasive blast at nozzle pressures between 4 bar and 6 bar. This is contrary to the 7 bar benchmark guideline published by many equipment and media manufacturers.

Blastrite's tests confirmed the recommended 7 bar blast pressure setting and, depending on the abrasive media type, optimum production speeds were achieved between 7 bar and 8 bar blast pressure.

Testing Platinum Grit B90 optimised at 7 bar, removed mill scale to a SA3 cleanliness standard at 3 minutes a square meter or 20m^2/hour. At 6 bar, production speed reduced by 23%, and at 4 bar production speed was 49% less than the 7 bar setting.

In other words: an operator blasting at 6 bar would take 1.6 minutes longer to abrasive blast 1m^2 to SA3 compared to an operator blasting at 7 bar, and an operator blasting at 4 bar would take 6.8 minutes longer to blast 1m^2 the latter achieving only 8.8m^2/hour.

It is important to note, although Blastrite's research programme confirmed 7 bar as the optimal abrasive blast setting, that it has published its commercial data based on test results obtained at 6 bar. This was done to align published data with most operators' real life abrasive blasting system setup utilizing a 7 bar compressor. On average 1 bar blast pressure is lost due to improper abrasive blasting setup and equipment configuration.

The blast tests also highlighted the effect of air pressure on surface profile. When Blastrite tested different grades of Platinum Grit at different blast pressures it achieved varying surface profiles at a SA3 cleanliness standard. Platinum Grit B90, the most popular grade, achieved a 49 microns profile at 4 bar blast pressure which increased to as high as 116 micron profile at 7 bar (130% variation).

Blastrite established that, although higher blast pressures will increase the blasting speed and surface profile, there is a limit in terms of gains. Moreover if, blast pressure is increased beyond 8 bar, production speed and surface profile will start to decrease.

To verify this Blastrite tested the production speed of Platinum Grit B90 at pressures ranging from 6 bar to 9 bar. It was determined that production speed at 9 bar was almost 22% lower than the production speed measured at 7 bar. This is because that all friable abrasives have internal fracture zones. Increasing the impact force, as influenced by blast pressure, causes the abrasive particle to fail amongst progressively more of these internal flaws and eventually shatter into a powder-like substance at extreme pressures.

Consequently, establishing the optimum pressure setting will achieve the best balance between production speed and surface profile.

Sieve size of media

The old saying 'fine is fast' suggests that a finer abrasive blast media will be faster in removing surface contamination. But how much faster is a finer media. The answer: twice as fast, using only half abrasive media.

Blastrite tested all the commercial grades of Platinum Grit B40 to B125 and found that B40 outperformed all the other grades: B40 removed mill scale to a SA3 surface cleanliness at a rate of 25.2m^2/hour; B60 achieved 21.6m^2/hour (14.3% slower); B90 achieved 18.9m^2/hour (25% slower); and B125 achieved 12.9m^2/hour (48.8% slower).

During these tests, abrasive media consumption was also monitored a 11.8kg of Platinum Grit B40 was used to abrasive blast one square meter to SA3 compared to Platinum Grit B125 which required 25.8kg (119% increase) abrasive media to blast 1m^2 to the same standard.

continued on page 22

Surface Cleanliness vs Surface Profile

As blasting abrasive suppliers, Blastrite is often on the receiving end of the dreaded question: *"What grit do we need to blast to a SA2.5 profile?"*

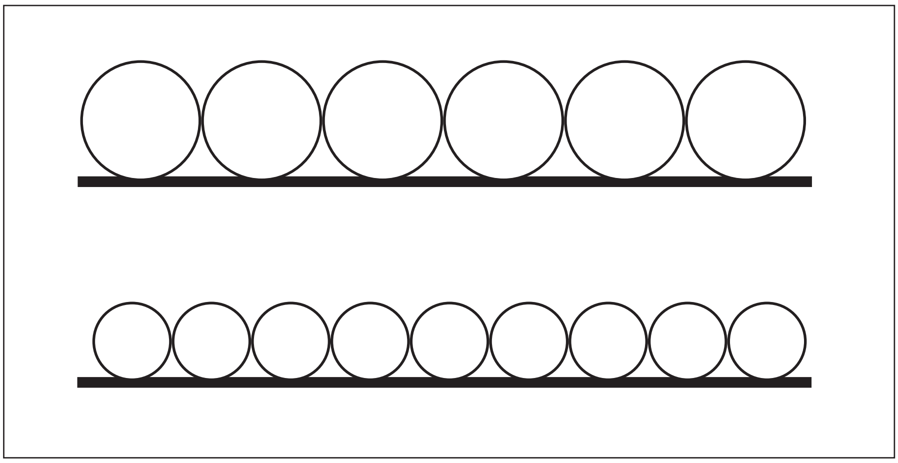
Finding ways to answer this question over the years has been challenging as the differences between profile and cleanliness is simply not always understood by individuals operating in the industry.

Surface cleanliness, i.e. the SA1, SA2, SA2½ and SA3 standards are Cleanliness Standards, which are determined by using high resolution pictures to determine the visual cleanliness of the steel. The SA Standards as we know them are by ISO. The other standards bodies, jointly NACE and SSPC also have cleanliness standards.

Profile, on the other hand is a measurable condition of the steel before and after blasting. It is the roughness of the steel and the average peak to valley height achieved during blasting. This is usually measured by Method A – the Surface Comparator, Method B – the digital profile gauge, or Method C – the Testex Method.

Broadly speaking, just about any abrasive blast media can achieve the specified cleanliness. The factors to take into consideration when choosing the abrasive is the depth of profile that is specified or required and the type of substrate, i.e. ferrous or non-ferrous.

While the paint manufacturer generally specifies what surface profile is required according to the selected paint system, should there be no reference to profile, the rule of thumb is that it should not exceed 1/3 of the total DFT of the coating system.



The distribution of different size abrasive particles.

Blastrite concluded that abrasive media sizing had the second biggest influence on production speed and surface profile. This can be explained by drawing imaginary abrasive particles as circles next to one another, *(see above)*. Repeating the same exercise with smaller circles are drawn demonstrated that substantially more circles can fit into the same space. The latter would result in increased performance as more abrasive particles impact the substrate at any given time.

To understand the full impact of abrasive media particle size one also has to address abrasive metering or abrasive mass flow rate. Mass flow rate cannot be increased indefinitely and is governed by the internal diameter (orifice) of a blast nozzle. As the nozzle will eventually clog if the amount of abrasive to the nozzle is increased beyond a certain limit.

Research was done on a 10mm orifice venturi blast nozzle to determine the optimum mass flow rate for all grades of Platinum Grit. B125 abrasive flow to the nozzle was optimised at 5.56kg/min; B90 was optimised at 4.41kg/min; and B60 at 3.27kg/min.

The lower mass flow rate of B60 does not mean fewer particles impacted the surface per second compared to B125. By estimating the average particle diameter of each grade, calculating its volume and its mass based on Platinum Grit's specific weight, Blastrite was able to estimate how many particles impacted onto the surface per second.

Blastrite calculated that, on average 2 786 x B125 particles, 6 064 x B90 particles, and 15 200 x B60 particles impact the surface per second during an abrasive blasting process at these flow rates.

Based on this exercise, it is clear that productivity is related to the number of particles that impact the surface at any given time and this is reflected in the blasting figures previously mentioned where B60 achieved 21.6m^2/hour and B125 only 12.9m^2/hour.

Standoff distance

During sandblasting it is common practise for an operator to very nearly touch the work piece with the blast nozzle. The perception blasting will be more effective when a blast nozzle is held closer to the surface is incorrect. There is a misconception that abrasive particles and compressed air exit a blast nozzle at the same speed. Research done in 1993 by Dr. R Uferer[2] proved that the average exit speed of abrasive particles is three times slower than the exit speed of compressed air. Due to this exiting compressed air further accelerate abrasive particles outside the blast nozzle. Therefore the cleaning area of a venturi nozzle, set up at 7 bar blast pressure, increases by as much as 50% for every 100mm it is moved away from the surface.

Research in 1969 by Remmelts[3] and the SSPC[4], confirm that the optimal stand-off distance for a 7 bar blast nozzle is above 400mm.

However, what Blastrite did not expect to find was that surface profile at a standoff distances of 300mm was lower than that measured at 400mm. The surface profiles created by the common grades of Platinum Grit B60 and B90 were 18% higher at a standoff distance of 400mm compared to 300mm. B125 was only 6% higher at 400mm. The exception to the rule was B40 where surface profile decreased by 42% when measured at 400mm standoff distance. This grade performed at optimum when the nozzle was held 300mm from the surface.

Nozzle traverse speed

During the test process Blastrite determined that both production speed and surface profile changed according to nozzle traverse speed. Research showed that an optimised blast nozzle using Platinum Grit B60 traversing across a plate at 50mm/sec produced a surface profile 18% lower than the same set-up traversing across the plate at 150mm/sec. When the traverse speed was further increased from 150mm/sec to 200mm/sec the profile decreased by 7%, suggesting that surface profile can also be manipulated by the speed at which the operator is blasting.

