2010 Volume 7 Issue 3

HOT DIP GALVANIZING TODAY

HOT DIP GALVANIZERS ASSOCIATION Southern Africa

44

Featuring:

Architectural hot dip galvanizing: "What every Architect should know!" – an architectural hot dip galvanizing case history

Railway station at Moses Mabhiba Stadium • A game farm in Swaziland

Cable ladders and trays in commercial / industrial applications

Regulars include – Stephen's Corner; Duplex Coatings; Bob's BANTER; On the Couch and Members News

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

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CONTENTS

Front Cover: *A kaleidoscope of photos showing architectural hot dip galvanizing on building facades, etc. as well as a unique configuration of edge mounted cable ladders in a project.*

Hot Dip Galvanizing – Adding value to Steel

Executive Director's Comment

One of the Association's primary objectives is the continued need for education relating to the application of hot dip galvanizing and duplex coatings for corrosion control. Many end users and specifiers of these two methods of corrosion control continue to recognise the need to train their inspectors as we have witnessed a continued demand for candidates to attend the intense two day Hot Dip Galvanizers Inspectors courses. Full details of this "tough" two day Inspector's course remains available for review on our web site. The original two day courses were arranged to minimise time that candidates were away from their respective work places.

Comments received from numerous attendees of the original two day Inspectors Courses, was that it was too short and intense for the amount of technical information that needed to be assimilated. Based on such comments and a request for more practical involvement we developed an updated and revised three day Inspectors Course. Revisions to the chapter on corrosion and the environment with a new chapter on duplex coatings and galvanizing of reinforcement in concrete have been introduced. The extra day is to be used for actual hand on practical inspections of galvanizing and an afternoon at a paint applicators yard.

A pilot three day course was conducted during July and received positive responses from a group a seven participants. As a result of the positive feedback, we are encouraged to continue with such training.

We are planning to phase out the two day course by the end of 2010 and only offer three day Inspectors Courses from 2011. A number of two day courses are still to be concluded during the remainder of 2010, but should we find that candidates opt for the three day version, we are able to arrange the full course provided six or more people indicate their interest.

Bob Wilmot

Note from the Editor

Our main features for this issue include, **Architectural Hot Dip Galvanizing** where often due to the ill-informed expectations and late planning of some specifiers can be controversial at times. Here our article and subsequent articles, address but a few of the essential requirements of achieving this new and exciting hot dip galvanizing requirement and as a result make use of this **Reliable, Dependable and Predictable** coating system.

The Galvanizers Association of Australia (GAA) have unfortunately removed their specification on the subject from their web site and instead added several new notes to their "Appearance and Freedom from defects", clause, in the Australian/New Zealand National Standard, including "Transport and Storage; Superior Finish; Smoothness and Mechanical Cleaning for Duplex Coatings".

Our **Case History** looks at the architectural hot dip galvanizing used at **Stratford's Guest House and Conference Centre** in East London, which won the Hot Dip Galvanizing Awards Event in 2001 and is now 10 years old!

Supporting articles include the **Railway Station at Moses Mabhiba Stadium** as well as a **Game Farm** in Swaziland and a method of enhancing the hot dip galvanized finish by using an orbital sanding disc, complete the feature.

The other main feature is on **Cable Ladders and Trays** (an essential requirement for distributing power and communication requirements in either commercial, industrial and mining projects). Contributions from two suppliers one called **"The Bookmakers Favourite"** and one on the **"Gautrain"**, compete the feature.

"Galvpatch" an equivalent and appropriate zinc rich epoxy repair material in competition to the original product, **"Zincfix"** has just recently been launched. The Association is now keeping stock of both products.

Prof. Stephen Yeomans in his "Corner" **"It only works when you don't need it!"** includes the second part in the series on hot dip galvanized rebar.

The **Duplex** feature includes an article on some hot dip galvanized and duplex coated dock levellers, destined for Angola.

"On the couch" features Geoff Colloty who has been at the helm of Robor Galvanizers one of the largest general galvanizers in the Southern Hemisphere, on his way to retirement.

Education and Training, includes our literature and our standard two day certificated coating inspectors course. We also include a photo of the delegates of a recent plant tour through Bay Galvanizers in Richards Bay.

Other regular articles include, **Bob's Banter**, where Bob Andrew chats about **"Lessons of Ethics from Cleaner Fish"** and **Members News**.

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

Enjoy the "magazinc".

Terry Smith

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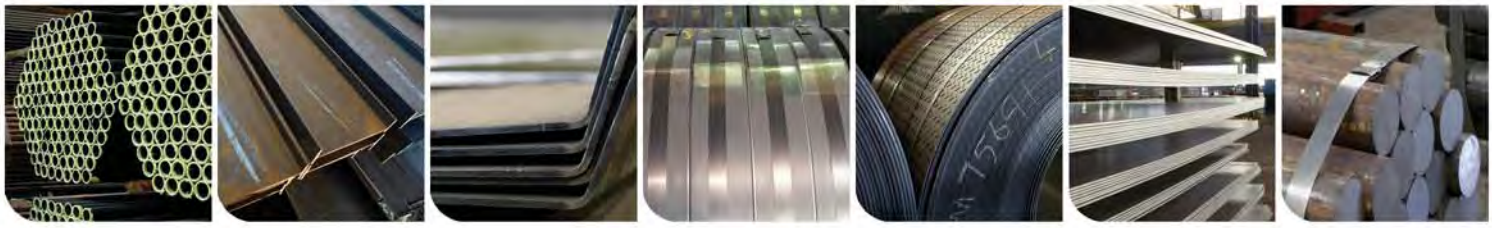

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What every architect should know about hot dip galvanizing deemed for use in architectural steelwork!

The main intention of hot dip galvanizing or painting exposed steelwork for a building is to prevent the steel from rusting, ideally lasting for the service life of the building. (Performance of the two systems is not up for debate in this article.) The method of application of the two systems is vastly different.

Hot dip galvanizing is a metallurgical reaction between molten zinc and steel where bond, coating thickness and appearance is less dependent on the galvanizer and more dependent on a law of metallurgy and the type of steel. Paint on the other hand is bonded to the substrate mechanically via a number of surface preparation methods, some less successful than others. Abrasive blasting to obtain a surface profile is seen to be the optimum method of substrate preparation for painting.

The appearance of the former from the outset is hugely dependent on the chemical composition of the steel with silicon and phosphorus playing the major roles, whereas the appearance and performance of the latter in the medium to long term is dependent on the specified paint system and hugely dependent on the many application variables, including the expertise of the painter.

So when it is decided by the architect / specifier that exposed steelwork is to be hot dip galvanized and the steel arrives at the galvanizer, it is not merely incumbent on the galvanizer to reach over and switch on the magic switch, which says 'Architectural Galvanizing' and the steel exits the bath in perfect quality but rather it is a function of proper planning and participation by all parties especially the galvanizer to achieve success.

The concept of using hot dip galvanized mild steel for architectural use in South Africa most probably began informally a number of years ago but as far as we are aware in 2000 when Al Stratford of then Stratfords Architects extensively used it on Stratford's Bed & Breakfast and Conference Centre in East London which is now 10 years old (*see Case History*) and in 2002/3 when the first phase of MTN Head Office in Fairlands, Johannesburg was well on its way.

Our involvement with the latter project started when I was called to the MTN site by an irritated architect to view a mock up handrail system that was hot dip galvanized. The intention of the mock up was to allow the clients to choose between a hot dip galvanized mild steel and a stainless steel handrail system.

I too was disappointed at the hot dip galvanized handrail as it had some rough surfaces, lumps and some small coating repairs (while the mock-up was well within the requirements of SANS 121, it was not what the architect had envisaged). These areas were well within the view of the client standing in front of the mock-up. Needless to say the stainless steel sample won the day!

When I enquired about how the order was brought about, it was obvious to me that the component had just been delivered to the galvanizer from the steelwork contractor with no formal written instruction as to the purpose of the component.

Hot dip galvanizing has been around in South Africa for about 50 years, primarily as an effective corrosion control medium. Besides its use along the coast mainly for structural steel, gates and burglar bars, etc. on the Reef it is extensively used in industrial and above and below ground in mining applications. So when it is specified for a more refined type of application, extraordinary things need to be put in place.

I subsequently approached the architect and requested that the HDGASA be involved from the start of the second Phase, which happened some two years later.

Photo 1.

Photo 2.

Photo 3.

Photo 4.

Photo 5.

Photo 6.

Turning to the internet I found the Galvanizers Association of Australia (GAA) had a specification called, "Galvanizing as an Architectural Finish – Procedures for Design Detailers".

Using some of the guidelines from the GAA and the Association's combined experience of in excess of about 50 years in the industry a check list was developed where both the architect, steel designer / fabricator and galvanizer all had joint responsibilities for the successful rollout of the quality of the hot dip galvanized coating.

The GAA has in the interim decided to recall their architectural specification and I quote Rosemary Scott, Executive Director of the GAA, "Re *'architectural finish' – the GAA now specifies the use of the Australian/New Zealand Standard 4680, Section 7 "Appearance and Freedom from Defects" which refers to a "superior" surface finish and the provision of acceptable type samples or methods of test. It is important that the specifier works with the galvanizer in the early stages of the project.*

Points 2, 3, 4 and 5 of Section 7 of AS/NZS 4680, which in our opinion are not as explicit in SANS 121 (ISO 1461) are set out below for consideration.

"2 *Advice on the transport and storage of galvanized articles is given in Appendix F.*

3 *Where a superior surface finish is required or the presence, size or frequency of any defects in the coating is considered to be of concern, appropriate arrangements should be made between the purchaser and the galvanizer. This may be achieved by the provision of acceptable type samples or methods of test.*

4 *Articles galvanized after fabrication have a thicker, less smooth coating when compared with continuously galvanized products such as sheet or wire.*

5 *If the galvanized product is to be subsequently painted or powder coated, the galvanizer should be advised at the time of order, as extra work may be required to ensure that the agreed finish is obtained."*

Our experience as far as the requirements of architects wanting different finishes is no different to the GAA. Some architects only want the varying spangle appearances, *see photos* 1 *to* 3, with the aged spangle condition shown in *photo* 4 and some are not fused either way and are not concerned with the mottled/matt grey appearance, *see photos* 5 *to* 9. Occasionally one has a steel with both finishes *see photo* 10.

If one remains with an aluminium-killed steel where the silicon is 0.04% or less and the phosphorus is less

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Photo 7.

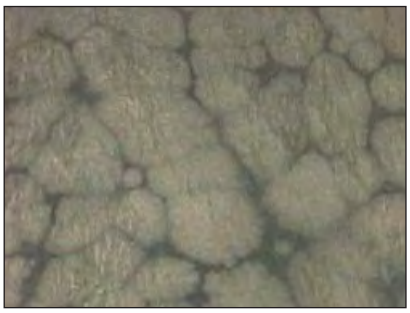


Photo 8.