Conclusion

In 1992 Dr. R Uferer[5] of the University of Karlsruhe calculated that abrasive blasting using compressed air as an accelerator for abrasive media is very inefficient. He found that the efficiency of the process was only about 5%. This means is that at a 100% efficiency setup only 5kW of a 100kW compressor is available for surface cleaning.

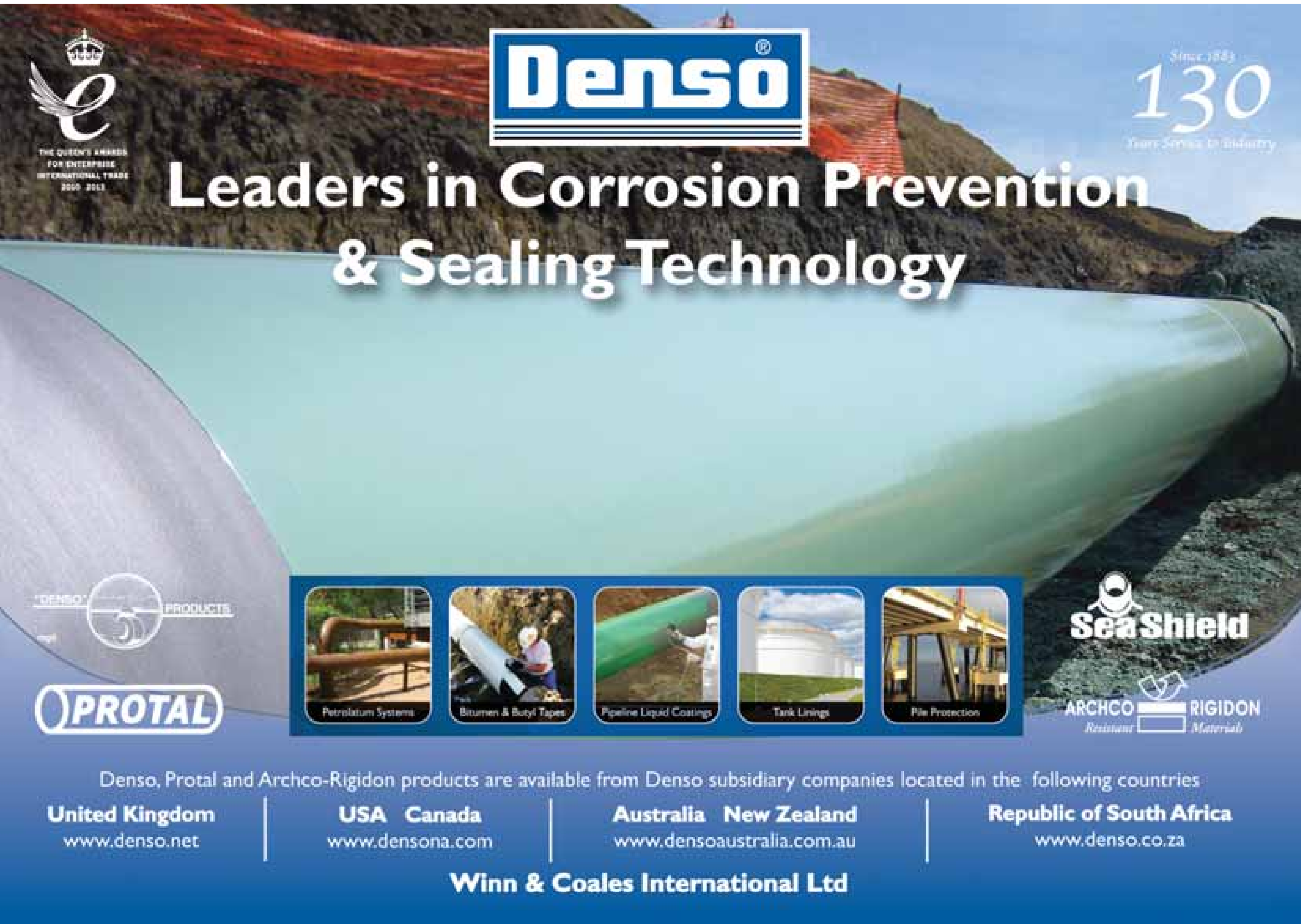
"At this low energy yield it is vital that contractors understand all the parameters that influence their day to day production performance and appreciate that essential gains can be made by choosing the correct abrasive size and optimizing their equipment. Equally substantial losses can be incurred if a blind eye is turned to the process," concludes Huysamen.

References:

1. *All tests were conducted on new steel plates with intact mill scale.*
2. *R. Uferer: Optimales Druckluftstrahlen unter variable Bedingungen, 1993*
3. *J. Remmelts: Optimum Conditions for Blast Cleaning Steel Plate, 1969*
4. *Surface Preparation Commentary for Metal Substrates, March 2015, §7.3.7*
5. *R. Uferer: Optimales Strahlen unter variablen Bedingungen, 1992*

André Huysamen, Chief Executive of Blastrite

THE INSTITUTE WOULD LIKE TO ACKNOWLEDGE THE ADVERTISERS AND THANK THEM FOR THEIR SUPPORT



Why motor car bodies no longer rust

When owning a car in the seventies and eighties particularly if one lived along the South African coast, some years after purchasing the vehicle the body work would start to discolour and eventually rust. This would occur mostly along the edges of the windows, at the bottom of the doors, the sills under the doors and on the bonnet arising from stone chipping while driving.

While I guess many complained about it to their car dealers and thought no one was taking any notice, the Japanese and Korean car manufacturers in the late eighties and nineties who were looking to get a market share, listened and began their introduction to the market by offering 6-year corrosion warranty on their cars.

North American-made vehicles were having "real rust problems" that couldn't be fought merely with heavier, and more expensive, paint. By the mid-1980's, one really had to galvanize the whole car if you wanted to issue warranties

The beginning of GAP

In 1999 the North American car manufacturers and their steel industry suppliers under the aegis of the International Zinc Association (IZA) in Durham, North Carolina formed the Galvanized Autobody Partnership (GAP), under the leadership of Frank Goodwin, director of technology and market development for the IZA.

The goals of GAP included a cooperative program between steel and zinc producers, which according to Goodwin were to advance and defend zinc-coated advanced high-strength steels. Zinc in one form or another had been used to protect steel used in automobiles since the 1970's but corrosion resistance was never a feature until the Japanese cars gained entrance to the U.S. market in the early 1980's

One of the changes that had to be brought about was the replacement of zincrometal (an organic coating that was developed in the early 1970's) by a genuine zinc metallic coating that could offer both sacrificial and barrier protection to automotive body steels.

By 1987, what became standard was a 10-year perforation and five-year cosmetic warranty from all the North American, European and Japanese automakers for vehicles sold in the North American market.

That really put the burden on the steelmakers to ask, how were they going to galvanize steels with the high surface quality, together with forming and welding properties required to make a car?

Recognizing that the hot dip sheet lines of the day could not achieve these capabilities , Goodwin says, the only option was to use a continuous electrogalvanized (zinc electroplated) steel substrate, and this approach was embraced by steelmakers in Europe, Japan and North America.

The development of electrogalvanized (EG) coatings was exceptionally prolific. New coatings were introduced to the automotive industry at an impressive rate, each designed to be better than the previous generation of

coatings. The number of new electroplated coating developments was impressive, possibly numbering close to several dozen coatings at the height of the development phase. Over time, most of these were slowly rationalized out of the system until in 1993, Toyota Motor Corporation reported that in Japan commercial quantities of coated steels had been reduced to 6 grades.

This lead to large-volume zinc electroplating lines being built where they processed 20 million tons of steel per year through the early 1990's.

However, the industry found this process expensive because of the amount of electricity required and because the speed of the lines was constrained. At the time, however, EG was the only process approved for automotive quality.

GAP had begun working on various development projects by then. "Everyone saw the Holy Grail was to hot dip galvanize automotive steels. It was already done for building panels and appliances. Getting

continued on page 26

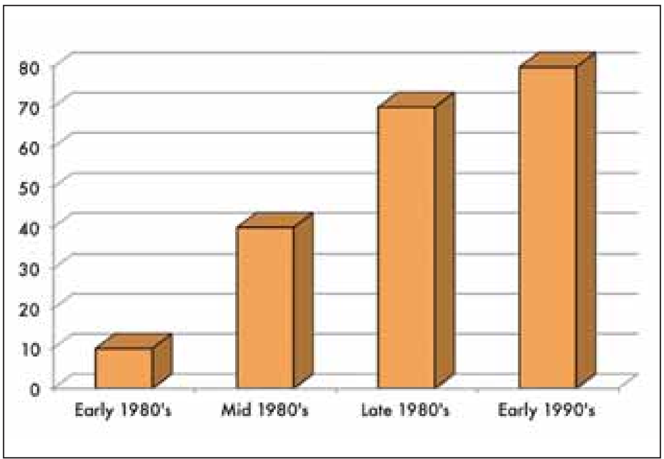


Figure 1: Approximate porportion of coated steel usage in North America.