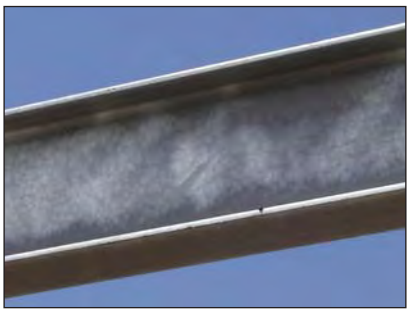


Photo 9.

Photo 10.

Photo 11.

Photo 12.

than 0.02%, the finished surface will generally always be a variegated spangle type of appearance. The resulting galvanized coating thickness will conform to the Standard. Some of the more controlled silicon-killed steels also fall into this category.

If however, the steel is silicon-killed where the silicon content is greater than 0.25 and the phosphorus slightly greater than 0.02%, the resulting coating could be dull grey or have a mottled coating appearance and this would not necessarily be evenly distributed along the length of the steel. The resulting galvanized coating thickness will generously exceed the requirements of the Standard.

Some galvanizers have looked into alloying the molten zinc with elements such as nickel and tin to enhance the finish appearance. (As alloying of the zinc is more expensive than the traditional melt, the development of alloying other than with a small amount of aluminium in South Africa has been slow to take off mainly due to the perception from the general customer that price rules at the end of the day). *See photos* 11 *and* 12.

Therefore, should one want to ensure a specific finish for aesthetical reasons after hot dip galvanizing, up front communication with the HDGASA and the selected galvanizer who is a member of the Association is of prime importance!

Discussing the subject of architectural galvanizing with Jeremie Malan of Jeremie Malan Architects, who were the Architects for the New National Library in Pretoria. The New National Library used an extensive amount of external steelwork that was hot dip galvanized in accordance with SANS 121 (ISO 1461) and the Architectural Check List.

Jeremie comments that when requiring hot dip galvanizing of an architectural standard, one of the most important factors is that greater attention must be levied on steel detailing by all involved parties, so that the inevitable coating repairs due to alterations on site, are greatly reduced or avoided.

Jeremie also concedes that up front communication during the planning stages of the project with technical staff of the Association and subsequent to this, regular participation in the project team by the selected galvanizer, is of extreme importance to the success of any major architectural steelwork project.

To view the check list that was developed for "Architectural Hot Dip Galvanizing" refer to magazine no. 33 or alternatively our web site www.hdgasa.org.za.

A subsequent article on the subject of Architectural Hot Dip Galvanizing will address and expand on the important designers criteria in the check list.

Terry Smith

PROPOSED FEATURES FOR 2010

November/December (No 45):

• The world of hot dip galvanizing around us! • Greening of the hot dip galvanizing industry • Continuous sheet and wire • Thermal spraying

NOTE: FEATURES MAY BE SUBJECT TO CHANGE

Moses Mabhida Railway Station

In the shade of the majestic pristine white glory that is Durban's new Moses Mabhida Stadium lies the most strikingly peculiar looking building – the new Moses Mabhida Station. This ultramodern railway interchange is in complete contrast to the immaculate white stadium and quite tongue in cheek, for those in the know, architecturally, from a corrosion point of view.

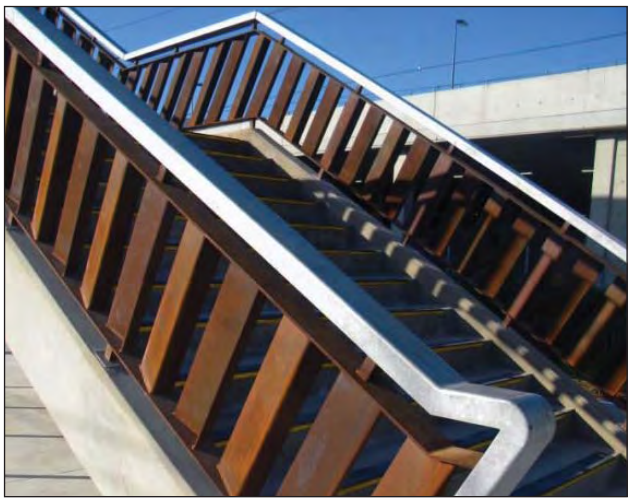
This R140million new development for transport body, Passenger Rail Agency of South Africa (PRASA) forms part of the upgrade of the Moses Mabhida Stadium precinct. The station is dual purpose in that it provides the obvious, access to the rail interchange. It also functions as a 'bridge' over the busy railway lines for pedestrians wishing to enter the Moses Mabhida precinct from Umgeni and Walter Gilbert roads.

The thinking behind the new railway station is the avoidance of congestion during Soccer World Cup 2010. In essence organisers would like fans to park their vehicles at other stations and use the train to the Moses Mabhida Stadium. Several stations in the greater EThekwini municipality have been upgraded / refurbished for this specific purpose.

One of the views showing the use of Corten Material fixed to a duplex coated frame.

The structure makes strong use of moulded concrete, which is accented throughout the building in odd angles. The theme of odd angles is carried throughout the building. The concrete is framed by an immaculate duplex coated steel structure, which is clad in glazing as well as

continued on page 8...



Hot dip galvanized handrailing supported by Corten balustrades.

Hot dip galvanized steel in the process of being painted.

Corten steel. The use of Corten steel in this instance is an absolute paradox, as visually it seems that the building is in fact rusting, which is not the case. Corten steel weathers and forms a patina which stabilises the medium. Also used in the structure is hot dip galvanizing. The combination of the Corten steel and hot dip galvanizing provides a striking visual effect, especially seen in the long hand railings and balustrades on the stairways down to the platforms. These ingenious structures were engineered by Rebcon Engineering.

Construction of the new facility proved to be an exceptional challenge, in that the site is perched over the existing operational main railway lines. This meant that the contractor had to contend with high-voltage overhead lines (3 000 volts) and trains rushing through the site at normal operating speed as no disruptions to normal railway services could be afforded. To further complicate matters, the site, situated in an old riverbed, have a resulting high water table, which meant special attention to piling. An exceptionally tight deadline of ten months was set out for project completion, in time for the 2010 Soccer World Cup.

Impact Engineering secured the structural steelwork portion of the tender. The logistics and challenges of the project forced the company to think 'out of the box'. Impact Project Manager on the project, Herman Labuschagne explains: "Electricity running through the high voltage power-lines has an arc of 3 metres. This implied a very real danger, especially during humid conditions. The steel was literally installed about a metre above the overhead lines!" The company was only accommodated by Metrorail, in terms of switching the power off, after the last commuter train had passed through at night – around 21h00! Due to the tight deadline and also the live overhead power-lines on site, a night-shift starting at 21h00 and finishing at 03h00 was necessitated. Most of the off-loading and positioning of heavy structural steel happened at night under floodlights supplied by Grinaker-LTA. A normal dayshift starting at 07h00 and finishing at 16h00 also ran for seven days a week.

The Hot Dip Galvanizing of this immaculate structure was shared by Phoenix Galvanizing and Voigt & Willecke Galvanizers from Durban.

Desere Strydom.

The Association wishes to thank Desere Strydom for the above article.

Hot dip galvanizing goes "Out of Africa"

Mike Oldfield of Cousins Steel International in Durban is certainly no stranger to using hot dip galvanizing as a preferred method of corrosion protection. The majority of the structures that he builds all over Southern Africa make use of the coating. In fact Mike is such a supporter of the coating that he has used it not once, but twice, in his own personal dwellings. Mike's addition to his Morningside home was featured in the 2005 Hot Dip Galvanizing Awards. At the end of 2009, Mike did it again, and this time his Bush Lodge in the Royal Jozini Big Six got the 'superior treatment' in terms of corrosion protection.

Mike's brief to architect Lisa Rorich was to design a bush lodge in keeping within a certain envelope as prescribed by the Developers – 25% of the site. The idea was for a main dwelling, linked via pathways with five free-standing units. The design naturally needed to capture the picturesque surroundings and conservation featured highly on the agenda. Every tree on the site was surveyed and as far as possible the structure was designed around the existing trees. Multi storey structures were not allowed, as well as visible naked lights.

Mike wanted to go with a timber home, but needed a sub-frame, which under normal circumstances would also have been done in timber. In the interest of a longer lasting and maintenance free structure – the decision was made to do the sub-frame in hot dip galvanized steel. Mike also had the added advantage of fabricating the structure in-house.

The site presented some engineering challenges in that it was located on clay. This implied deeper foundations which reached below where the moisture levels of the soil changed thus ensuring a stable structure despite the presence of clay. The main structure features duplex coated structural steel. Hot dip galvanized purlins were used as 'cross members' on which timber cladding was anchored. Mike explains: "The site is located in a very humid area, right on the water's edge, so corrosion is was a real concern. Hot dip galvanizing really was the only consideration for this project." All the hot dip galvanizing for the project was done by Phoenix Galvanizing in Durban.

Naturally there were many constraints during the construction of the lodge. The site is 360km from Durban, which meant that all the steel had to be transported through the border, which required two permits. Transport and logistics had to carefully planned in terms of the rigging crew, which comprised of LR Britz and Davgo Rigging. In addition, the final 18km of the journey meandered through the game reserve which has a 40km per hour speed limit! Another complication was the fact that the game reserve road ended approximately 150 metres from the site, which made the use of a crane for off-loading purposes impossible. Off-loading by hand proved to be the only solution and in keeping the weight of the sections down, lengths of steel was restricted to 8 metres long. Mike laughs: "we literally cleared away the snakes before we carried the steel down the narrow pathway that meandered to the site. In total 110 tons of steel was transported to site and off-loaded by hand!

The view of the cottage units over the water.

continued on page 10...

All the sub frames, floor supports and purlins were hot dip galvanized.

There were not many other major obstacles besides the fact that a hippo walked through the site every night!"

Finishing of the steel shell was done by means of fixing 22mm shutterply to the hot dip galvanized purlins. The structure was clad externally with Iroko Timber (a Brazilian hardwood). Internally majestic white oak tongue and groove panels completed the picture. The pathways which connect the main dwelling with the other free-standing units of the lodge were clad in garapa. The roof of the structure was thatched and the developers, in an effort to engage and empower the local community, required that local labour be used. Local Swazi labour was trained and completed the thatching of the dwelling.

The finished product framed by the backdrop of the majestic Lubombo Mountains is a sight to behold. I guess one can say that this is what happens when hot dip galvanizing meets 'Out of Africa".

Desere Strydom
Also see www.royaljozini.com and www.cousinssteel.co.za

The Association wishes to thank Desere Strydom for the above article.

Using an orbital sander can improve the appearance of the hot dip galvanized coating

Some zinc runs, surface roughness and partial discolouration from the quench bath, made the appearance of the hot dip galvanized panel less acceptable from an aesthetic perspective.

The circular motion of the orbital sander is mild enough to not remove a significant portion of the coating but sufficient to improve the appearance!

The appearance of the hot dip galvanized coating after using the orbital sander.

Re-galvanizing a mooring chain results in an exponential increase in service life!

The chain shown in *Figure* 1 was first put into service in May 1996. Two years later, it was lifted and inspected. A photograph of the chain was taken at this time and published in *Galvanizing Today Issue* 11 *September* 1998 (*see Figure* 2 - *the top chain was unprotected and discarded after* 14 *months of use. The lower chain was hot dip galvanized and was in service when this photo was taken*). Red rust (but no pitting) was apparent between the links where fretting (grinding) had removed most of the zinc. About a year after this, deep pits had formed at the fretting surfaces and the chain was stripped in acid and re-galvanized (3 years).

The chain was then put back into service and monitored for the next 11 years. In July 2010, it was removed and photographed – *see Figure* 1. Only three or four links near the end in contact with the D-shackle had corroded significantly further. Even these links appear to have retained at least 50% of their cross section.

Explanation

The corrosive waters of the Vaal Dam tend to form deep pits in the steel links once the sacrificial zinc coating has worn off at fretting surfaces. The sacrificial ability of the adjacent zinc (throwing power) seems surprisingly low.

Re-galvanizing the chain appears to deposit a significant amount of sacrificial zinc into these problem pit sites. Further corrosion is therefore stifled because of the absence of anodic sites.

Rod Rankine Engineering Solutions cc Email: rod.rankine@telkomsa.net
Tel. 011 791 1798 *Mobile* 083 309 4258

Figure 1 (photo above left). The re-galvanized 8mm hot dip galvanized mooring chain after 14 years service in the Vaal Dam. The links of chain in the middle of the photograph were the worst corroded – this end had been attached to the Dee-shackle below the mooring buoy where it experienced the greatest amount of grinding. The links at the bottom had been above water much of the time (attached to the boat) and the links shown at the top represent the average condition the rest of the chain. Figure 2 (photo above right). The chain as it appeared in 1998.

Stratfords Guest House and Conference Centre

Entrance view showing the front laser cut hot dip galvanized signage, which has back lighting for illumination at night *(photo taken in 2001)*.

The application

Building of Stratfords commenced in November 2000 and was entered and easily won the 2001 Hot Dip Galvanizing Awards. The building is situated within easy walking distance of Vincent Park Mall in East London. Al Stratford the current president of South African Institute of Architects was then commended by the judges on the multiple uses of hot dip galvanizing in combination with other materials. They also commented, "The extensive use and novel design combined with striking features provides an aesthetic advertisement for the use of hot dip galvanizing in architectural applications".

Al Stratford.

Besides Al's love of hot dip galvanizing for its honest appeal, he also used it for its potential maintenance free life. In this case history, we do an inspection of the building after 10 years and report back our findings not only in terms of the coatings longevity but also highlight a few areas on the building that due to construction imperfections and nature requires some premature roof and fascia maintenance.

Environmental conditions

Inspecting the hot dip galvanized coating in July this year the residual coating thickness readings taken on a number of components suggest that while the area of Vincent, East London is coastal, the environment is equal to about a C3 corrosion category in terms of ISO 9223 with the predictable corrosion rate of zinc being about 1 to 2µm per year.

The north and south wing run parallel to each other and enclose a cloistered garden that terminates in a covered patio centre. The main dining room is on the right and the reception offices on the left. Note the timber banisters used to connect the hot dip galvanized steel hand rails *(photo taken in 2001)*.

Photo 1.

Photo 2.

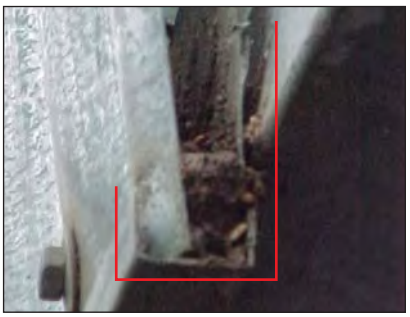


Photo 3.

Photo 4.

Photo 5.

Photo 6.

"S" rib profiled coating class Z600 (SANS 3575) continuous hot dip galvanized sheeting was used as the material of choice in the stressed skin on the South Façade as well as for the roof sheeting on the North wing. Three areas on the sheeting were identified as concerning.

The rainwater anti-drip fascia

The novel rainwater anti-drip fascia at the bottom of the stressed skin façade in 2004 was showing localised corrosion – *see photos* 1 - 7.

Photo 7.

The u-shaped novel rainwater anti-drip fascia (*see red outline following the shape in photo* 3), had collected some cement

continued on page 14...

Photo 8.

Photo 9.

Photo 10.


Photo 11.

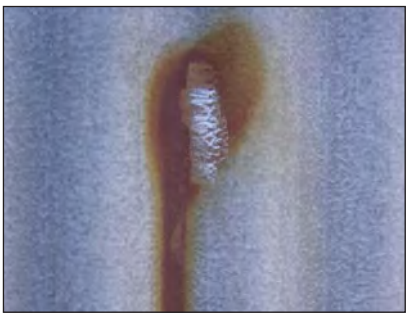


Photo 12.

Photo 13.

Photo 14.

Photo 15.

Photo 16.

Photo 17.

Photo 18.

Photo 19.


Photo 20.

on the inside while the building was being constructed. This prevented the natural exit of any retained water. The solid cement therefore remained wet. This continued wetness facilitated the formation of soluble zinc hydroxide (or wet storage stain), which in turn resulted in some localised corrosion of the sheeting (*photo* 4). The area where the sheeting corroded was fixed and a new fascia (of different shape and in a Z275 coating class – spot coating thickness 12.5µm) was added. S*ee photos* 5 - 7.

Rain water gutter with return lip

This novel shaped gutter also played the role of a fascia and to add strength a 180° return lip was added on the inside, *see gutter shape in red in photo* 9. This lip together with dust, debris and leaf deposits from the closest tree together with the normal rainfall, created the conditions for under deposit corrosion and the gutter over these 10 years corroded through in a few areas (*photo* 10).

discolouration on roof sheeting

One particular spot on the roof sheet on the North Wing of the building was concerning, however, we found that the discolouration on the roof sheet was as a result of an inappropriately coated fastener, which had corroded to a point that the corrosion products now dripped onto the roof sheeting and caused staining. The coating at the discoloured area, however, proved to be intact. S*ee photos* 11 - 14.

Continuous hot dip galvanized sheeting to SANS 3575 *– coating grade* Z600

The sheeting and rain water gutter with return lip in general appeared to


Photo 21.

Photo 22.

Photo 23.

Photo 24.

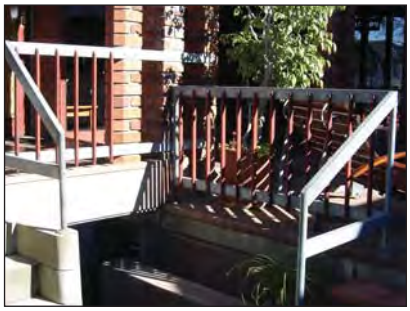


Photo 25.

Photo 26.

Photo 27.

be performing well against the environmental conditions at hand, *see photos* 15 - 19.

In terms of original coating thickness, SANS 3575 *includes various coating grades, from* Z100 *to* Z700. Z600 (*one of the coating grades*) *represents the mass of zinc in grams/sqm. To convert the coating mass to*

continued on page 16...

Photo 28.

Photo 29.

Photo 30.

Photo 31.

Photo 32.

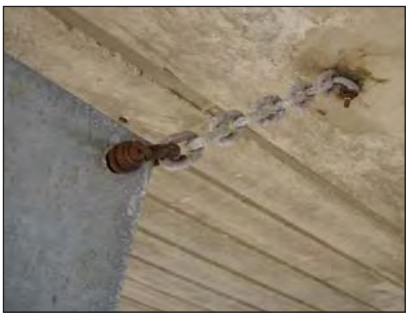


Photo 33.

coating thickness, 600 must be divided by 7 (Specific Gravity of zinc) and by 2 (includes both faces), ie. 600/2x7 = 43µm. The fine print in the specification allows not less than 40% of the individual value (510 gm/sqm) to be found on one surface, ie.29µm. Coating thickness on roof and gutter averaged about 40um.

Zinc fasteners

Some of the original fasteners, which were unfortunately zinc electroplated, were showing signs of discolouration and rust (*see photos* 20 - 21).

The hot dip galvanized coating in general was performing extremely well:

- Hot dip galvanized roofing steelwork and handrails (*see photos* 22 - 27).
- Hot dip galvanized entrance signage (*see photos* 28 - 30).
- Hot dip galvanized visitor's signage – the electroplated shackles were showing signs of rusting (*see photos* 31 - 33).

Conclusion

One of the major benefits of using a metallic zinc coating no matter how applied, is the predictable life performance. This I calculated by measuring the mean hot dip galvanized coating thickness and comparing that with the corrosion rate figures given in ISO 9223, EN ISO 14713-1:2009 or even the Associations Information sheet No 8, available from our web site.

Bear in mind that coating life is proportional to its thickness and for this reason the thinner zinc electroplated coatings on the various screws highlighted, should be suitably cleaned and touched up with an appropriate paint, to ensure a longer durable life span.

The hot dip galvanized coating on both the structural steel as well as the roof and side cladding after 10 years of exposure to the atmosphere in East London, is sound and will not require any refurbishment or replacement for many years to come!

Gautrain Cable Management Systems

The Cable Management System along the station platforms and concourse areas was designed by Cabstrut with assistance from Bombela JVC for the Gautrain project. This particular CMS was manufactured using continuous hot dip galvanized (Z275) steel for the housing of power, communication cables, audio, lighting and signage mounted above the platforms. All external surfaces were white aluminium epoxy powder coated.

The range of Cabstrut products supplied were CL cable ladder and accessories as well as heavy duty cable tray with 150mm side rail all hot dip galvanized for the use in power reticulation.

Hot dip galvanized P1000 single and P1001 double unistrut type channel was used for metal support framing. All sizes and types of brackets including cantilever arms for supporting the metal framing used were hot dip galvanized.

The design of all underground brackets by Wade Walker, Alstom Consortium and Cabstrut which were all hot dip galvanized, were used to support power and signal cables

within the tunnels as well to accommodate the mounting of the underground light fittings.

About 30 000m of Wire Mesh Cable tray including standing support brackets, all hot dip galvanized were installed. The back to back P1001 unistrut type double channel bracket and fixing nuts allowed the contractor to select his most

continued on page 18...

suitable mounting position for cable tray and cantilever arms. A range of hot dip galvanized fixings and fasteners, were used in the installation process.

Hot dip galvanized sliding P1000 unistrut type channel frames designed by Cabstrut for drainage pipe expansion joint supports were incorporated into the Gautrain Viaducts.

All hot dip galvanized pipe hangers and saddles were supplied by Cabstrut for use on the project. Extensive use was also made of the 'Gripple' galvanized steel rope hanging system for stabilising the drainage pipes.