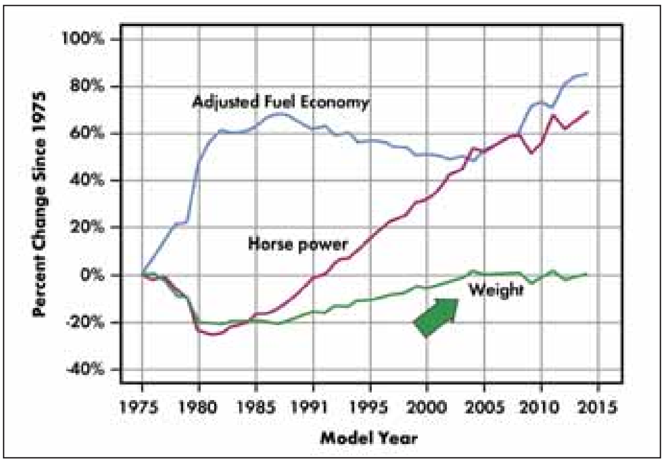


Figure 2: Trends in N.A. light vehicle adjusted Fuel Economy by Model Year, also showing increases since 1980 of 20 percent for gross vehicle weight and 85 percent for horsepower (Ref. 3, U. S. EPA 2014 report).

that to be automotive quality was the key," says Goodwin, and that happened by the mid-1990's.

At about the same time, hot dip coated free zinc and the zinc/iron alloy Galvanneal was being developed for the automotive industry. Free zinc hot dip was largely intended for unexposed structural applications while Galvanneal had the ability to be used for unexposed applications as well as meeting exterior surface finish requirements more easily than hot dip free zinc. Galvanneal is essentially in-line galvanizing followed by strip annealing to provide for a fine matte finish which is easily welded and suitable for high quality paint over-coating.

Collectively, these two coatings are today the most commonly found sacrificial coatings in use by the global automotive industry.

From the early 1980's until the mid-1990's, automotive manufacturers around the world were steadily increasing the amount of coated steels on their vehicles in order to improve corrosion resistance performance.

The percentage of coated steel usage was steadily rising and had increased to over 80% by the mid 1990's from a low of approximately 10% in the early 1980's. The approximate percentage of coated steel usage in North America is shown in *figure 1*.

Galvanized steel sheet production grew rapidly between 2005 and 2014, with only a slight dip in 2009 due to the global economic crisis, notching up an average global growth rate of 5% annually, analysts estimate. While there is no definitive production figure, sources point to a fairly strong upwards trend, with the industry driven by the construction sector, which takes 80% of output, and by the automotive sector, which takes 20%.

Andrew Thomas, a principal zinc analyst at Wood MacKenzie in the USA notes that currently 80-90% of the metal used in cars in North America and Europe is galvanized, compared to just 30% in China, a level expected to grow.

IZA's Frank Goodwin notes that in Europe, North America, Japan and Korea significantly higher quantities of galvanized sheet have been used over the last ten years to protect automobiles from corrosion. In North America, Japan and Korea over half of all galvanized sheet production is destined for the automotive market, whereas in other countries the construction industry consumes a larger share, he says.

In the North American car industry specifically, Goodwin sees that due to the Advanced High Strength Steel and Ultra High Strength Steel initiatives for vehicle lightweighting, autobodies will be composed 70% of galvanized steel sheets by 2025, up from 60% currently.

While eyes are on the growth in aluminium usage in vehicle manufacture, which may enhance lightweighting for instance in the Audi A8 and recently-launched Ford F-150 aluminum truck *(photo on page 24)*, the question of vehicle repair may not have been fully addressed. Dale Nevison, executive director of the US-based Galvanizers' Association says, steel is the least expensive corrosion protection available and easier to repair than aluminium.

Fuel economy push

Once GAP participants realized that the Holy Grail was to hot dip galvanize automotive steels, they sought to keep pace with the demands of increasing fuel economy standards, which "began ramping up to the goals we have now: The metric is 54.5 mpg (23km/lit) by 2025 in the United States," while the European Union has similar goals using different measures. Automakers selling into the EU must reduce emissions from 160 grams of carbon dioxide per kilometre to 95 grams by 2020 *(figure 2)*.

The primary concern was, and is, "how to galvanize all these new steels, performing pre-treatments, for example, before dipping. You have to use a very smooth substrate," steels with high yield strength and tensile properties. They must be as strong as the old steels but thinner and feature pristine, coatable surfaces.

As new generations of steels have been developed and commercialized, GAP members have "been able to figure out processes that answer the technical questions. Everybody works together on it," Goodwin says.

The third generation of steel sheet for which GAP is working to develop the right coating process has a yield stress of 1,270 MPa, a tensile stress of 1,420 MPa, a uniform elongation of 9.3 percent and a total elongation of 17 percent.

The material is getting down to 0.5 millimetre thick from 0.9 to 1.0 millimetre today, "and you actually have to be able to galvanize it at high production volumes," says Goodwin.

Further development

The successful results of the IZA GAP have led to its sixth three-year program cycle, addressing advancement in continuous galvanizing processing and improved zinc-based coated product performance required to ensure that new automotive steels can be galvanized and are the material of choice for body-in-white applications. Since 1999, a total of 65 steel, zinc and other global companies have sponsored in excess of $20 million in galvanized automotive steel research. Each three-year cycle has provided about $1.6 million, plus matching funds. Highlights from the current twelve development programs, include the work on 3G steels, zinc based coated HPF steels, hydrogen solubility effects, internal/external oxidation of Advanced High Strength Steels (AHSS), improving CGL coating wiping, and galvanizing bath management issues while processing higher Manganese steels.

continued on page 28

Some galvanized materials now offer corrosion resistance for 40 – 60 years, and research by some companies continues to find ever-more resistant options to help deal with problems that may be caused by extreme weather events and climate change.

Steelmaker Voestalpine has developed zinc magnesium hot dip galvanized steel strip and a "galvannealed" product which has both zinc and a ZnFe alloy coating. According to the company, the zinc magnesium coating has "the highest degree" of corrosion resistance and "no limitations" with respect to processing properties. "Especially in the automotive industry zinc magnesium has the potential to become the standard product over the next decade," the Austria-based company said in an emailed statement. "A zinc magnesium galvanized product could then be a similar niche product like an electrolytical galvanized product is today."

Acknowledgements

I would personally like to thank Frank Goodwin (USA) and Rob White (SA) both of International Zinc Association (IZA) for assisting me with this article.

North American Zinc-Based Sheet Steel Coatings Technology: Production and Product Performance Update and Challenges. *Frank E. GOODWIN, International Zinc Association and Eduardo A. SILVA, United States Steel Corporation.*

The Changing Use of Galvanized High Strength Steels: A Review of the Recent Past and a Look at the Near Future. *Curt D. Horvath, General Motors Corporation, USA.*

Platts Metal Insight *Volume 10 / Issue 11 / June 11, 2015*

Editor's note

So, most car bodies made from steel that offer an extended corrosion resistance warranty of in excess of 10 years have in effect a metallic zinc substrate over coated with a sophisticated series of organic coatings which is essentially a "Duplex Coating" offering its synergistic performance combination of the two individual coating systems!

The next and subsequent articles in this series will cover the latest organic coatings that are being used to supplement the metallic zinc coated substrate and how effectively they are applied to achieve the desired corrosion resistance warranty.

Corrosion in history

Corrosion in history

Interest in the corrosion problem has been increasing for many years. This has inspired investigators and writers to such an extent that it is now difficult to follow the voluminous technical literature relating to this subject and select that which is useful. The wastage of metals due to corrosion has become an important engineering problem. Probably no other source of waste, except that affecting human life, is of greater concern to all. Herbert Hoover the 31st president of the USA who was a mining engineer has well said:

"It is only through the elimination of waste and the increase in our national efficiency that we can hope to lower the cost of living, on the one hand, and raise our standards of living, on the other. The elimination of waste is a total asset. It has no liabilities".

An accurate estimate of the loss resulting from corrosion of iron and steel is, of course, out of the question. From certain data, however, which are at hand regarding the average annual renewal of corrugated metal roofing, wire, pipe lines, steel coal cars, and similar iron and steel products often subject to severe corrosion, it seems that, because of inadequate protection, the annual replacement from this cause, on the average, may reach as much as **2 per cent** of the total tonnage in use. It is estimated that about 1 200 000 000 long tons of rolled iron and steel products were in use in the world **in 1931.**

In recent years the steel produced was about eighteen times the total tonnage of all non-ferrous metals. On this basis, it is evident that a large and increasing proportion of the annual production may be required to replace that rendered unserviceable by corrosion. It is true that a large part of the corroded metal is recovered as scrap, but, on the other hand, in structures where the metal is not readily accessible the total cost incidental to replacement is often many times the cost of the new material required. Sometimes the reduction in sectional area and strength of structural iron and steel, due to corrosion, leads to serious weakening or failure.

Rust in history

To the great majority of people, corrosion means rust, an almost universal object of hatred. `Rust' is, of course, the name which has more recently been specifically reserved for the corrosion of iron, while `corrosion' is the destructive phenomenon which affects almost all metals. Although iron was not the first metal used by man, it has certainly been the most used, and must have been one of the first with which serious corrosion problems were obtained. It is not, therefore, surprising that the terms corrosion and rust are almost synonymous.

The great Roman philosopher, **Pliny, AD 23-79,** wrote at length about ***ferrum corrumpitur,*** or spoiled iron, for by his time the Roman Empire had been established as the world's foremost civilization, a distinction due partly to the extensive use of iron for weaponry and other artifacts.

To the fighters of old, rust was something of a mixed blessing. In the eleventh century, a Norman knight, **William de Lacey,** lost his way during a hunting expedition into the thickly wooded and swampy Vale of Ewas, in Wales. He came across the remains of **St David's** hermitage whereupon, overcome by an urge to mend his sinful ways, he decided to dedicate the remainder of his days to religious contemplation and rebuilding the chapel. Legend has it that he never for the rest of his life removed his armour.

One explanation for this strange behaviour was that it was a self-imposed penance. More likely, however, is that he was prevented from doing so because of corrosion brought about by the dank atmosphere of the valley. Corrosion of arms and armour has also been advantageous. The techniques of bluing and gilding were frequently used to protect steel objects, for, it was found that the application of a variety of heat treatments created highly protective films of oxide. These, with skill, could turn functional weaponry into beautiful works of art.

(Reference: www.corrosion-doctors.org)

Corrosion of continuous hot dip galvanized steel gutters in a desert

Photo 1: General view of the greenhouses erected in the desert.

During the time that I was at the Hot Dip Galvanizers Association Southern Africa, I got to undertake a number of interesting assignments and coating evaluations.

One of these was a trip to the Middle East, where a South African company had supplied a greenhouse structure to be erected in the desert *(photo 1)*.

The company had won the tender and as nothing extraordinary was specified by the client, supplied a standard greenhouse structure that would be quite acceptable for mild conditions in South Africa.

About three years after erection the client called to say the gutter in one particular greenhouse, which acts structurally to keep the roof plastic taut, had failed and in others the gutters were showing signs of severe corrosion.

Gutters

One particular gutter showed extensive corrosion *(photo 2)* and in one area, complete failure *(photo 3)*.

Photos 4, 5 and 6 show coating thickness readings of 34.5; 27.2 and 27.3µm respectively taken on the undersides (where no corrosion existed) of the failed gutters.

Photo 7 shows the inside of a gutter that was never used in the structure but lay in the yard and was subjected to the same conditions as those installed. Notice the corrosion of the hot dip galvanized coating on the inside of the gutter. The gutter was inverted *(photo 8)* to reveal the underside of the gutter which was not corroded at all. *Photo 9* shows a single residual coating thickness of the inverted gutter underside of about 39.4. *Table 1* shows coating thickness readings taken on the underside of the gutter.

The gutters are manufactured from a 1.6mm thick steel Z450 continuously hot dip galvanized sheeting, which according to ISO 4998 has an average coating mass of 450gms/m^2, equating to a nominal average coating thickness of 32µm an individual coating thickness of 28µm and a minimum of 22µm.

As can be seen from the coating thickness readings above, the gutter material

	One end	Opposite end
Mean	35.48	33.57
Minimum	21.3	23.4
Maximum	115	76.9
No. of readings	21	19

Table 1.

conforms to the requirements of Z450 in terms of ISO 4998.

Photo 10 shows loose products of corrosion taken from inside the gutters including zinc, ferrous oxide and wind borne silt. In the foreground is a rusted piece of gutter seen from the inside of the gutter.

Photo 11 shows the rusted piece of gutter in *photo 10*, turned over, with a residual coating thickness of 39.2µm.

Fans, louvres and their housings

Photo 12 shows a general view of the louvre in front of the exhaust fan *(photo 13)*, with the circle indicating where coating thickness measurements were taken, such as the side frame *(photo 14)* 18.1µm, the louvres 29.2 *(photo 15)* and 25.3µm *(photo 16)* and outer part of the sill of frame where the coating has been locally reduced to 1.1µm *(photo 17)* respectively. *Photo 18* shows products of corrosion are present on the lower inside sill of the fan housing.

The fan housing and louvres are manufactured from a 1.0 and 1.2mm thick steel Z200 continuously hot dip galvanized sheeting, which according to ISO 3575 has an average coating mass of 200gms/m^2, equating to a nominal average coating

continued on page 30

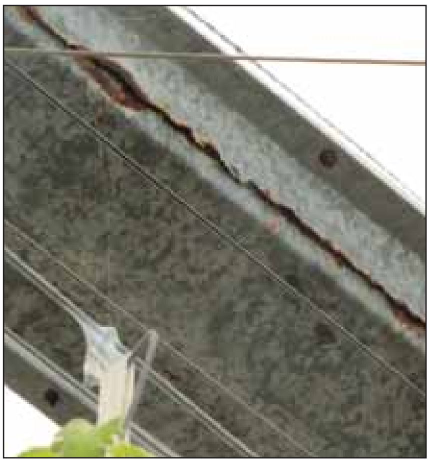


Photo 2.

Photo 3.

Photo 4.

Photo 5.

Photo 6.

Photo 7.

Photo 8.

Photo 9.

Photo 10.

Photo 11.

Photo 12.

Photo 13.

thickness of 14µm an individual coating thickness of 12µm and a minimum of 9.7µm.

As can be seen from the coating thickness readings above, the housing material conforms to Z200 of ISO 3575. Some isolated areas on the fan housing as well as the top part of the sill inside the fan housing has corroded considerably to a point where the continuous hot dip galvanized sheeting material has no longer any protective value. The fan itself is also manufactured from a 0.6mm thick – Z200 continuously hot dip galvanized sheeting.

Main frame and pipe columns

Photo 19 shows a general view of the inside of the greenhouse. *Photo 20* shows an isolated area where the continuous hot dip galvanized coated sheeting (making up the roof truss) has been compromised. *Photo 21* shows the residual coating thickness of 25.6 adjacent to the damaged area. The coating still conforms to a Z275 class of coating according to ISO 3575.

Photo 22 and 23 shows a salty residual stain on the column which when removed indicated a residual coating thickness of 67.3 and 80.9 respectively. For a 2mm thick steel the coating still conforms to the requirements of the general hot dip galvanizing standard ISO 1461, which for steel of between 1.5 and 3mm thick should have a local coating thickness of 45 and a mean of 55µm respectively.

Differential aeration or aggressive soils

While each of the columns in the greenhouse *(photo 24)* were embedded in concrete to try and prevent future differential aeration or necking corrosion the columns in the net house were not.

Corrosion of the hot dip galvanized column *(photo 25)* has advanced to a point where the coating below the sand has been compromised and the column will prematurely fail if the surface is not addressed.

Note too the vegetable supports in the net house which have been subsequently inverted *(photo 26)* following the premature corrosion of the hot dip galvanized coating.

Photo 27 shows the residual zinc electroplated coating thickness (21.0µm) at the truss haunch plate where the salts have been removed. Note the rusting zinc electroplated bolts.

continued on page 32

Photo 14.

Photo 15.

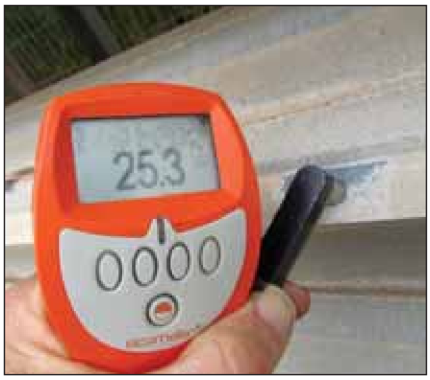


Photo 16.

Photo 17.

Photo 18.

In addition to the gutters failing, differential aeration on some of the columns and discolouration of the general fasteners are of concern.

Discussion points

Hot dip galvanizing

Hot dip galvanizing comes in various forms the two of which are important here are continuous hot dip galvanizing of sheeting and general or batch hot dip galvanizing. The former is done as a continuous process, where after the sheeting is coated it is mechanically wiped to produce a range of pure zinc coating classes such as Z 200, Z275 and Z450.

General hot dip galvanizing is the dipping of pre-cleaned components into molten zinc, resulting in a metallurgical reaction with the steel and the consequent coating comprises a series of iron zinc alloys.

While the life of a metallic zinc coating is proportional to its thickness the iron zinc alloys of a general hot dip galvanized coating provide a further 30% of corrosion resistance in comparison to a pure zinc layer.

Protection by hot dip galvanizing

Besides coating thickness the durability of a hot dip galvanized coating is dependent on the natural formation of a zinc carbonate film (matt grey patina). Should this layer not be able to form due to surface contaminants or permanent deposits, corrosion will continue unabated and durability will be severely reduced.

Fasteners and nursery irrigation supports

All nursery irrigation supports and fasteners used in both the nursery and greenhouse have been zinc electroplated. As discussed above the life of a metallic zinc coating is proportional to its thickness so consequentially a thin zinc electroplated coating will generally last about one tenth of an equivalent hot dip galvanized component.

Fans and fan housings

The durability of the continuous hot dip galvanized coating should be assessed but in the interim the components making up the fan and housing could be hot dip galvanized by one of the local galvanizers in the area. Should this be acceptable, one

Photo 19.

Photo 20.

Photo 21.

Photo 22.