The order to Cabstrut was in excess of R20 000 000.00 for the Gautrain project.

Evaluation of hot dip galvanized cable ladders at Sasol Synfuels, Secunda

General view of the cable ladders and accessories, were located on site.

The Hot Dip Galvanizers Association was requested to evaluate the condition of the hot dip galvanized coating on certain cable ladders and accessories that were over ordered for a project, at Sasol Synfuels, Secunda. The products had been on site since December 2006, with the evaluation and inspection being done on Monday 5 May 2008. I report as follows:

Coating thickness

The cable ladders and accessories are manufactured from 2mm mild steel and in accordance with SANS 121 (ISO 1461) and should have a local coating thickness of 45µm, with a mean of 55µm. *See table* 1, extracted from the specification.

MINIMUM COATING THICKNESS ON ARTICLES THAT ARE NOT CENTRIFUGED – SANS 121 (ISO 1461)		
Profiles	**Local coating thickness min. µm***	**Mean coating thickness, min. µm***
Steel ≥ 6mm	70	85
Steel ≥ 3mm to < 6mm	55	70
Steel ≥1.5mm to <3mm	45	55
Steel < 1.5mm	35	45

Table 1.

COATING THICKNESS (µm)				
	Mean	**Max**	**Min**	**No of readings**
Straights	71	143	51	52
Vertical risers/droppers	61	87	48	36
90° horiz. bends	75	116	55	38

Table 2.

Photo 1.

Photo 2.

Photo 3.

Random coating thickness readings on a representative sample of cable ladders and accessories were taken, *see table* 2.

P*hotos* 1 - 3 provide a pictorial view of typical coating readings (from left to right 75, 72 and 62µm respectively).

discolouration

P*hotos* 4 *and* 5 show some localised discolouration which was scrapped off showing a coating thickness reading of 55µm. P*hoto* 6 shows an accessory that is generally discoloured. This was scrapped off showing a coating thickness reading of 67µm.

Site alterations and coating repair

P*hoto* 7 shows the coating thickness reading adjacent to the area that has been site altered and welded and not repaired. This area must, according to SANS 121 (ISO 1461) be appropriately repaired.

Mechanical damage and over cleaned areas

P*hoto* 8 shows some mechanical damage, all damaged components must be repaired or replaced. P*hoto* 9 shows an over cleaned area on the end of the accessory. This frequently occurs when protuberances, left after the component is withdrawn from the molten zinc, are enthusiastically removed, not only at the galvanizer but also afterwards. When removing the

continued on page 20...

Photo 4.

Photo 5.

Photo 6.

protuberances the coating is frequently over cleaned, resulting in uncoated areas. These too require repair.

Conclusion

Before a conclusion can be reached it is important to understand how zinc protects.

A hot dip galvanized coating (Zn + Zn / Fe alloys) provides corrosion protection in two ways. The first and most important feature is the provision of a virtually impermeable barrier between underlying steel and the environment i.e. there is minimum coating porosity.

The second and extremely significant feature is the cathodic protection provided by zinc to steel. Zinc is electronegative (anodic) to steel and hence it will be sacrificed preferentially while the steel is protected even at small uncoated surfaces. This is also the reason why corrosion (rust) cannot creep underneath a hot dip galvanized coating.

Photo 7.

Zinc is aptly described as a wasting protector since it also corrodes although of course, at a substantially lower rate than steel in most environments. It is thus correct to state that the life of a galvanized coating is more or less proportional to its thickness in a given environment which is why galvanizing specifications provide for minimum acceptable coating thicknesses.

Despite its use to prevent corrosion, zinc itself is a highly reactive metal. Inevitably on exposure to the atmosphere (e.g. withdrawal from molten zinc in the galvanizing bath) the zinc surface reacts to form zinc oxide and unstable zinc hydroxide, (white rust) which may not necessarily be visible to the naked eye. At the same time, oxygen and carbon dioxide react with the zinc to form a stable, tightly adherent and durable basic zinc carbonate surface film which provides the durability for which hot dip galvanizing is reputed. The initial shiny appearance with a metallic lustre disappears to be replaced by a matt, light grey appearance.

In polluted industrial environments, the presence of sulphur dioxide will result in the formation of sulphur

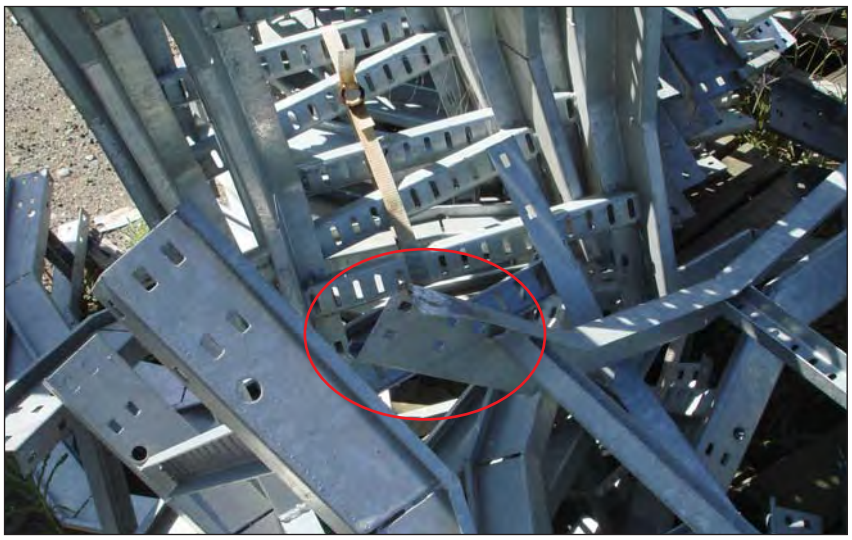


Photo 8.

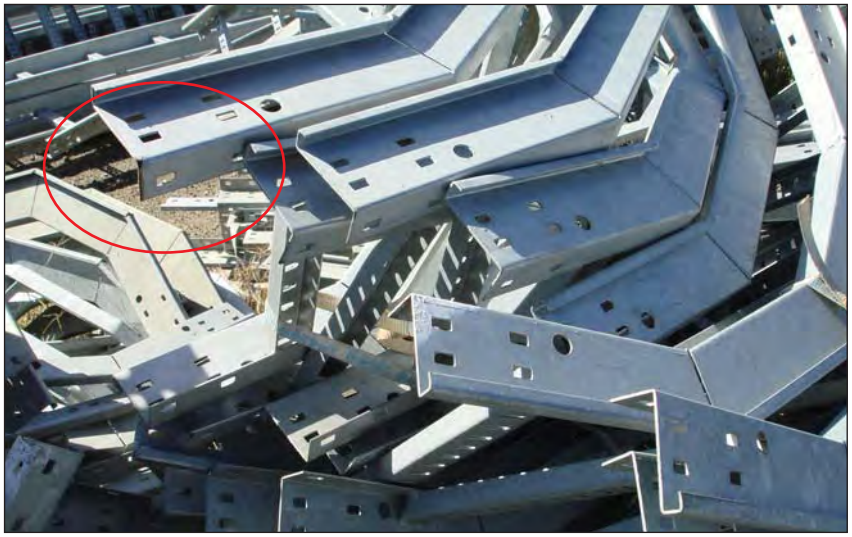


Photo 9.

containing zinc compounds, which are generally brownish in colour.

For the above reasons and the confirmation of the coating thicknesses taken randomly on a selection of cable ladders and their accessories at the site, the hot dip galvanized coating is in similar state to what it was when originally delivered, coating thickness is still in excess of that required by the specification SANS 121 (ISO 1461). The cable ladders and accessories are therefore acceptable and will provide a similar life to those supplied new.

Some cable ladders and accessories require corrective action in terms of coating repair and mechanical damage. Kindly refer to our coating repair procedure.

Terry Smith

Craig Woolhouse from Elcometer in Manchester, UK will be in South Africa during September for the 'Coatings for Africa Conference' in the Drakensberg.

He will be presenting a paper at the Conference which runs from 15 to 17 September. In addition to this he will be doing 3 presentations in Durban, Cape Town and Johannesburg. These will be a 40 minute presentation followed by a question and answer session.

DETAILS AS FOLLOWS :

Durban:

Date: Tuesday 14 September 2010
Time: 16h00
Venue: Plascon Durban
1236 South Coast Road

Cape Town:

Date: Monday 20 September 2010
Time: 16h00
Venue: Kelvin Grove, Newlands

Johannesburg:

Date: Tuesday 21 September 2010
Time: 16h00
Venue: SAPMA Board Room,
Bedfordview

There will also be an opportunity for a hands on session to cover new Elcometer products.

Please RSVP for catering purposes to Graham: sales@bamr.co.za

Hot dip galvanizing – the bookmaker's firm favourite!

When specifying a cable support system, remember it is 'horses for courses', but hot dip galvanized steel remains the bookmaker's firm favourite.

At Strutfast (Pty) Ltd we have divided our cable management market into two specific sectors, namely, Commercial and Industrial.

Double sided cable ladder will not easily twist when loaded.

Commercial and industrial sectors

The commercial market is defined as the market wherein regular support of cable carrying products are generally available from building structures such as walls, floor slabs, roof structures or closely spaced structural steel members. Typical examples of this sector are low, medium and high rise office buildings, hotels, factories etc.

The industrial market is defined as the one in which regular supports of cable carrying products are generally not available and where additional structural supports are required for fixing of our cable carrying products. Typical examples of this sector are mining, petro-chemical, and numerous other structural or heavy industrial type installations. As one can envisage from the above, the technical requirements for the cable support system in the commercial sector are generally less demanding / stringent than for the cable support system in the Industrial sector.

Cable ladder versus cable tray

The two distinctly different product types used for carrying cables are defined as '*cable ladders*' and '*cable trays*'.

The cable ladder is made up of two side rails (or stringers) and cross rungs fixed at right angles between the side rails, whereas the cable tray is a flat shallow product, resembling a tea tray.

Unfortunately specifiers and contractors alike make use of a third term, namely '*rack*'. This term should be avoided, as it does not define the product type to be used.

The correct selection of a '*ladder*' or '*tray*' is determined by considering the specific characteristics of the cables being carried. Whereas instrumentation cables generally require the continuous support afforded by a cable tray, the more inflexible, rigid, but heavier electrical cables require support at intervals as afforded by the structurally stronger cross rungs of the cable ladder. In commercial use the installation of both cable ladders and trays are easily accomplished by way of an overhead support system, either in the ceiling void fixed to the concrete slab or to structural steel members. The cable ladders or trays are then mounted in the horizontal plane supported at 1.5 to 2 metre centres. As the structural strength of cross rungs of cable ladders are far superior to the flat sheet or wire of the cable tray, cable ladders are able to carry heavy cable loads across a wider width than the cable tray in the horizontal mounting position. It is for this reason that cable ladders are manufactured to widths of 1 000mm or more and cable trays are restricted to a maximum width of 600mm.This rather obvious structural reality is often ignored by electrical specifiers, who regularly insist on cable trays of 1 200mm wide.