Photo 23.

of the fan systems should be removed and cleaned of corrosion products and then sent for hot dip galvanizing.

Due to the thinness and corrosion of the sill immediately below the fan of this component the feasibility of this should be discussed with the galvanizer beforehand.

Coating repairs

Two localised areas on the one roof truss in the greenhouse *(see photos)* have due to damage or some aggressive surface contaminant prematurely corroded. These areas should be cleaned of the products of corrosion by way of a wire brush and then suitably repaired.

Galvanized wire, differential aeration of pipe columns and corrosion of cable tensioning device in net house

Essentially continuous hot dip galvanized wire is produced in varying coating thicknesses, should hot dip galvanizing be preferred, the thickest possible coating should be specified (SANS 675 Heavy class). Alternatively, Galfan which is a 95% zinc coating and 5% aluminium providing two to three times the corrosion resistance (thickness for thickness), should be specified.

Similarly to the columns in the greenhouse, the pipe columns in the net house could be fixed to a concrete foundation ensuring exposure above the ground. Alternatively, the area both immediately above and below the ground (about 300mm) could be over coated using a coal tar epoxy paint, preventing this occurrence.

The corrosion protection of the cable tensioning device should also be investigated and discussed.

Weather in the area

While the conditions on hand are a desert, which is generally dry and non-corrosive, several extenuating circumstances exist to promote corrosion of hot dip galvanizing particularly when used as a gutter.

Precipitation

At most there is a 5% chance of rainfall during the months of November through to May and while there is an extremely remote possibility of occasional thunderstorms, rain is generally light. Light rain has a far less of a chance of ensuring the wash off of contaminants or in this case fine sand from the inside of the gutters.

Winds

Throughout the year the wind is mild to moderate and occasionally strong which will have the effect of picking up the fines of the sand in the vicinity of the greenhouse and blowing these fine sands into the gutters.

continued on page 34

Photo 24.

Photo 25.

Humidity

Humidity levels above 70% induce corrosion and coupled with sodium chloride salts in the wind blown fine sand, this too can promote corrosion of the untreated hot dip galvanized gutters.

Aggressiveness of surrounding sands

Two sand samples were taken from the surrounding area in the vicinity of the greenhouses and brought back for analysis.

Sample 1 contained 3417 ppm of chlorides and 6051 ppm of sulphates.

Sample 2 had less chlorides and sulphates.

Greenhouse interior

Humidity factors together with soil additives and chemicals used to prevent unwanted bugs must promote corrosion to a degree.

Conclusion

The aggressive fine sand deposits blown into the gutters plus light rain coupled with high humidity levels caused a poultice effect which interfered with the natural formation of the stable zinc carbonate patina and due to the almost continuous wetness under the fine sand in the gutter together with high concentrations of both chlorides and sulphates from the surrounding sands, the thin zinc coating prematurely corroded, resulting in failure.

The same can be said for the premature corrosion of the fans and their housings and fasteners, etc.

Recommendations

When the gutter of a structure such as this forms an integral part of the structure, extraordinary design and fabrication precautions need to be taken to prevent future failure.

Consider the following:

- Substituting a thicker steel gutter that is batch or general hot dip galvanized to ISO 1461.
- Following appropriate substrate preparation over coat the inside of the gutter with a reputable organic coating system, such as an epoxy primer followed up by a polyurethane top coat.
- Increase the number of water off take positions and increase the gutter gradient to these down pipe positions.
- Add a note to the warranty conditions that the gutters be regularly broomed to remove surface deposits.
- Substitute the zinc electroplated fasteners for hot dip galvanized to ISO 1461 equivalents.

Terry Smith

Photo 26.

Photo 27.

New Elcometer 456 Ultra/Scan Probe

Ever since the development of the coating thickness gauge in the mid-1940's, dry film thickness measurement has relied upon individual measurements being compared to a coating's specification.

With the introduction of digital coating thickness gauges, in addition to coating thickness measurements becoming easier, more accurate and repeatable than ever before, the task has become much more simplified.

Modern gauges, such as the Elcometer 456, have significant processing power built in – allowing users to automatically compare thickness values to a coating's specification, display trend graphs, store the reading together with the date and time the reading was taken, into memory. The gauge can even transfer data wirelessly to a mobile cell phone, recording the GPS coordinates of precisely where the measurement was taken.

Measurement speeds have also increased significantly, almost doubling, from approximately 40 readings per minute back in the 1980's, to in excess of 70 readings per minute in the new Elcometer 456.

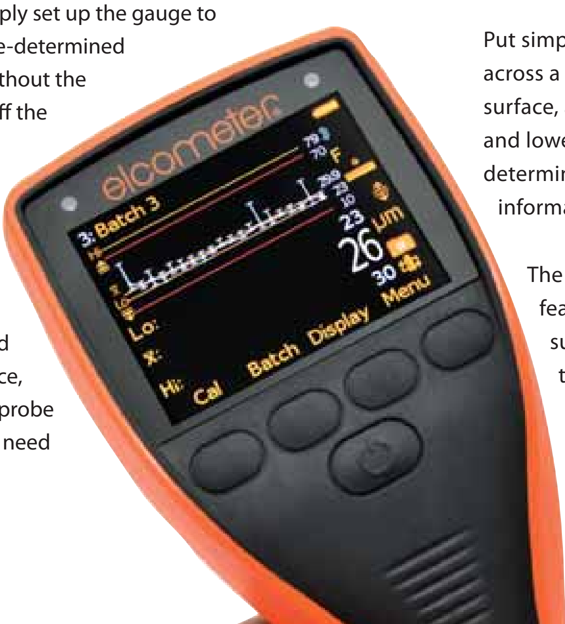
At first glance, you may ask why this is important, especially if only a small number of readings need to be taken at any one location. The measurement speed is used by manufacturers to indicate how quickly an accurate reading can be taken and therefore how soon any subsequent reading can be made.

Imagine, if you will, two inspectors measuring the dry film thickness of a pipeline. Inspector 1 is on one side of the pipe and Inspector 2 is on the opposite side. Both are tasked to take three spot measurements every 5 meters. If Inspector 1 is using a gauge with a measurement rate of 70 readings per minute, and Inspector 2, a gauge with 40 readings per minute, then it will not be too long before Inspector 1 is significantly further ahead of Inspector 2.

Other than the time it takes to move to the next measurement location, the limiting factor for increasing the measurement speed – thereby reducing the time taken to undertake a coating thickness inspection – is the time required to lift the probe off and replace it back on to the coated substrate.

If the inspector can simply set up the gauge to automatically take a pre-determined number of readings, without the need to lift the probe off the surface, then the measurement time can be increased even further.

Additionally, if the probe could be dragged across the coated surface, without damaging the probe or the coating then the need



for prescribing the number of readings to be taken over a defined area can be brought into question.

Introducing the new Elcometer 456 with Ultra/Scan probes

When connected to the latest Elcometer 456 coating thickness gauge, the newly developed Elcometer 456 Ultra/Scan probe has a reading rate (in scan mode) in excess of 140 readings per minute – further enhancing the speed and accuracy of field based dry film coating thickness measurement on Ferrous (F) and non-Ferrous (NF) substrates.

Each Ultra/Scan probe has been designed to take a 'snap on' replaceable end cap, so that the sliding action required to achieve a scan of a coated surface does not cause any wear to the probe tip, crucial to maintaining the accuracy of the probe over its life.

Using the Elcometer 456's patented offset feature, the thickness of the cap is excluded from any coating thickness measurement and, as the cap wears during use, the wear effect is also accounted for. The gauge will even display a warning message when the wear cap needs to be replaced.

The Elcometer 456 Ultra/Scan probe can be used in either Scan or Auto Repeat Modes.

Scan Mode

When selected, Scan Mode allows users to slide the Ultra/Scan probe over the entire surface area. As the probe is lifted off the surface, the gauge not only displays the average coating thickness, but also the highest and lowest coating thickness values over the entire scan.

Each set of three readings is then stored into memory, together with the date and time of the scan. The values can also be displayed on the gauge's display as a run chart.

During each scan, the Elcometer 456 displays the live thickness reading – together with an analogue bar graph which graphically indicates the thickness relative to both the nominal thickness and any user defined thickness limits.

Put simply the user can now simply 'drag' the probe continuously across a coated surface and, upon removing the probe from the surface, at a glance, view the display to see the average, highest and lowest readings, as well as whether they are inside opre-determined limits – thus providing invaluable and immediate information.

The Scan Mode can also be used with a 'hold' function. This feature allows the probe to be momentarily lifted from the surface to clear areas such as welded joints or cut outs and then placed back in contact with the coating to continue data recoding without interruption of the data set.

continued on page 36

Using the pipeline example to demonstrate how useful the Scan feature can be, the inspector can simply walk along the pipe – with the probe in contact with the coating – and upon removing the probe from the pipe, immediately assess the high, low and average coating thickness values on the gauge screen.

Auto Repeat Mode

In Auto Repeat Mode, as the probe slides across the surface, more than two readings are taken every second, with each individual reading stored in the memory of the gauge.

With a reading rate in excess of 140 readings per minute the Auto Repeat Mode significantly speeds up the inspection of large areas of coatings which require the recording and analysis of individual readings.

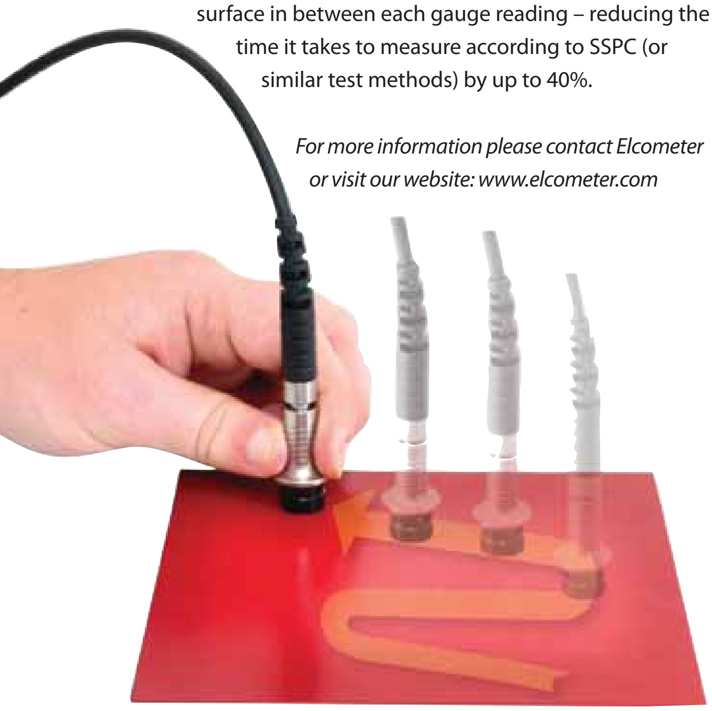
Working with Standards and Test Methods

International Standards and Test Methods often describe the number of individual gauge readings to be taken in a spot measurement and/or the number of spot measurements required over a defined surface area.

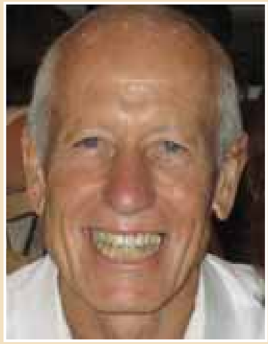
SSPC PA2, for example, requires a minimum of three gauge readings to be taken per spot measurement and five spot measurements over a $10m^2$ area. Using the Elcometer 456's Counted Average and Fixed Batch modes with the Ultra/Scan probe set to Auto Repeat, the gauge automatically takes three readings, stores the average and is then ready for the next set of three measurements.

In this way, the user no longer has to lift the probe off the surface in between each gauge reading – reducing the time it takes to measure according to SSPC (or similar test methods) by up to 40%.

For more information please contact Elcometer or visit our website: www.elcometer.com



Editorial Comment



On behalf of the Corrosion Institute of Southern Africa who celebrate 55 years of existence in South Africa it gives me great pleasure to introduce to you the first edition of *"Corrosion Exclusively".*

The initial edition will be made available at the Institute's Annual Awards event to be held in Johannesburg on 16 October and a similar event in Cape Town on 13 November. Thereafter, it will be posted and emailed to all members and other interested parties, including consulting engineers, architects and other specifiers. We hope then to publish four issues starting in January 2016. The magazine is according to choice available as a hard copy and/or also sent electronically.

While the Institute previously had a standalone magazine in "Corrosion and Coatings" for about 25 years produced by George Warman Publications, it unfortunately fell away when the publishing company was taken over by Prime Media Publications.

As the Editor of this potentially exciting new publication I hope that through the magazine I can live up to Institute member's expectations and it is for this reason that **I invite and welcome regular participation from all members and readers. Without these valuable contributions the magazine will only hover around the ground but with them it is bound to soar to greater heights!**

The main objective of *Corrosion Exclusively* will be to highlight the scourge of corrosion in our country, where inappropriate or inadequate corrosion control systems have to be prematurely replaced costing the asset owner huge sums of unnecessary money per year.

Other materials such as **stainless steel, aluminium and copper** will in future also be discussed where their use in the application is appropriate.

Notwithstanding its advertisers or supporters, the magazine **will be an equal opportunity platform having no bias in favour of any particular coating, material or system provided it is practical, cost effective and appropriate for use for the environment at hand.**

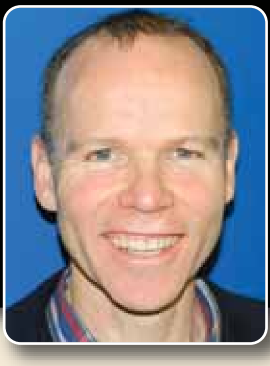
The introduction of the magazine includes messages from the President, Manager and residing Chairmen, followed up by Institute news and activities. We celebrate 55 years of existence in South Africa by including the early History of the Institute.

Other articles include, **Starting with the correct specifications to achieve quality steel design and fabrication; Essentials for appropriate substrate preparation; Why motor cars no longer rust!; Case History; Instruments and Equipment; BLAST FROM THE PAST, Personality Profile; Guest Writer and Members News.**

While "BLAST FROM THE PAST" was proposed by Mike Book, we are looking for appropriate "corrosion" names for both the "Guest Writer" and "Personality Profile". Should you have any ideas, kindly advise?

I trust you enjoy reading this inaugural edition of *Corrosion Exclusively* and should you wish to contribute or comment, kindly contact me on editor@corrisa.org.za.

Terry Smith



Guest Writer

Josias van der Merwe

A little is all you need

It started with an invitation to join a Writing Intensive workshop. This highlighted the need for our undergraduate students in Corrosion and Wear at the School of Chemical and Metallurgical Engineering at the University of the Witwatersrand to be exposed to a number of writing tasks. The idea is to help them to become more fluent in expressing their ideas and arguments and just to overcome the fear of writing.

As their first writing task I decided to explore their experience with corrosion while they were growing up. Subsequently, reading their work I realized how their varied backgrounds and cultures enrich our countries diverse culture.

While their backgrounds ranged from private school, rural villages and local townships, everyone had a story to tell about corrosion.

One of these was how corrosion led to the collapse of a shack, which makes one marvel at the perseverance of the student under difficult circumstances. In another instance a water tank collapsed after the structure corroded and almost caused serious injuries. Many times the extent of corrosion might not be excessive but can cause significant damage and small areas of concentrated attack could lead to catastrophic or even life threatening results.

However, in the same way it is known that small additions of noble elements can completely alter the corrosion resistance of alloys. Over a number of years numerous researchers from our School, such as Du Plessis[1], Potgieter[2,3], Lekala[4] and others, as well as many researchers worldwide, such as Tomashov[5], have looked at this effect and specifically at the influence of ruthenium additions to stainless steel and chromium rich alloys under oxidizing conditions.

What these investigators found was that ruthenium gives an enhanced activation of the hydrogen reaction which promotes the passivation of the stainless steel in oxidizing acids. In addition, on its own ruthenium has an extremely high corrosion resistance. Most of the initial work had been concentrated on the bulk alloying of materials. However, with the price of ruthenium, this is generally too costly to consider as a corrosion resistant material even at very low concentrations and because of this has not been applied extensively. However, the benefits of adding small amounts of ruthenium to stainless steel are considerable and led us to investigate the possibility of applying a thin ruthenium enriched layer to the surface of a component.

Generally such layers are unfortunately only as good as their adhesion to the surface and this is where a number of existing methods fail.

A technique that does give a very strong metallurgical bond is laser alloying or laser cladding. With the help of the National Laser Centre we were able to successfully apply a ruthenium enriched layer with this method. Due to the low heat input of the process, minimal distortion can be experienced which makes it more attractive than other methods. Initially low concentrations of ruthenium were added and relatively thin layers were applied. At higher levels the ruthenium showed a degree of heterogeneity in the form of ruthenium rich islands in the layers and this resulted in inconsistent corrosion results but not without considerable improvement[6]. The laser alloyed layers also showed an improvement in strength with increased hardness and this related to the laser parameters.

Corrosion resistance increased significantly with ruthenium additions so that the 304L stainless steel almost gave similar results to that of nickel alloys which means that the cost of a thin enough layer could be competitive in certain selected applications. In the presence of sulphuric acid even with 1wt% chloride in solution the benefits were significant[6].

It is important to find the optimum level of ruthenium and the most appropriate thickness that can be added to a stainless steel substrate. When considering costs a number of factors become important such as the surface to weight ratio, shape of the component and size. Although more work has to be done to provide consistent results and find appropriate applications, ruthenium is a South African resource that needs to be utilized and ultimately will assist us to move ahead in the beneficiation race that is so important to our survival.