Metal framing

An assortment of bracketry, F1000 strut profiles and spring nuts known collectively as '*metal framing*' affords the electrical installer of cable support systems, the ability to easily and quickly install a cable support system capable of carrying the cable design loading specified for a project, without requiring welding on site.

Design and specification of a cable support system

The specification of cable support systems generally falls under the jurisdiction of the electrical or instrumentation engineer, due to the fact that he controls the cabling. As a well designed cable support system requires expertise in structural and

corrosion engineering, it is necessary for the specialist supplier of cable support systems to offer technical support in these areas to ensure that their products are correctly specified for each particular application.

Suppliers of cable support systems offer the market a wide range of products with varying cable carrying capabilities, manufactured in many materials and finishes (e.g. graded stainless steels, 3CR12, aluminium, fibre reinforced plastic, hot dip galvanized mild steel, duplex coated hot dip galvanized mild steel and industrial paint systems on mild steel), to cater for every type of corrosive environment imaginable.

We believe that, as there are *'horses for courses'*, similarly this range of products enables the designer to select the best option that will satisfy a specific set of structural and environmental design requirements for the life of the plant.

Structural design considerations for a steel cable support system

Reputable suppliers of cable support systems should be able to predict the load carrying capability/performance of each of their products at different support spans in order to recommend the most suitable product for a particular use. In order to do this, all cable carrying products should be designed and categorised in accordance with local and international standards.

The real challenge in the design of a cable support system lies in the industrial market, where cables often have to span long distances without intermediate supports. The design also depends on the preference of the electrical engineer, either to a) support the cables by laying them on a horizontal cable ladder/tray (bed), or b) tie them to an edge mounted cable ladder/tray (wall).

a) Horizontally mounted cable support systems

Structural supports are available at regular close intervals in building structures. Commercial quality mild steel cable ladders and perforated cable trays have been in use to support cables in our South African buildings for half a century. In the seventies and early eighties the likes of GKN Sankey and Brownbuilt Metal Sections marketed and sold these rather basic products, together with their Sankeystrut and Unistrut brands of metal framing products. These products were marketed as P76 medium duty and P55 light duty cable ladders, heavy duty, medium duty and light duty perforated cable trays. These products were all hot dip galvanized except for the light duty cable trays, which were manufactured from continuously hot dip galvanized Iscor steel (Iscor is now known as ArcelorMittal). Today all of

continued on page 24...



Trident using Strutfast's LONGBOW 20B Cable Support System, which has been designed and developed by Strutfast in compliance with the NEMA Standard VE-1. The Class Designation 20B signifies that it is capable of carrying a cable working load of 112kg/m over an unsupported span of 6 metres. The heavy duty supports were also designed and supplied by Strutfast. (All items hot dip galvanized to ISO 1461 by Galvadip).

the branded suppliers continue to sell their own brand of these generic products, because they are well known to all specifiers and contractors alike. Strutfast markets its range of these generic products as F76 and F55 cable ladders, HT76, MT38 and LT12 and LT19 cable trays.

Although a number of suppliers have manufactured a cable ladder system from continuously hot dip galvanized steel or stainless steel and using mechanical fixing of the cross rungs to the side rail, thus obviating the need for welding, this innovation has failed to replace the P76 and P55 hot dip galvanized or stainless steel cable ladder system. All brand suppliers today also offer the market an improved perforated cable tray product by utilising the concept of a return flange, which is structurally superior to a straight turned up side section. The generic heavy duty and medium duty cable trays, however, remain in demand by our local market and are still being utilised in large volumes to serve the cellular industry throughout Africa.

Until some eight to ten years ago local designers had no real need for supporting heavy cables on horizontally mounted cable support products over very long spans (six metres). South Africa's acceptance as a member of the global village changed all that during the nineties. We established that engineers in a significant part of the globe favour laying their cables on a cable ladder or tray, which is mounted in the horizontal plane, contrary to Southern African mining engineers, who preferred to strap their cables on edge mounted support systems. When mounted in this position over long spans, the cable ladder or tray requires a deeper side rail profile in order to satisfy the design load requirements.

There is presently no South African standard that governs cable support systems and the NEMA Standard VE-1 is widely accepted in many parts of the globe to establish the technical requirements of manufacture, performance and testing of horizontal mounting cable tray systems. As it is Strutfast's policy to consistently manufacture cable ladders of known quality and predictable cable load capacity, this Standard has been adopted in order to classify our cable support products intended for horizontal mounting in accordance with these global design requirements.

Strutfast's LONGBOW range of Cable Ladder Systems has been designed and developed in-house and satisfies all of the requirements of NEMA Standard VE-1. This claim has been verified by reputable independent test authorities. Strutfast's LONGBOW 20B and 20C Cable Ladder/Tray System respectively carries a cable working load of 112kg/m and 149kg/m over an unsupported span of 6 metres.

b) Edge mounted cable support systems

In the local Industrial market South African engineers generally favour strapping their cables to an edge mounted cable ladder/tray. More than twenty years ago a well known



The Strutfast product used on this installation is our SB75 STRONGBOW Cable Ladder. The finish is hot-dip galvanized to ISO 1461 by Galvadip. The installation Contractor is Craig Miller Technical Services.

brand supplier recognised this engineering preference, as well as the mining industry's abundant use at the time of rather rudimentary and heavy welded angle and flat bar cable ladders. This inspired the design and development of a sheet metal product that all but replaced the use of the tried and trusted angle and flat bar cable ladder on our mines.

The outstanding features of this product are full welding at the junction of each cross rung with the side rail and extended bottom flange, thus creating a rigid fixed joint. It is these rigid fixed joints which provide this product with its superior structural strength to carry cable loads over a relatively long span of 3 metres when mounted on its edge, without showing noticeable signs of sagging. In addition, the end of each cross rung is cut back at an angle in order to allow a generous opening for zinc flow during hot dip galvanizing.

Strutfast's STRONGBOW Cable Support System has been designed following these above structural design principles for superior strength for carrying cables whilst mounted on edge.

The fact that numerous specifiers continue to incorrectly specify the totally inadequate P76 cable ladder system for mining and heavy industrial edge mounting applications is an indictment to the cable support system suppliers' inability to provide specifiers with correct technical product information and necessary support.

Whilst the STRONGBOW Cable Support System is a great product for most heavy duty mining and industrial applications, like any product, it has its design limits. As the product allows the installer to strap cables on one side of the ladder only, whilst mounted on edge, the cable load is of necessity eccentric to the centroid of the cable ladder section and consequently the product tends to twist progressively relative to the magnitude of the cable load and the distance between supports.

The obvious structural solution of utilising a double sided cable ladder system which is loaded with cables progressively and equally on each side will ensure that the product will not twist and fail over long spans of 6 metres or more. Cross bracing between vertical cross rungs will further provide structural strength over long spans. Often electrical / instrumentation engineers piggyback single sided edge mounting cable ladders on long spanning pipe (or other services) bridges on industrial projects and in this manner utilise an otherwise unsuitable, but more economical product such as the F76 Cable Ladder System.

continued on page 26...

In line with our passion to provide our market with new and innovative products to satisfy all of the electrical/instrumentation engineer's needs, wants and requirements, Strutfast has designed and developed a single sided cable support system, which is capable of carrying cables in an edge mounted application over unsupported spans of between 4 and 10 metres.

Environmental design considerations for a steel cable support system

Reputable suppliers of cable support systems should be able to predict, within reason, the life expectancy / corrosion resistance of each of their products in differing materials and finishes in order to recommend the most suitable material and/or finish for use in a particular corrosive environment. In order to do this, all materials and finishes should conform to local and international standards.

Specifiers and contractors alike should always insist on material certification and finish certification to be provided with supply of products ordered.

a) H*ot dip galvanizing*

The coating of choice for ninety per cent of our stock of cable support system product is hot dip galvanized to SANS 121 (ISO 1461) in the case of our mild steel manufactured items. Some of our commercial cable trays and wiring trunking where no welding is required during fabrication is fabricated from continuously hot dip galvanized Z275 sheet to SANS 3575 (ISO 3575). Even considering the price fluctuation in the cost of zinc over the years, I cannot envisage a more ideal coating for our products than hot dip galvanizing to an agreed standard of quality required by the electrical specifier.

Any hot dip galvanizer wishing to coat cable support products has to realise that his coating is part and parcel of the product. This, of necessity, means that surface roughness and spiking on the cable bearing surfaces and at splice mating surfaces are unacceptable, whether otherwise acceptable to SANS 121 (ISO 1461), or not. It has been my experience that whereas some plants are unsuited to galvanize our products, others are unwilling to go the extra mile, regardless of price.

To those galvanizers who are willing to work together with manufacturers and suppliers like ourselves in order to produce a quality product, which meets all of the design requirements of our industry, your positive attitude will serve to retain hot dip galvanizing as the preferred coating of cable support systems into the future. For your sustained reliable service and quality galvanizing of our products over many years, I wish to thank Galvadip, our primary hot dip galvanizer.

b) U*ncoated corrosion resistant material*

In line with Strutfast's philosophy for superior selection of the most suitable cable support system that will satisfy a specific set of structural and environmental requirements for the life of the plant, we believe that each grade of stainless steel, 3CR12, each grade of aluminium, fibre reinforced plastic with its specific resin and reinforcing system could be the best *'horse for a particular course'*.

As it is my objective in this article to justifiably sing the praises of hot dip galvanizing as a wonderful corrosion protection system for steel, I shall not

herein elaborate on the undeniable benefits of selecting a cable support system manufactured from one of the above materials which has superior corrosion resistant properties ideal for performance in certain corrosive environments.

c) Reliability of a hot dip galvanized coating versus a paint coating

When considering the various protective coatings available for use on a cable support system, which is expected to perform in a corrosive environment, it is important to realise that premature failure of any protective coating on a cable support product will have catastrophic consequences relative to premature coating failure on general mild steel products such as structural steelwork, hand rails, walkways etc.

As a cable support system's purpose is to carry cables, the designer of said system should always be acutely aware of the massive additional risk that he / she or his client is facing, if the coating that he is considering in the design is susceptible to premature failure. Failure of the coating invariably means that the plant will have to be shut down in order to uplift the cables and install a new cable support system. The designer should at all times take account of this massive potential risk and not be short sighted when a paint coating shows a cost saving ahead of a corrosion resistant material option, which guarantees a very low risk of failure.

In order to properly weigh up the risks of premature coating failure of hot dip galvanizing and paint, the late Dr Jan van Eijnsbergen, the eminent paint chemist, used statistical methods to determine the '*reliability factor*' of a particular coating system. His objective in doing this was to be able to evaluate the reliability of any applied coating. Without going into any further detail of his further work in this regard, a brief analysis of his comparison of the reliability of the application of hot dip galvanized coating versus paint coating reveals that the former coating application is almost 400% more reliable than paint coatings. This analysis does not do justice to the true reliability of galvanized coatings as it deals only with the application stage of the process. Once the hot dip galvanized coating is present, it will never fail from application related factors, as the galvanized coating will not form on other than perfectly prepared steel surfaces. Contrary to this fact, any paint can be applied to any surface to give a satisfactory initial appearance.

The above analysis proves that:

1. A paint coating is heavily dependent on application and they are statistically 400% more likely to fail than galvanized coatings.
2. Hot dip galvanized coatings never fail because of poor application and their performance is not affected by transport and handling.

Electrical/instrumentation engineers, who are not necessarily knowledgeable regarding corrosion resistant coatings or material, should clearly appreciate that the choice of a paint system on a cable support system is extremely risky, particularly when compared with an alternative choice of a product manufactured from a single material which has corrosion resistant properties and a well known record of performance in that particular corrosive environment. They should always insist on the risk-free option for their cable support systems.

The risk element in considering paint options on cable support systems escalates exponentially when the installation thereof are situated in areas of Africa, which have little or no resources or infrastructure to deal with a coating failure.

Lessons on business ethics from cleaner fish

There and many examples in nature of mutualism, where a cooperative relationship between two different species produces a fitness benefit for each species that increases the individual species' chances of survival. The opposites of mutualism are interspecific competition, where both species lose, and exploitation, where one species benefits at the expense of the other. It has been found that 70% of all land plants rely on cooperative relationships with fungi to provide them with life-giving compounds and most of the natural diversity we see around us is a result of cooperation between groups of species in a biological evolutionary way.

A wonderful example of mutualism is found with cleaner fish, typically the genus Labroides found on coral reefs in the Indian and Pacific Oceans. These fish provide a cooperative service to other larger fish by removing dead skin and parasites. The client fish are better off without parasites and dead skin while the cleaner fish survive on their client's debris.

One can understand that a continuous diet of parasites and dead fish skin must be pretty boring, so every now and again a cleaner fish, seeking something a bit more exciting, takes a bite out of the fish he is cleaning. Obviously, the client is upset at having been nipped by something as lowly as a cleaner fish and quickly swims away. One may suspect, however, that the client will soon forget this incident in the hurly-burly of cleaning but scientists have shown that client fish actually eavesdrop on the heroic and boastful conversations of cleaners

(perhaps, in a sort of fishy pub, 'The Coral and Reef') and soon get to know who the most reliable cleaners are and, especially, which cleaners have a tendency for biting. They rate the cleaners on the basis of cooperative or non-cooperative behaviour as well as on 'image', like their reputation for being biters.

There is also another form of cleaner fish, the sabre-toothed benny Aspidontus taenitus that just mimics the behaviour of decent hard-working cleaner fish to attract a client. As soon as the client is nearby, the little devil takes a bite out of the client and darts away to safety. Client fish generally know who these are and try as much as possible to avoid them. They do this by being more in the company of good and honest cleaner fish.

Scientists have shown (please don't ask how they do these tests) that experienced cleaners, who know that they are being continuously rated are unlikely to repeat their biting antics. When they move to a new area, however, where there is a new group of clients, they become biters again, at least until they recognise that there is an image-scoring situation going on among their clients. They take their chances until they realise that their antics are losing them customers.

Cleaner fish work individually or in pairs. When working in pairs, if one of them nips the client and the client moves away, then both obviously suffer. If they work individually, then of course, they alone suffer if they bite. Scientists have now also shown that cleaner fish are less likely to bite when working in pairs: they seem to have an inherent sense of obligation to their partners.

As in business, cleaner fish depend for their survival on relationships: between themselves and with their clients. The currency of these relationships is mainly that of reputation. Unethical behaviour, like taking advantage of your client, harming your partner's chances of success and being dishonest will slowly but surely destroy your reputation and irrevocably damage business relationships. Like the cleaner fish, however, we have an inherent sense of fairness. Although we may not always think so, our capacity and potential for ethical behaviour is an important part of our make-up as a human being.

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

"It only works when you don't need it!"

In this second article in this series, the behaviour of zinc in concrete is explored to explain the nature and extent of the corrosion protection afforded by galvanizing. Further articles will explore the design and structural considerations for galvanized reinforcement, applications of galvanized reinforcement and a portfolio of world-wide examples.

Passivation of steel in concrete

Steel in concrete is protected against corrosion by a passivation mechanism in which adherent and protective corrosion products form on the surface of the steel. The reason for this passivation is the high alkalinity of the concrete pore-water solution, the pH of which in hydrated concrete is greater than 12.5. Under these highly alkaline conditions of concrete a microscopic oxide layer is formed on the steel surface of the reinforcement, the so-called passive film. This passive film impedes the dissolution of the iron and so the corrosion rate is severely limited, even in the presence of moisture and humidity.

Galvanized steel in concrete

Galvanized steel embedded in concrete is similarly passivated but there are differences to the passivation of steel. The main difference to steel is that zinc is an amphoteric metal. This means that the zinc is stable over a wide range of pH, from approximately 6 to 12.5, but below and above these values the corrosion rate increases exponentially as shown in *Figure* 1.

Studies of the behaviour of zinc in alkaline solutions has revealed that in a pH interval between 12 and 13.2 ± 0.1 the

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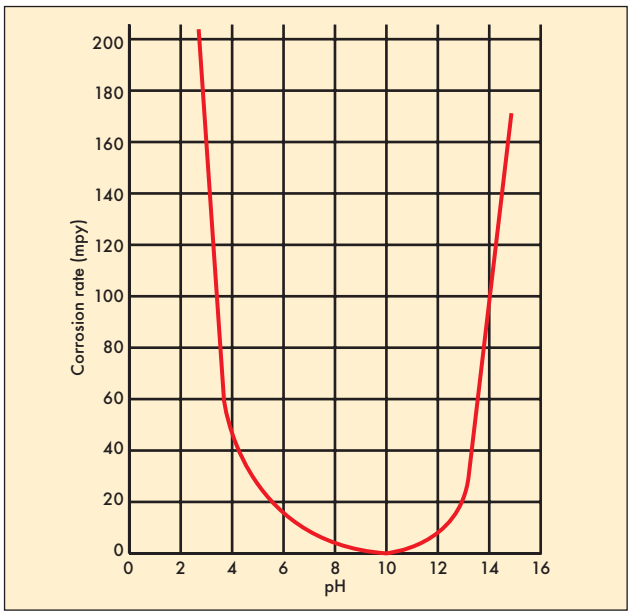

Figure 1. The corrosion rate of zinc as a function of the pH of the environment

galvanized coating corrodes at an acceptably low rate and the corrosion product that causes the passivation of zinc in calcium-rich alkaline solutions is calcium hydroxyzincate (CHZ). Even though the morphology of this layer varies with the pH of the contact solution, once the passive film of CHZ is formed its stability is not altered even if the pH increases to a value of 13.6 ± 0.1 which is fairly typical of normal concretes.

The evolution of hydrogen

Simultaneous with the processes of passivation, hydrogen evolution occurs along the bar surface. This reaction initially is quite vigorous but it steadily decreases with time due to the continued formation of the surface layer of CHZ which eventually becomes continuous on the surface with the hardening of the cement paste.

Electrochemical studies have revealed that while the generation of hydrogen is common, the total duration of the reaction depends primarily on two factors:

- the chromium content of the cement which varies considerably in different cement types and may completely suppress the hydrogen evolution; and
- the alkali content of the cement and therefore the pH of the pore solution.

As will be discussed in the next issue, the main consequence of the hydrogen gas evolution is the formation of bubbles at the bar/concrete interface which is thought responsible for some loss in bond of galvanized reinforcement when no chromium additions are made to the concrete or when separate chromate passivation of the bars is not performed. However, this decrease in the contact zone at the interface is only transitory, as the formation of the CHZ crystals progressively fills these gaps and so this effect is of minor significance.

Influence of the galvanized coating structure

What is well known is that the different microstructures of galvanized coatings have a significant effect on the stability of the coating in contact with alkaline solutions. This is primarily because it is the outer pure zinc layer (h) which provides the most effective passivation, while the underlying Fe-Zn layers are less stable particularly so in the presence of chlorides which selectively attack them.

In conventional galvanized coatings, the attack on the galvanized coating during passivation is by dissolution of the external pure zinc layer while for annealed galvanized coatings the Fe-Zn alloy layers disintegrate by selective attack in which the zinc is used to develop the CHZ film. From this it has been deduced that galvanized coatings should have sufficient reserve of the pure zinc layer (at least 10 mm) to enable the development of a perfect, and so passivating film of calcium hydroxyzincate.

There are two main circumstances that need to be separately discussed when considering the behaviour of galvanized reinforcement in concrete as follows.

Carbonated concrete

The carbonation or neutralisation of the cover concrete is one of the principal reasons for the corrosion of black steel reinforcement. The pH of the concrete changes from highly alkaline to values around neutrality (pH 7) due to reaction with slightly acidic rainwater from the atmosphere.

From *Figure* 1 it is clear that at low pH the rate of corrosion of zinc is very low and so it would be expected that the galvanized coating would perform well. This has been confirmed by extensive research and field observation which have shown that galvanized steel does not corrode in carbonated concrete.

The presence of chlorides

Chlorides are the most frequent cause of reinforcement corrosion. The chlorides are present in the concrete from two sources: the mixing as part of the raw materials (water, aggregates or as an admixture); and from marine exposure or the use of deicing salts. In both cases the attack on the reinforcement is localised (i.e. pitting) resulting in a reduction of the cross section of the reinforcement.

TYPE OF EXPOSURE	CHLORIDE LIMIT
Prestressed concrete	0.06
Conventional RC – moist environment and exposed to external chlorides	0.10
Conventional RC – moist environment but not exposed to external chlorides	0.15
Above ground building where concrete will stay permanently dry	No limit
ACI Committee 20, Guide to Durable Concrete, Chapter IV, 1994. Limit expressed as percentage by weight of cement.	

Table 1. ACI recommended limits for chlorides in concrete.

For black steel, corrosion initiates when a threshold value of the chloride ion in the pore solution is reached. This threshold concentration depends on the pH and increases as the pH increases. The American Concrete Institute has published recommended limits for chloride in concrete in contact with black steel as in *Table* 1.

It is to be noted that these values are not necessarily the chloride threshold; rather they are a conservative recommended limit. In most specifications an actual chloride content of less than 0.2% of the cement content (or 0.6 kg/m^3 of concrete) for a low corrosion risk is recommended. This value is more often reported as the chloride threshold.