References

1. *S.C. Du Plessis (1984). "The effect of platinum group metal additions on the corrosion resistance and mechanical properties of a 12% chromium ferritic steel", MSc dissertation, University of the Witwatersrand. Johannesburg, South Africa.*
2. *J.H. Potgieter (1991) "Alloys cathodically modified with noble metals", Journal of Applied Electrochemistry, 21, 471–482.*
3. *J.H. Potgieter (1997) "The effect of cathodic modification on the corrosion behaviour of duplex stainless steels". PhD thesis, University of the Witwatersrand, Johannesburg, South Africa.*
4. *M.B. Lekala, J.W. van der Merwe and S.L. Pityana (2012) "Laser surface alloying of 316L stainless steel with Ru and Ni mixtures" International Journal of Corrosion, vol. 2012. 1–4.*
5. *N.D. Tomashov, G.P. Chernova, L.A Chingriskaya and E. Nasedkin (1986) "Special features of behaviour of high chrome ferritic stainless steels alloyed with palladium or ruthenium in solution of sulphuric and hydrochloric acid", Protection of Metals, 22, 704-710.*
6. *J.W. van der Merwe, J.D. Tharandt and P. Masiu (2014) "Corrosion resistance of laser-cladded 304L stainless steel surfaces enriched with ruthenium additions in sulphuric acid media" The 6th International Platinum Conference, 'Platinum–Metal for the Future', The Southern African Institute of Mining and Metallurgy, 219-224.*

An illustrious paint contractor reflects back in time

Mike Book as he was then as captain of the Under 19 KZN Athletics Team.

It all started in June 1953 in Bulawayo, Southern Rhodesia where I was born in a flat above Dowings Bakery (any divine intervention could have resulted in me being a loaf of bread)

When I was 6 months old my family moved North to Fort Rosebery now known as Mansa in Zambia (Northern Rhodesia) where my father (Nils "Spanner" Book) managed a Trading Store in Fort Rosebery which traded in ivory, crocodile skins and supplied beef to the European market.

In 1962 all hell broke loose when Kenneth Kaunda (president of the Zambian African National Congress) started the CHA CHA CHA campaign (civil disobedience movement) by burning schools, violent uprisings and sabotage.

I think we started the "chicken run" and packed the 1957 Chev and three days later arrived in Durban. Spanner got a job with Prolux Paints (now Dulux) and I finished my school days firstly at Mansfield Junior and then Beachwood High in 1970. I was captain of the Natal under 19 Cross Country Team.

After battling to make a living off diving for crayfish and jigging mullet for a year I moved to Newcastle and started my career with Reef Industrial Painters as a spray painter (@ R0.70 per hour) working at Iscor Newcastle which had just commenced. My first job was spraying the maze of concrete cable tunnels under the Iscor plant with PVA Acrylic.

I will never forget being trapped in a dust storm in a boson's chair 70 metres above the ground whilst spraying the Red and White aviation stripes on the Iscor Newcastle Stacks. Only the maid and I knew how scared I was when she did the washing.

During the 70's the construction industry was booming, unemployment was at its lowest ever. The Rand was powerful (R2 to the British Pound and R1.00 = $1.42). South Africa was working flat out building the infrastructure of the country. Life was at its best with companies like Southey's, Gordon Bennet, VCM Paint Contracting, Mines and Industrial Painting Contractors and Reef Industrial Painters, employing >6 000 personnel each, paying cash wages every Friday, using the old Kalamazoo system (no computers and electronic banking), distributing wages to the various pay points around South Africa, which seems like an impossible task today.

The Reef wages were made up for the employees every Thursday ready for the Friday pay run in Durban and flown from Virginia Airport in the Reef Cessna 210 Beechcraft to the remote sites around South Africa where we would buzz the site, the supervisor would then drive to a predetermined spot, and then we would come in low and throw the money bag out and fly onto the next site and be back in Durban by 15H00.

On one occasion when we got back to Durban we were told that the Vaal Reef Site in Orkney had not been paid and that the Supervisor was missing. We assumed that the supervisor had run off with the payroll. We told our client that the pre-arranged drop off site was the veld by old Orkney air strip and requested that he go there. An hour later the client phoned to say that he had recovered the payroll which was laying a few metres away from our unconscious supervisor. When the money bag was thrown out of the aeroplane it hit the Supervisor's head squarely resulting in a fractured skull.

Transnet Bridge KwaZulu Natal

In ±1973/74 I was working on the "new" Bay Side Smelter and my colleague the late Theo Dwyer was working on the rehabilitation of a Railway Bridge over the Tugela River. We shared a caravan which was parked on the slopes of a hill above the Tugela River. Theo was a big man, weighing ±140kg and we would braai every night having a few beers before bed. On this particular night Theo had had his bridge painting rejected by the inspectors and he was in a foul mood, so we drank a few beers and a bottle of brandy and retired to bed. Once in the caravan Theo started to demonstrate to me what he was going to do to the inspector by shadow boxing in the small caravan, suddenly the jockey wheel loosened, the caravan went rolling down the hill towards the river, over an embankment and launched itself on top of a tree. For the next four months the "tree caravan" became our accommodation with no means of recovering it. To my knowledge the caravan is still on top of the tree.

Corrosion Institute Dinner

These were grand occasions in the 1970/1980's and always held at the Wanderers. Tuxedos were the order of the day. Walter Barnett opened the proceedings by saying grace. Up until ±1977 it was a men's only function. The first two ladies invited were Meryl Nixon and my wife Cindy. The men were seated first and the ladies were introduced into the Wanderer's hall with a standing ovation. This was the tradition for three years and then the function become quite popular with the men bringing their partners.

continued on page 40

The South African Coating Contractors Association

During the late seventies the contractors got together, as they felt that the Corrosion Institute did very little for the painting contractors. After a meeting in 1976 Cyril Ford (Southey), Eric Schertyl (Mines and Industrial Painting Contractors), Jim Drury (Reef Industrial Painters), Bill Bennet (Gordon Bennets) and myself formed the SACCA. Meetings were held every month at RJ Southey's offices in Ophirton, in the South of Johannesburg. The good thing that came out of these meetings was that we learnt of paint failures across the country far more quickly. Other than that we realized that there was very little that we (SACCA) could do for ourselves and after two years the association was disbanded and we all filtered back to the Corrosion Institute.

Brothers of the Brush

After the disbanding of SACCA the comradery and fellowship amongst the contractors was in good health and spirits, we would have ad-hoc meetings, enjoying a good couple of drinks and sharing Industry news. These meetings were tagged as "Brothers of the Brush meetings" in the 1980/1990's and colourful characters like Vic Earle, Terry Riley, Mike Kelly (Kelly Industrial Painters), Louis Sacks (Rand Sandblasting) Mike Suttie (Magnum Blast) to name but a few would attend. Today these meetings are scarce and if they were to take place, it would probably be over a cup of tea and biscuits.

Change of specifications over the years

The paint specifications have changed over the years since 1971 from 3/4 coat Alkyd Systems to Chlorinated Rubber/Vinyl Systems (1980's) to the more popular Epoxy/ Polyurethane Systems.

Prior to 1993 the tradition was to blast and prime in the shop and then touch up and apply final coats after erection on site. This tradition changed after the Alusaf and Namakwa Sands contracts and today we apply all the coats in the shop with touch ups on site.

The reason for this was a combination of factors:

a) Numerous strikes would take place on sites, costing contractors lost down time, resulting in losses.

b) Fewer man hours spent working at heights, resulting in a safer working environment.

c) The site program was improved as sheeting could start immediately.

d) Payment terms were improved as the paint contractors now got paid 90% when the steel was delivered and did not have to wait until all the steel was erected for payment.

Paint suppliers technical teams in the 1970's/1980's

The following friends were the **"best of the best"** during the boom times:

Dulux Team: Klaas Dientz, Tom Edwards, Pauline Lind, Bob Millenaar, Sandra Perrins, Allan Burns

Plascon Team: Frans Fulkard, Simon Upfold Brown, Reg Burke, Kevin Peterson, Meryl Nixon, Don Cochrane and Allan Dunlen

Advance Coatings: Terry Ashmore, Jerry Callahan

Crown Cebestos: Johnny Zastron

Chemrite Coatings (now known as Stoncor): Eric Vermaaker, Barry de Le Rey, Genevieve Budler

I don't think we would have managed without the following consultants keeping us contractors and suppliers honest:

Eric Duliguil, Colonel Brett, Mike Brett, Dr Colin Alvey, Charley Brett, Neil Webb, Bob Andrews, Rool Roos, Sonny Kelly and Bob Beech.

Dick Gunning, Louie Sacks and Mike Book in a jovial mood at a Corrosion Institute function.

Largest paint failure

I painted 35 000t of structural steel with 400 painters using an Epoxy Coal Tar System. The paint peeled off the full 35 000t of steel.

I remember sitting in a very large boardroom surrounded by about 30 silent and fuming executives in a horse shoe formation with me sitting on my own in the middle.

The Chairman then opened the session staring at me and without blinking read out a detailed report of the paint failure blaming me for this catastrophic disaster. After about 5 minutes he came to the end of his well prepared speech and said "Mr Book what are you going to do about the paint failure" to which I answered in one word "resign" and I got up and walked out.

I had no answer at the time and after discussing it with my colleagues did a thorough investigation and proved that the Tar supplied from the Dr Otto Coke Ovens at Iscor was of a poor quality causing the Epoxy Coal Tar to "bloom" in 24 hours resulting in delamination. The end result was after two years we got paid out for our claims. I do not wish this on any contractor. Operating in a survival mode under these conditions is never pleasant.