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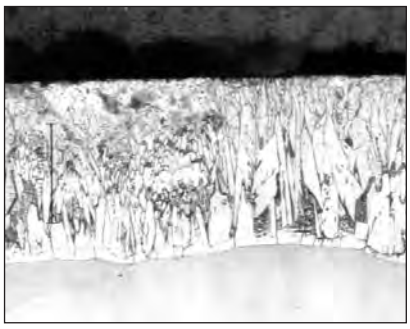
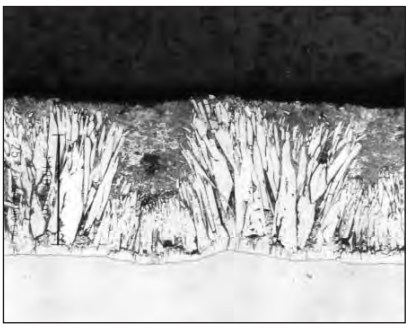
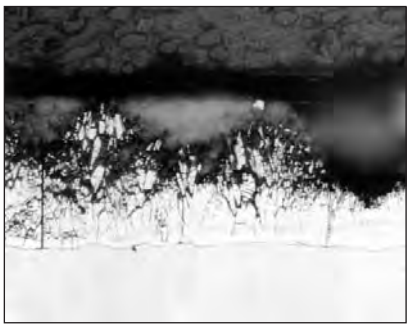


a) Freshly galvanized steel with 180 µm thick alloy layer coating.



b) Galvanized bar exposed to fresh concrete showing partial loss of outer pure zinc layer. Remaining coating – 164 µm thick.



c) Exposure to chloride-contaminated concrete showing loss of pure zinc layer with intrusions around alloy layers. Average coating thickness – 110 µm.

Figure2. Changes in the galvanized coating with exposure to concrete. (200x)

In contrast, there is no universal agreement on the resistance to chloride attack of galvanized reinforcement. What seems clear however is that while zinc is also attacked by chlorides, a higher chloride threshold is needed. Research with galvanized bars in simulated cement solutions has shown that zinc succumbs to pitting attack at chloride ion concentrations some 5 - 6 times higher than that required for black steel.

Similarly, a range of laboratory studies with galvanized bars in concrete mixes and also field studies have shown that the chloride threshold for galvanized bars is at least 2 - 2.5 times higher than that for black steel. Some results suggest as much as 8 - 10 times higher. This factor is a major reason for the long-term durability of galvanized reinforcement in concrete exposed to aggressive environmental conditions where chlorides are present.

What is also evident is that the galvanized microstructure has an important influence in that the absence of the external zinc layer produces much higher corrosion rates while the alloy layers are less resistant to chloride attack than the pure zinc. In consequence, the most resistant galvanized coatings are those with a thicker external layer of pure zinc. When plain zinc bars are used, low corrosion rates are measured while galvannealed coatings are catastrophically destroyed when used in chloride-containing concrete. Thus the more resistant part of a galvanized coating is the pure zinc outer layer, and the weakest (or less resistant) is the underlying alloy layers.

Further, the resistance of the galvanized reinforcement against chloride penetration depends on the compactness of the CHZ layer and on the microstructure of the remaining coating. By the time the chlorides reach the reinforcement, the CHZ layer should have already been formed. Thus, if it is compact and continuous and the remaining coating has a thick enough pure zinc layer to resist pitting attack, the galvanized coating will resist chloride attack quite well.

If the amount of chlorides continues to increase, the threshold, although higher than for bare steel can ultimately be reached and the corrosion of the galvanized layers develops. This delay in the onset of corrosion with respect to the bare steel is known as the extension of the service life of the reinforcement provided by the galvanizing. This has variously been reported for galvanized bars to be in the range of 4 - 5 times longer that that for the corrosion of black steel in equivalent exposure conditions.

The issue of the extension of the life of galvanized coatings can be demonstrated by a simple calculation of the time to corrosion of black steel and galvanized steel in similar exposure conditions as follows:

- for black steel, assume an upper threshold value of 0.4% Cl- by mass of cement; and
- for galvanized steel, assume a lower threshold of 1.0% Cl- based on conservative experimental and field data.

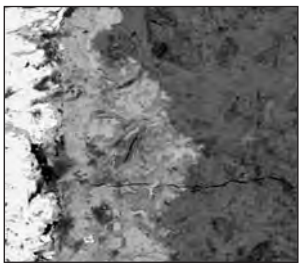
For the calculation, assume an equivalent exposure condition in a marine concrete:

- 0.35% chloride ion concentration at the concrete surface; with
- 30mm cover to the reinforcement; and
- a diffusion coefficient D = 1.4 x 10-12 m^2/s.

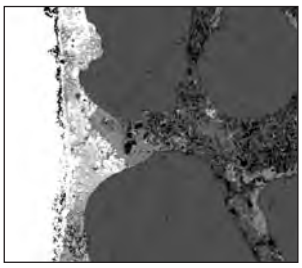
Fick's Law predicts that for black steel corrosion of the reinforcement will initiate after 15 years, while for galvanized steel attack initiates after 44 years. This indicates a theoretical extension of life of three times for galvanized bar over black steel bar. In practice however, the extension is normally much longer.

Behaviour of the coating

An understanding of the reaction mechanism of the zinc alloy coating when placed in concrete and the characteristics of the corrosion products so formed is fundamental to a full appreciation of the corrosion protection afforded by the galvanizing of reinforcement.



a) Showing partial dissolution of the galvanized coating (left) and plume of zinc-rich corrosion product (centre) migrating into cement matrix. (1000x)



b) Migration of zinc-rich corrosion products away from the bar/matrix interface into the cement matrix. Large particles are sand. (100x)

Figure 3. SEM images of interfacial zone between bar and matrix showing the presence of zinc corrosion products (white plume).

The research that has been done in this area has shown that the mode of dissolution of the galvanized coating depends on the state of the galvanized surface. If the coating exhibits a pure zinc layer, it dissolves uniformly at first and only later does localised attack occur in the alloyed layers. What is clear is that when the galvanized coating first comes in contact with wet cement and is initially passivated, about 10µm of zinc is dissolved from the pure zinc (eta) layer of the coating.

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This is shown for a galvanized steel with an initial coating thickness of 180µm (*Figure 2a*) embedded in non-chloride contaminated concrete for a short period (*Figure 2b*) where the average thickness of the coating remaining is 164µm. Studies of galvanized bars recovered from field structures indicate that the coating remains in this condition for extended periods of time provided the conditions in the concrete do not significantly change. In such circumstances, very little further metal loss will occur until the zinc is depassivated and active corrosion commences.

Once active corrosion of the zinc initiates, usually due to the accumulation of high levels of chloride, continued dissolution of the eta alloy layer occurs followed by attack on the underlying alloy layers (*Figure 2c*). This attack results in the formation of deep tunnels and holes in the alloy layers, particularly around and through the zeta phase which comprises the bulk of the coating. Despite this however, a dense layer of both the gamma and delta phases remains intact at the bar surface and this affords ongoing corrosion protection to the underlying steel. Even if the coating is completely lost from small areas of the bar surface, the zinc continues to provide sacrificial protection over distances of up to about 8 mm (as revealed in one experiment).

Zinc corrosion products

Considerable work has also been done to identify the nature of the corrosion products produced and the effect of these on the concrete mass. A number of minerals have been identified in the corrosion products, primarily zinc oxide and zinc hydroxide. A unique feature of these products is that they are friable (loose and powdery) minerals, are less voluminous than iron-rich corrosion products, and are able to migrate away from the bar and into the adjacent concrete matrix where they fill voids and microcracks. This is shown in *Figure 3* in which the plume of zinc-rich corrosion products appears white against the gray calcium-rich cement matrix.

In contrast to the situation with corroding black steel, the zinc corrosion products cause very little physical disruption to the surrounding matrix, thereby maintaining the integrity of the cover concrete. There is also evidence that these corrosion products fill pore spaces in the matrix thus creating a barrier in the matrix of reduced permeability. This not only increases the adhesion of the matrix to the bar but may also reduce the transport of aggressive species such as chlorides through the matrix to the coating surface. Because of this galvanized steel continues to provide long-term protection in concrete even if the zinc is actively corroding due to high chloride levels.

Professor Stephen R Yeomans, Senior Visiting Fellow, University of New South Wales, Canberra, Australia.

DDL Equipment – dock levellers: an update

In 2005 the winner of the Mining and Industrial Category at our annual awards dinner was DDL Equipment for their innovated Dock Leveller.

The outstanding feature of this particular submission was that Mr. Andrew Stewart, MD of DDL Equipment chose to use hot dip galvanizing as the preferred corrosion control system for his design. This represented a departure from the more traditional paint systems that was subjected to mechanical damage once commissioned and in service.

The Hot Dip Galvanizers Association was indeed fortunate to be in a position to revisit DDL Equipment and review progress of how these dock levellers have been accepted by the market.

We were delighted to learn that the project was making positive progress with substantial market interest and acceptance.

Interest in this equipment has extended to as far as Angola with the despatch of 20 dock levellers together with pit frames, truck wheel guides, free standing units and side safety skirts, all hot dip galvanized, and including DDL Equipment's Dock Cubicle Contact Curtain Seal. The consignment was to be installed as part of a large distribution centre in Luanda Angola.

The company offers a range of products suitable for equipping large warehouse facilities, including various types of galvanized lift tables, elevating docks with lifting capacities from 500kg to 10 tonne, dock sealing systems and a full range of door systems.

July 2010, Mr. Andrew Stewart (left), MD of DDL Equipment, with Bob Wilmot of the Association, inspecting a hot dip galvanized dock levellers during our follow-up visit to the company..

Inspecting a series of hot dip galvanized truck wheel guides prior to despatch to another client.

Duplex coated (hot dip galvanized and painted) dock levellers being loaded for despatch to Distribution Centre in Luanda Angola.

Over the immediate past 8 months the company has supplied 54 units ranging from the Angolan customer, General Motors, Ford, Crown Chicken Uitenhage and Sunningdale Dairy.

Hot dip galvanized Lifting Table, Clover Boksburg – in compliance with the new Food Safety Act and H.A.C.C.P.

Galvanized Dock Leveller at a Dock Loading Bay with a Combo Sealing System using Aluminium Backing on Mounting Plates.

It is rewarding to see how Mr. Stewart has embraced the use of hot dip galvanizing for use as the preferred method of corrosion control system for his various designs.

Thank you for sharing your successes with the Association as we believe that the trust that you have placed in hot dip galvanizing for corrosion control is fully justified.

NOW WITH CPD POINTS

Galvanizers Inspectors Course

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

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

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

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

COURSE CONTENT

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

COURSE DURATION

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

DATE AND TIME

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

Johannesburg:
February 16 - 17; March 17 - 18; April 20 - 21; May 18 - 19; June 22 - 23; August 17 - 18; October 5 - 6 and November 23 - 24.

Cape Town:
May 11 - 12; September 7 - 8.

Special courses can be arranged for a minimum of 6 delegates at any venue in South Africa.

COURSE COST AND PAYMENT TERMS

R2 800.00 per person inclusive of VAT. Should you have 2 or more delegates from the same company, course costs will be R2 600.00 per person inclusive of VAT. Please note that payment is due on the first day of training. Cheques to be made payable to "Hot Dip Galvanizers Association SA". Members qualify for a discount.

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

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

Association publications

PRICE LIST

Prices Exclude Vat (July 2010)

Wall Chart
Casual Price R22-00 each

Practical Guidelines for the Inspection and Repair of Hot Dip Galvanized Coatings
Casual Price R53-00 each

Steel Protection by Hot Dip Galvanizing and Duplex Systems
Casual Price R80-00 each

Facts About Hot Dip Galvanizing – Practical Guidelines
Casual Price R18.00 each

Metal Pro Galvanized Steel Markers
(Popsicle Orange / White / Yellow)
Price R39.15 each

Galvpatch 100g

Quantity	Price per Unit
1 - 19	R46.00 each
20 +	R43.00 each

Zincfix 100g

Quantity	Price per Unit
1 - 19	R56.50 each
20 +	R52.50 each

Bay Galvanizers tour

Technical staff from National Ports Authority in Richards Bay tour through the facilities of Bay Galvanizers.

Eureka Project completed in record time thanks to new Robor Hybrid Structure

A new lightweight Robor Hybrid Structure, introduced by the steel tube and pipe manufacturer, accounted for the remarkably successful fabrication and erection of the structural steel of a Eureka DIY 11 800m^2 factory in Stormill, Gauteng.

Eureka had very strict requirements and tight project deadlines, which Robor – in conjunction with main contractor Renico Construction, and Entity Architects and Engineering – successfully met due to the speed of construction offered by its innovative development. With a footprint of 148.4m x 79.5m x 8.8m high eaves and a total structural steel weight of 147.8t, the Eureka factory illustrates the power of this Hybrid Structure's unique combination of materials. Impressively, the structural steel was erected in a three-month period. The project was started at the end of November 2009 and the main structural steelwork was complete in February 2010.

The new Hybrid Structure not only offers construction industry professionals the freedom to customise their products and solutions for a wider range of service, but also presents the opportunity for up to 40% savings in mass and a major reduction in project delivery times in a very competitive and demanding market.

Supplying a comprehensive range of value-added products and services, Robor worked in consultation with Entity Engineering in developing the highly successful Robor Hybrid Structure as an alternative to the traditional structural steel systems used for mini-factories, factories, warehousing, shopping centres and other types of buildings that rely on structural steel roofing. Entity Engineering's Andrew Bull says: "The Hybrid Structure used for the Eureka project is an outstanding application of advanced building technology to deliver an efficient, economical and strong building."

Traditional engineering designs vary from 15kg/m^2 to 30kg/m^2, sometimes more. Although these structures have evolved over the years, the construction industry is still at times restricted by the limits on the transportable length of steel sections, high erection costs and the ever-diminishing complement of qualified boilermakers and welders. Also, the current worldwide economic crisis has made banks more reluctant to finance new developments and it seems the best way forward is to find cost-effective building concepts that will positively contribute to the growth of the economy.

The Robor Hybrid Structure offers just such a solution through a system that combines Robor-manufactured

Eureka used Robor's innovative Hybrid Structure for constructing its 11 800m _ DIY factory in Gauteng. The structural steel is lightweight and allows for customisation.

Robor's Hybrid Structures is a cost and time-saving alternative to traditional structural steel systems. The Eureka factory was constructed in just three months.

structural tubing with high-strength, lightweight galvanized steel. System co-designer, Hendrik Beyleveld, says: "This extremely competitive system allows for a much lower rate per square metre cost compared to any other system available on the market." The new design method and technology have reduced weight per square metre from 22kg/m^2 to as little as 12.5kg/m^2.

The cold formed section and structural tubes were chosen carefully to optimise the design and exploit the inherent benefits of each section. Pieter Dorland of Eureka DIY is very

impressed with Robor's new offering: "The light steel design and construction have made a great difference to this project. It has not only enabled us to save costs on the steelwork, but the ease of fabrication and erection has facilitated the project's completion within very tight deadlines, despite the adverse weather conditions of the first couple of months of 2010."

One of the greatest advantages of the system is that the rolling and fabrication can be done on site without the need for boilermakers and welders. Where advantageous, long lengths can be rolled on site, minimising the transport costs and the amount of joints in the structure. Supervised fabrication using local labour delivers further cost savings, as do lower maintenance requirements. In addition, corrosion protection costs can be reduced as half the structure is made from pre-galvanised steel, as a result of which no further corrosion protection may be required, even in some coastal environments.

Entity Architect's Almero Retief commends Robor on the outstanding execution of the Eureka project. "The tempo and erection method not only ensured a saving for the client, but also allowed for minimal rain delay during the construction period. It was a real pleasure working with a professional steel contracting team that exceeded all deadline expectations – we will definitely be using the lightweight steel structure in future projects!"

ERRATUM

In Magazine No 43, Masts and Poles we ran an article "IPM projects and emphasis on straightening after hot dip galvanizing". While I applauded IPM for developing their own in-house tolerances, my subsequent comment wrt the photo said "I now find myself mentally aligning the light poles on major roads while driving and many are not 100% aligned." It was reported that my comment and photo could have referred to companies such as IPM. This was not intended and as Editor I would like to apologise for this confusion!

New Affiliate Member – C.I.S.

COMPANY OVERVIEW

C.I.S started trading in 1998 under the Central Information Services Vereeniging. This company was restructured into C.I.S Engineering in 2008. C.I.S focuses on the manufacturing of light to medium steel structures for the telecommunications and power industry sectors.

Product and services range

The product range includes:

- Communication masts
- Lattice towers (both angle iron and tubular structures)
- Electricity distribution and transmission pylons up to 400kV
- Sub station steelwork
- General steel structures such as building frames
- Project management and structure building services

The company's products have been successfully utilised in South-Africa, Zimbabwe, Mozambique, Zambia, Malawi, Namibia and Lesotho

Facilities

C.I.S is located in Vereeniging. Facilities include under crane area of some 9 000m^2 and lay down areas of a further 30 000m^2. The plant houses dedicated modern mast and tower manufacturing equipment. Design facilities include full 3-D CAD capabilities and all in –house designs are approved by professional engineers.

The company is certified to ISO 2001:2008 and this quality system covers all aspects from design through to installation. C.I.S is a Structa Group Company.

On the Couch.....

Geoff Colloty

By Desere Strydom

The end of 2010 sees prominent personality in the hot dip galvanizing fraternity and MD of Robor Galvanizing, Geoff Colloty retiring. We caught up with Geoff to find out what his plans are for the future.

How did you get involved in this industry? It's actually quite a long story, but in a nutshell, Monoweld Galvanisers was in a spot of bother in early 1992, and I was called in to assist for 6 weeks – which ultimately turned into 6 years! I've been in the Industry for a total of twelve years.

Which projects do you recall and for what reasons? One of the earlier major projects which created a boost for the industry was the MTN / Vodacom cellular tower roll-out. Not only was it the size of the masts, but the speed and intensity was quite exciting. The Maandagshoek project for Amplats, where the immersible labels were first used, and the Bafokeng Rasimone Platinum project is also high on the Agenda.

Which projects are you most proudly associated with and for what reason? Probably the best was a relatively small one for Sapref in Durban which we stole from under the nose and watchful eye of Anni Ramkisson of Phoenix Galvanizing – much to his annoyance (chuckles). More recently the fact that Robor Galvanizers secured both the Medupi and Kusile Power Station Projects.

Robor has been a force to be reckoned with in the HDGASA Awards, taking home a total of nine awards since the inception of the scheme. Your secret? In the early years of the Awards, prominence was given to the Galvanizer. The EXCO put in a lot of effort to change the emphasis to the "Project Owner". At Robor Galvanizers, we tried to look for a project or order which was "out of the ordinary"; not run of the mill daily stuff.

Robor Galvanizers have been a leading force in the Hot Dip Galvanizing fraternity in terms of quality. How was this standard achieved and consistently applied through your organisation? Riaan Louw, our Operations Director, started at the then Monoweld Galvanisers a month after I did. He is a qualified metallurgist who specialised in surface treatment of steel, and knew the importance of proper process controls in order to achieve consistently good quality. The support team which has been built-up has been trained to ensure that process controls are kept to an optimum.

"Architectural Finish Galvanizing" seems to be the "buzz phrase" in our Industry at the moment. What are your thoughts on the matter? In the general scheme of things, I think the opportunities for hot dip galvanizing are fairly limited. The requirements, both in the type of product to be galvanized, as well as the surface finish and aesthetics, require a different processing mindset. It is very difficult to get 5 tons of light material for architectural use processed in a different way to 1 000 tons of structural material. The problem is exacerbated by the fact that, in many instances, architects and designers don't want all the breathing and drainage holes which are required to ensure a high quality product. Specifying the correct grade of steel to ensure a good finish is also problematic at times.

The past two years have been trying times for Hot Dip Galvanizers due to the economic downturn. What are your predictions for the Industry going forward? I have always maintained that, no matter what industry you are in, there is always work out there! You have to position yourself and your company accordingly. As a born optimist, I believe that the outlook for the hot dip galvanizing Industry is very positive. Even with the protracted economic recovery likely to take longer than originally expected, there still needs to be infrastructural spend and increase GDFI in SA in the years to come. This will undoubtedly result in downstream spin-offs which will mean work for the corrosion protection industry as a whole. The galvanizing fraternity need to work to ensure hot dip galvanizing is specified wherever appropriate.

The end of 2010, sees Geoff Colloty retiring, what do you have planned? Besides relaxing a bit, we plan on doing some travelling – mainly around SA, which we've neglected over the years. I have always wanted to paint, but never found the time, and we do have a few other hobbies to pursue. The call of the bush is also high on the agenda!

Tell us a little about yourself? I am actually a Natalian, which makes me an ardent Sharks Supporter that has been living and working in Gauteng for the past 40 years! I am married to Jenny and we have 4 adult children, all living in Gauteng and 4 grandchildren – 3 girls and a boy.

Geoff Colloty's hobbies and passions? Interests include cooking – which I always do with wine! I'm also building up my bonsai collection. We love the bush and get out there as often as possible. In between, I manage to get some gardening done, which I find very relaxing!

The Hot Dip Galvanizing Industry wishes to thank Geoff Colloty for his valuable contribution to our Industry as a whole. We wish him a happy, peaceful and blessed retirement.

Desere Strydom

Also see: www.robor.co.za and http://commentfromthecouch.blogspot.com

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ARMCO SUPERLITE
GALVANIZING

Our Isando plant can accommodate heavy steel structures with our 13,2 metre kettle and improved cranage and loading facilities. Our Dunswart plant specialises in small, difficult-to-handle items with centrifugal and jobbing work handled efficiently with three production lines. Both plants offer an in-house transport facility, a high level of expertise and quick turn around time.

The company has it's own SANS 121 2000 ISO 1461 accredited Hot Dip Galvanizing plants. And is listed under the SABS ISO 9001 scheme.

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