Conclusion

Sadly many of my good friends mentioned above have passed away or retired, but they have all played a major role in building the infrastructure of South Africa and I will not forget the roles they played and the unforgettable memories. I have seen how quickly we do forget the ICONS of the past, and this is wrong as these legends have shaped our lives as mentors and paved the way for us as individuals in our current and future successes.

Mike Book

Recycled steel abrasives from Simple Active Tactics

Simple Active Tactics, soon to celebrate 10 years of serving the corrosion industry, has established a plant specifically designed to recycle steel abrasives trade named Sat-Steel.

The plant, situated at Atlantis in Cape Town, uses spent steel shot as a raw material to produce a range of commonly used sizes of both grit and shot. Prior to the operation being established, spent steel shot was costly to dispose of in "hazardous" waste sites designed for metallic waste.

The raw material is meticulously cleaned using a dry, double drum magnetic separator which removes all non-magnetic (silica sand) and partially magnetic material (chrome sand). The pure metal extract from the process yields a highly cost effective range of steel shot and grit, sized and bagged according to industry requirements whilst the non-magnetic products are further processed for resale back into the foundry industry.

Most popular of the company's recycled products are two general blasting grades, "A" Blast (size equivalent G40/S230) and "J" Blast (size equivalent G50/G80) which offer outstanding value compared with new steel grit. The main demand for these products is coming from general blasting yards that use and recycle expendable slag abrasives in a semi-recoverable environment. Sat-Steel not only offers an almost dust free blasting environment but having the durability of steel versus slag, can be used many times over.

Simple Active Tactics also offers a complete range of new carbon steel and stainless steel shot and grit.

www.satactics.co.za   www.ecoblast.co.za

R&D Contracting

R&D Contracting offers an innovative style of service delivery, adding a fresh approach to the industrial and commercial maintenance industry.

Our track record in providing roof refurbishments, removal and installations includes a vast number of production, manufacturing and commercial facilities. When it comes to delivering industrial coating solutions our sound analysis methodology and strict adherence to application directives allows for superior quality results.

By equipping our core drilling division with only the highest quality tools and skillsets, we provide versatile drilling solutions that are accurate and efficient.

The scope of our access services consists of sophisticated and contemporary access systems and equipment enabling us to provide appropriate solutions without compromising on safety. By combining this with our expertise in coating applications, we are also able to provide innovative turnkey signage solutions that can turn your signage into a focal point. In addition our comprehensive service offering extends to concrete spalling and repairs as well as asbestos removal – with this certification being renewed annually assuring you of the safe and secure removal of this hazardous product.

Our management team boasts over 45 years of experience in the field, so we understand what it takes to meet the high expectations of delivery in the market.

Total Contamination Control SA (Pty) Ltd. (TCC SA)

Total Contamination Control SA (Pty) Ltd. (TCC SA) offers training to metallurgical students and graduate interns for further exposure and development in the metallurgical and related fields of welding and corrosion.

TCC SA in partnership with Thermitrex South Africa has appointed two graduate interns and three engineering metallurgy students that still require to complete the work integrated learning modules of their courses before they can graduate, at TCC SA's Corrosion and Metallurgy Testing laboratory and Thermitrex factory in Boksburg.

The two interns are both recent and still fresh National Diploma graduates from the University of Johannesburg in the engineering metallurgy direction (physical metallurgy) and they will for a period of two years be exposed to the operations of a metallurgical processing plant, laboratory testing procedure and higher projects related to heat treatment, thermite welding, materials testing and corrosion under mentorship of experienced engineers and technologists in the field.

The three students who have completed most of the theory modules towards a national diploma in engineering metallurgy are required to perform a more controlled development program called Work Integrated Leaning (WIL) or Experiential Learning to comply with their specific university prescribed scope of learning. This WIL program consists of two six-month periods wherein the student is initially exposed to the routine technical workings of a business from the metallurgical related industry and subsequently during the second six month period in addition to continued routine work also required to perform an investigative project in the physical metallurgy related field.

For more information contact us at gregc@corrosion-lab.com

PERSONALITY PROFILE

In conversation with John McEwan

Briefly explain your background and how you came to be involved in the Corrosion Institute.

I became involved in corrosion protection purely by accident. When I finished school in the U.K., about fifty years ago, I was primarily interested in research chemistry. I was offered a position in the Chemistry Department of the foremost contract research laboratory in the U.K., the International Research and Development (IRD). That was the start of fifty years of stimulating and diverse work.

My fifteen years at IRD gave me vast opportunities and experience. However, my wife and I hankered for new adventures, and we found our way to Zambia where we had five great years and made many wonderful friends. I was then very fortunate to obtain a position in the Corrosion Group in Mintek where I worked for more than twenty years.

Soon after my arrival in South Africa, I was introduced to CorrISA by my boss Rob White, who was a member of Council. I was invited to the third International Corrosion Conference, and in 1987 I was enrolled as a Member of CorrISA.

What was the state of the industry then and what role did you play within the institute?

Research performed in South Africa in 1986 estimated the direct cost of corrosion was 5.2% of the GNP. The study also concluded that 25% of the costs could be saved by applying existing corrosion protection technology.

I was on Council for twenty years from 1991 to 2011; I held every Executive position and was President in 2002/3.

Talk about your years with the Institute and what changes you've seen over that time.

My main interests were always concerned with education and training. I was on the Education Committee which ran the first Corrosion Fundamentals (later to become Corrosion Engineering) course in 1992. I was Chairman of the Education Committee from 1994 to 2008; editor of Corrosion Control in Southern Africa in 1994 and 2004; ran the SAQCC Coating Inspector programme; held the fifth International Corrosion Conference in 2003; negotiated a licence to hold NACE Int. courses in southern Africa in 2004 (in the last eleven years more than 2 000 people have been trained); and developed corrosion courses for Sasol and the SA Navy.

I was awarded a Gold Medal for services to corrosion protection in 2006, and was one of the South African representatives on the International Corrosion Council from 1999 to 2007.

I have seen a number of significant and impressive changes. The Institute has developed and runs a wide range of courses, is very active at grass roots and consequently it has a larger management and administration.

What successes did you enjoy during your time with the Institute and what role do you play now?

My major successes are detailed above but in addition I am very pleased to have made such a large number of good friends, too many to mention. I no longer play an active role in the Institute, except to check the Audited Financial Statements, and the Minutes of the AGM.

If you could go back, what things would you do differently?

It is a bit arrogant to say that I do not think I would have done things differently except that sometimes I wish some things had progressed a bit faster.

What advice do you have for the industry going forward?

A recent worldwide survey has estimated that the annual direct costs of corrosion to the industrialised countries are greater than $1.8 trillion or 3% to 4% of the GNP. These estimates have not reduced significantly in the last forty or so years. Can the new and rapidly developing nations avoid repeating the costly infrastructure repair and replacement cycle of the existing industrialised nations?

The state of knowledge in corrosion science and engineering lies predominantly in an older generation that has amassed considerable years of fieldwork experience, primarily with conventional metallic materials. This is an exciting and critical time for corrosion science and engineering. It is imperative to act now and energise young scientists and engineers about corrosion and to create a sufficiently skilled workforce for the future. In addition, the public's rising expectations regarding safety and the financial need to reduce long-term capital costs should go far to emphasise the importance of understanding and developing corrosion design, mitigation, detection, and prediction strategies.

There are a number of new and advanced technologies either already available or almost reaching fruition.

CorrISA has an important role to play in corrosion education and training and as a forum to bring all of the major role players together to identify and discuss available technologies.

Tell us something about yourself.

My wife Celia and I were both born and raised in Newcastle-Upon-Tyne in the U.K. We have a lovely daughter, Lynsey, who has a Master's in Chemical Engineering. I have always had an interest in sports and keeping fit and still try to jog most evenings. I support all of the wrong sporting teams, England at cricket, Newcastle at soccer, the Lions at rugby but it is essentially good for the spirit. I travel a lot both for work and for pleasure, the latter mainly with my wife and daughter. I am passionate about too many things to list and regularly bore friends on the state of the environment, wastage, and wildlife (I am writing this in Kruger Park).

Jotun, a global leader in the manufacture of heavy duty protective coatings, is pleased to introduce the Steelmaster range of Intumescent coatings for Passive Fire Protection to the South African market. Steelmaster offers an aesthetically pleasing solution for protection against cellulosic fires – saving lives and property.

Steelmaster 1200WF – Reliable and Efficient

Steelmaster 1200WF has been fire tested, approved and certified to leading global test standards. It is the most efficient thin film waterborne intumescent coating for 120 minutes fire protection across a wide range of steel types – especially hollow sections.

Designed for performance and minimum environmental impact, Steelmaster 1200WF is an easy to apply product, promoting greater efficiency during application and providing an excellent smooth finish in any colour.

Jotun is able to offer a full solution for the design of effective intumescent coating solutions to meet industry requirements including comprehensive technical service.

Steelmaster 1200WF contains low VOC (volatile organic compounds) and is free of hazardous air polluting substances thereby maintaining safe air quality and complying with international 'green' standards.

U.S. GREEN BUILDING COUNCIL


12
10


Sat-Steel